

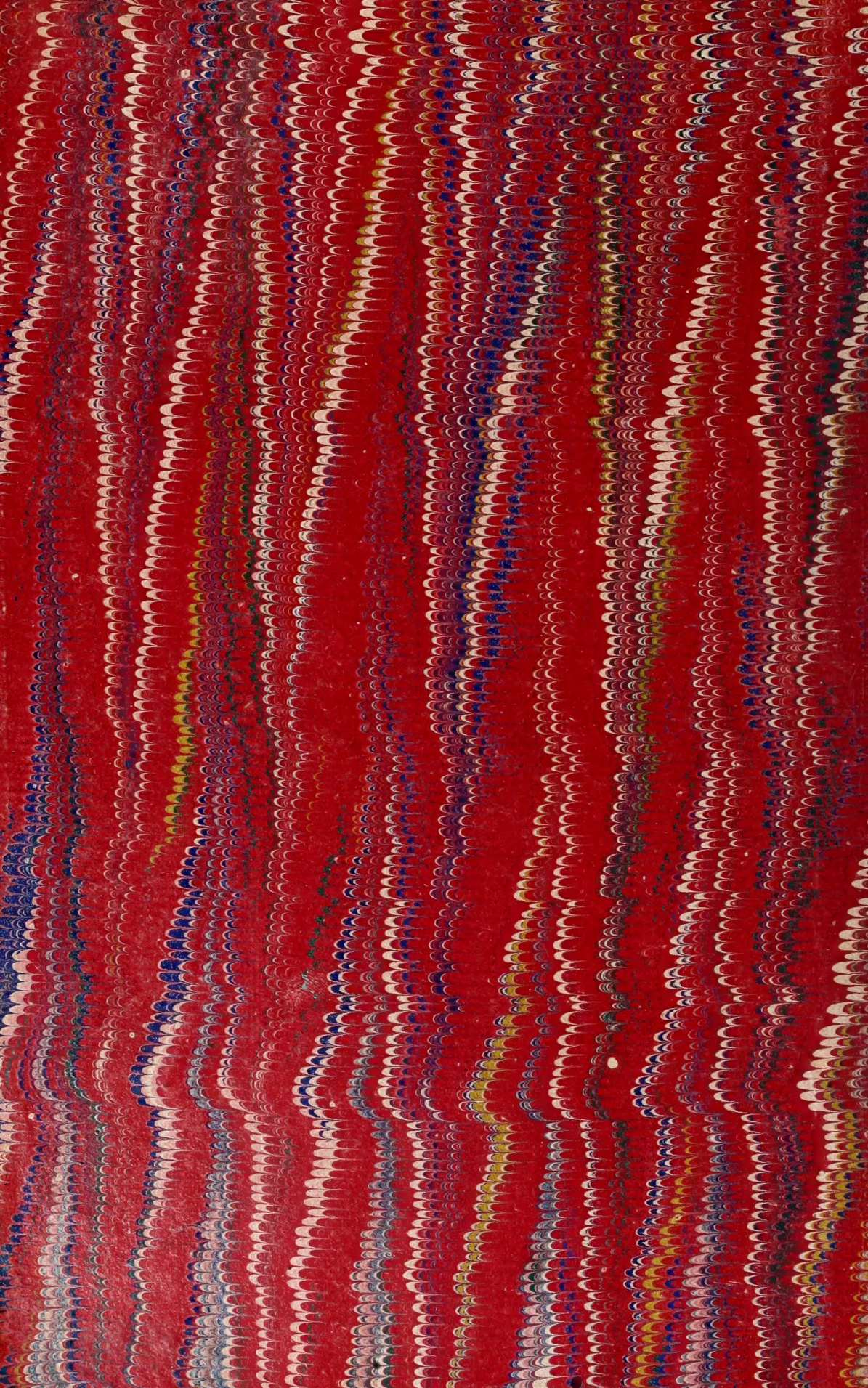
D

0003814704

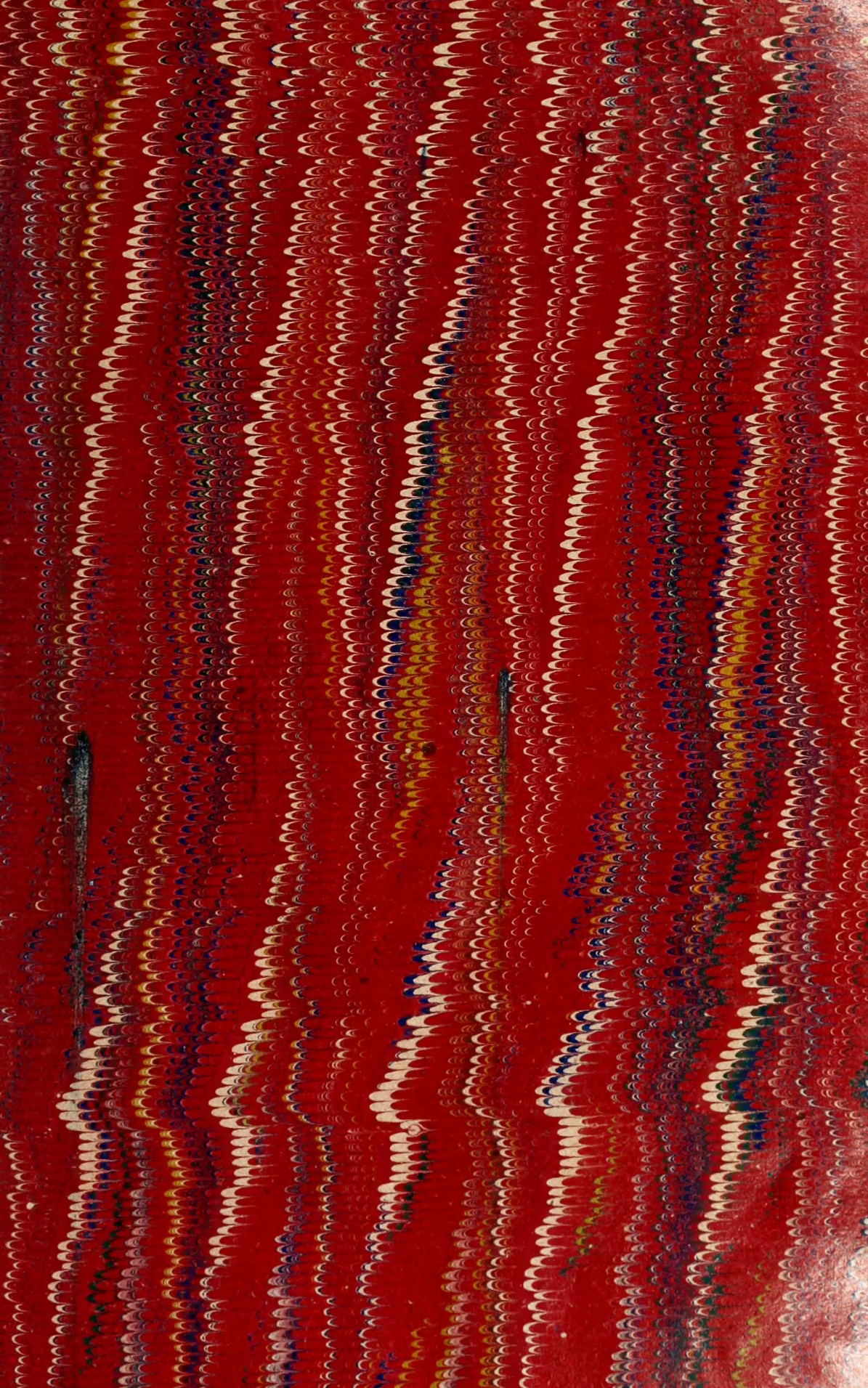


UC SOUTHERN REGIONAL LIBRARY FACILITY























REF  
AE  
S  
J64  
v. 2:2

JOHNSON'S  
NEW  
UNIVERSAL CYCLOPÆDIA:  
A  
SCIENTIFIC AND POPULAR  
TREASURY  
OF  
USEFUL KNOWLEDGE.

ILLUSTRATED WITH MAPS, PLANS, AND ENGRAVINGS.

EDITORS-IN-CHIEF.

FREDERICK A. P. BARNARD, S.T.D., LL.D., L.H.D., M.N.A.S.,  
PRESIDENT OF COLUMBIA COLLEGE, NEW YORK;

ARNOLD GUYOT, Ph.D., LL.D., M.N.A.S.,  
PROFESSOR OF GEOLOGY AND PHYSICAL GEOGRAPHY, COLLEGE OF NEW JERSEY.

ASSOCIATE EDITORS.

MARTIN B. ANDERSON, A. M., LL.D.,  
President of the University of Rochester, N. Y.;

JOHN G. BARNARD, A. M., LL.D., M.N.A.S.,  
Col. U. S. Engineers, Bvt. Major-Gen. U. S. A.;

CHAS. F. CHANDLER, Ph.D., M.D., LL.D., M.N.A.S.,  
Prof. Anal. Chem., School of Mines, Columbia College;

AARON L. CHAPIN, A. M., S.T.D.,  
President of Beloit College, Wisconsin;

HENRY DRISLER, A. M., LL.D.,  
Jay Professor of Greek, Columbia College;

THEODORE W. DWIGHT, A. M., LL.D.,  
Professor of Municipal Law, Columbia College;

CALEB G. FORSHEY, A. M., C. E.,  
Formerly Prof. of Math. and Civ. Eng. in Jefferson Coll., Miss.;

OCTAVIUS B. FROTHINGHAM, A. M.,  
Pastor Third Unitarian Society, N. Y. City;

THEODORE GILL, A. M., M.D., Ph.D., M.N.A.S.,  
Late Senior Assistant Librarian of the Library of Congress;

ASA GRAY, M.D., LL.D., M.N.A.S.,  
Fisher Professor of Natural History, Harvard University;

HORACE GREELEY, LL.D.,  
Founder of the New York Tribune;

SAMUEL S. HALDEMAN, A. M., LL.D., M.N.A.S.,  
Prof. of Comparative Philology in the Univ. of Penn.;

WILLIAM T. HARRIS, A. M., LL.D.,  
Ed. of The Journal of Speculative Phil., St. Louis, Mo.;

JOSEPH HENRY, LL.D., M. N. A. S.,  
Secretary of Smithsonian Institution;

ROSWELL D. HITCHCOCK, A. M., S.T.D., LL.D.,  
President of the Union Theo. Sem., New York;

CHARLES P. KRAUTH, A. M., S.T.D., LL.D.,  
Vice-Provost of the University of Penn.;

JOHN LE CONTE, A. M., M.D.,  
President of the University of California;

GEORGE P. MARSH, LL.D., M.N.A.S.,  
Envoy Extr. and Minis. Plenipo. of U. S. at Rome, Italy;

JOHN S. NEWBERRY, M.D., LL.D., M.N.A.S.,  
Prof. of Geology and Paleontology, Columbia College;

FOXHALL A. PARKER, U. S. N.,  
Supt. of U. S. Naval Academy, Annapolis, Md.;

WILLARD PARKER, A. M., M.D., LL.D.,  
Professor of Surgery, Columbia College, Med. Dept.;

PHILIP SCHAFF, Ph.D., S.T.D., LL.D.,  
Baldwin Prof. of Sacred Lit., Union Theo. Sem., N. Y.;

JULIUS H. SEELYE, A. M., S.T.D., LL.D.,  
President of Amherst College, Mass.;

WILLIAM STAUNTON, S.T.D.,  
Founder and First Rect. of St. Peter's Ch., Brooklyn, N. Y.;

ALEXANDER H. STEPHENS, A. M., LL.D.,  
Of Georgia, Member 43d Congress, U. S. A.;

ABEL STEVENS, A. M., LL.D.,  
Formerly Editor of The Methodist, New York;

THOMAS O. SUMMERS, S.T.D., LL.D.,  
Professor of Syst. Theol., Vanderbilt Univ., Tenn.;

WILLIAM P. TROWBRIDGE, A. M., M.N.A.S.,  
Prof. of Engineering, Columbia College;

THEODORE D. WOOLSEY, S.T.D., LL.D.,  
Ex-President of Yale College, Conn.

ASSISTANT EDITORS.

PORTER C. BLISS, A. M., LINUS P. BROCKETT, A. M., M. D., CLARENCE COOK,  
CLEMENS PETERSEN, A. M., JOHN N. POMEROY, LL.D., HENRY WURTZ, A. M., Ph. D.

WITH NUMEROUS CONTRIBUTIONS FROM WRITERS OF DISTINGUISHED EMINENCE IN EVERY DEPARTMENT  
OF LETTERS AND SCIENCE IN THE UNITED STATES AND IN EUROPE.

Complete in Four Volumes (Eight Parts), including Appendix.

VOL. II.—PART II.

HERMANDAD—LICHENS.

(TESTIMONIALS AT THE END OF LAST VOLUME.)

NEW YORK:  
A. J. JOHNSON & CO.,

11 GREAT JONES STREET, NEAR BROADWAY.

MDCCCLXXXI.



---

ENTERED ACCORDING TO ACT OF CONGRESS, IN THE YEAR ONE THOUSAND EIGHT HUNDRED AND SEVENTY-SEVEN,  
BY A. J. JOHNSON, IN THE OFFICE OF THE LIBRARIAN OF CONGRESS, AT WASHINGTON.

ALL RIGHTS RESERVED.

---

---

ELECTROTYPED BY  
WESTCOTT & THOMSON,  
Philadelphia.

---

---

PRINTED BY  
BURR PRINTING HOUSE, 18 JACOB ST.,  
New York.

---

---

ENGRAVINGS PRINCIPALLY BY  
REDMAN & KENNY,  
New York.

---

---

PAPER MANUFACTURED BY  
SEYMOUR PAPER CO.,  
New York.

---

---

BOUND BY  
JAMES SOMERVILLE,  
New York.

---



**Her'madad** (Sp., "brotherhood"), a general name for the leagues entered into by the Spanish cities in the Middle Ages for the preservation of public order and the defence of private property. The most celebrated (called Santa Hermandad, or Holy Brotherhood) was probably organized in Aragon in the thirteenth century; was established in Castile in 1282. Another, of thirty-five towns in Castile and Leon, was organized in 1295. Kindred societies throughout Spain soon followed. Their laws were codified in 1485, and published in 1527. In 1488 the Holy Brotherhood was reorganized, and in 1496 it was extended over a great part of Spain. In 1498, Ferdinand and Isabella reduced it from its high office of conservator of the peace and defender of popular rights against the feudal nobility, and it became an organized police force. In 1520-21 the Hermandad of Valencia rose in insurrection against the government. The name has come down to the present century simply as that of a police force.

**Her'mann** (Lat. *Arminius*), a German chieftain of the Cherusci, a son of Sigimer, was b. 18 B. C.; entered the Roman service, and became an equestrian. In 9 A. D., when Germany was groaning under the oppression of Varus, Hermann ambuscaded the Romans in the Teutoburger Forest, and almost all the Romans, Varus included, lost their lives. He fought Germanicus (14-16 A. D.), with disadvantage; defeated Marbodacus, king of the Suevi, 17; was put to death by his own relations 19 A. D., on the ground that he was aiming at absolute power.

**Hermann**, post-v., cap. of Gasconade co., Mo., 81 miles from St. Louis, on the Missouri Pacific R. R. and the Missouri River. It has a savings bank, a high school, 2 newspapers (English and German), 4 hotels, a planing-mill, and a large number of stores and public places. It is noted for wine-growing, its annual production being 400,000 gallons. Pop. 1335, exclusively German.

CHAS. EBERHARDT, PUB. "ZEITUNG UND ADVERTISER."

**Hermann** (JOHANN GOTTFRIED JAKOB), b. at Leipsic Nov. 28, 1772; studied law, languages, and philosophy at Leipsic and Jena, and was appointed *professor eloquentiæ* in 1803 at the University of Leipsic, which position he filled to his death, Dec. 31, 1848. He exercised great influence on metrical science by his *De metris Græcorum et Romanorum poetarum* (1796) and *Handbuch der Metrik* (1798), etc.; and on grammar by his *De emendatione Græcæ grammaticæ* (1801), and a number of minor essays. Also as a text critic he acquired a great name; he edited Æschylus, Euripides, Aristophanes, Bion and Moschus, and others. His lectures were very attractive by their liveliness and clearness, and very instructive by their fullness of knowledge; but his standpoint as a philologist, considering the classical languages as the only key to the understanding of the classical spirit, involved him in disagreeable contests with Böckh, O. Müller, and Crenzer.

**Hermann** (KARL FRIEDRICH), b. at Frankfort Aug. 4, 1804; studied at Heidelberg and Leipsic; travelled in 1825 in Italy, and was appointed professor in philology at Marburg in 1832, whence he removed in 1840 to Göttingen. D. Jan. 8, 1856. He combined in a happy manner the linguistic element of classical scholarship with the antiquarian, historical, and philosophical, and his *Lehrbuch der griechischen Alterthümer* (1841) and *Geschichte und System der platonischen Philosophie* (1839), as well as his *Culturgeschichte der Griechen und Römer* (1857), are much appreciated.

**Her'manstadt**, town of Hungary, in the province of Transylvania, on the Zibin. It is a beautifully situated and well-built town, the seat of the governor of the province and of a Greek archbishop, metropolitan of Transylvania. Pop. 18,588.

**Hermaph'rodism**, or **Hermaph'roditism** [named from the fabled HERMAPHRODITUS (see *see*)], the union of the characteristic organs of each sex in one individual. This union of the male organs (producing sperm-cells) and female (producing germ-cells) in one and the same organism is the normal condition in the great majority of plants and in many of the lower animals. Though the higher forms of radiates, mollusks, and Arthropoda all have the sexes quite distinct, except in abnormal instances, many of the inferior types of each are always hermaphrodites. Such, for instance, are the common snail and the earth-worm. No insect hermaphrodites (unless the Tardigrades are insects) are known, except in abnormal instances. Siebold found hermaphrodites among honey-bees, but he records that the workers threw them out of the cells, and that they speedily perished. It has been suggested that this hermaphrodism in bees may exist normally in some slight degree, and that it may give rise to the parthenogenesis of male bees, for it is well known that queen bees will produce male offspring without coitus with the male.

Hermaphrodism has not been observed with certainty in vertebrates, except perhaps in eels and fishes of the family Serranidae. It has been stated with considerable force that the homologies existing between the male and female organs prevent any possibility of hermaphrodism in the higher vertebrates; but there is no apparent reason why of bilateral or double organs one side should not assume the male and the other the female development. Thus, there might, it would appear, be one ovary and one testis—a condition analogous to what is often seen in the lower animals. In what are known as monstrosities by fusion, or the blending of two germs, by which have been produced such abnormalities as the presence of three legs upon one fetus, we seem to see that true hermaphrodism is not *a priori* impossible, even in human beings.

Many of the lowest forms of hermaphrodite plants and animals are self-fertilizing; that is, reproduction takes place without the sexual union of two individuals. But in very many plants which have both kinds of reproductive organs in one flower, fertilization is accomplished by means of insects, which carry the pollen of one flower to the pistil of another, nature having prevented self-fertilization by wonderfully ingenious yet often very simple means. Many bisexual animals, like the snail, conjugate for mutual fertilization. Spurious hermaphrodism, in which the characteristic organs of one sex assume, from incomplete or abnormal development, something of the appearance of those of the opposite sex, has been often observed. Under this head must be placed most or all of the recorded instances of hermaphrodism in the human species. The true hermaphrodism is double sex; spurious hermaphrodism is doubtful sex.

CHARLES W. GREENE.

**Hermaphrodite Brig.** See BRIGANTINE.

**Hermaphrodi'tus** was a son of Hermes and Aphrodite, and inherited the beauty of both of his parents. Once, when he was bathing in the well of Salmacis, near Halicarnassus, in Caria, Asia Minor, the nymph of the well fell in love with him, and prayed to the gods that she might remain united with him for ever; and when he ascended from the bath he was changed so that he was neither man nor woman, but both. The idea of this myth is of Asiatic, the myth itself of Roman, origin. In its later period Greek sculpture often represented Hermaphroditus, the upper part of the body female, the nether male.

**Her'mas**, the author of a once-celebrated book, *The Shepherd*, was by Ireneus, Clemens Alexandrinus, and Eusebius considered identical with the Hermas mentioned by St. Paul in his Epistle to the Romans (xvi. 14), while others have placed him a little later, and made him a brother of Pius I., bishop of Rome in the middle of the second century. *The Shepherd* is divided into three parts—the *Visions*, *Precepts*, and *Similitudes*. It is in the form of a dialogue, and consists of a blending of fantastic poetry and naïve morals, a character which explains how the book at once could be the *Pilgrim's Progress* of the old Church and yet be called childish by St. Jerome and Tertullian. It was originally written in Greek (ὁ ποιμήν), but exists now only in translations. The Greek text found in a monastery on Mount Athos, and published in 1857, is generally considered a translation of the Latin translation. An English translation of *Pastor Hermæ* was published in Edinburgh in 1867 in the *Ante-Nicene Christian Library*.

**Hermeneu'tics** [from the Greek verb ἑρμηνεύειν, to "interpret," and that from the name of *Hermes*, the son of Zeus and Maia, the messenger and interpreter of the gods] is the science and art of interpretation, or of ascertaining the meaning of an author from his language. It is closely allied to grammar, logic, and rhetoric, and presupposes them. Its aim is to reduce interpretation to fixed laws and principles, and to the precision of an exact science, so far as the elastic nature of thought and language will permit. The business of exposition has often been confounded with imposition, whereby all sorts of arbitrary subjective fancies are introduced into the text of which the writer never dreamed. The work of interpretation requires intellectual and moral qualifications, natural and acquired—viz. a full knowledge of the author's original language, historical situation, mental status, and range of ideas, and an appreciating sympathy with his spirit and aim.

*Biblical Hermeneutics* is general hermeneutics applied to the Sacred Scriptures. It has been most cultivated on account of the vast importance and general interest of these books. Its first germs may be traced to the Jews and to Philo of Alexandria, who reduced the allegorical method of interpretation to a system, which through Origen (d. 254) passed into the Christian Church. Origen of Alexandria distinguished a threefold sense of the Scriptures, corresponding to the tripartite nature of man (a somatic or literal, a psychic or moral, and a pneumatic or mystical sense). The grammatical school, on the other hand, which



was best represented among the Fathers by Chrysostom and Jerome (though by no means consistently), adhered to the natural and literal sense as the only one which the writer had in view. Assuming the last principle to be correct, there are still three legitimate kinds of interpretation, which, however, must harmonize with each other, and together give the one full meaning of the text: (1) *The philological* (also called *literal* or *grammatico-historical*) exegesis is concerned with the body or letter of the text, with verbal, critical, and antiquarian questions. It brings out the meaning of words and phrases according to the general rules of grammar, the particular idiom and vocabulary of the author, his age, nation, and country, and clears up all references to contemporaneous history and antiquities. It deals with the literary and human aspects of the Scripture, with the earthly form into which its divine contents are cast. It is the basis of all sound exegesis. It has been successfully cultivated during the present century in Germany and England by Winer, De Wette, Lücke, Bleek, Meyer, Ewald, Dillmann, Alford, Ellicott, Lightfoot. (2) *The theological* (or *doctrinal* and *ethical* interpretation) deals with the divine thoughts and spiritual truths of the Bible, and explains them in connection with its general teaching and according to the analogy of faith; but it ought not to be fettered by dogmatic prejudice or made subservient to sectarian interest, as was done in the scholastic periods of theology during the Middle Ages and the seventeenth century, when the Bible was used simply as a repository of proof-texts for certain tenets of orthodoxy and against heretical opinions. Among the most distinguished theological exponents are Augustine, Luther, Calvin, Ols-hausen, Tholuck, Hodge. (3) *Practical and homiletical* exegesis applies the text to the wants of the human heart, and draws from it lessons of wisdom and comfort for the battle of life. It belongs properly to the pulpit and to popular works. Of this character are the exegetical homilies of Origen, Chrysostom, Augustine, and other Fathers, and the commentaries of Matthew Henry, Burkitt, Doddridge, Starke.

*Literature.*—ERNESTI, *Principles of Biblical Interpretation* (1861, Latin; Engl. transl. by Terrot, 1843); WILKE, *Hermeneutik des N. T.* (1844, 2 vols.); LUTZ, *Bibliche Hermeneutik* (1861); CELLERIER, *Manuel d'Hermeneutique* (1852); FAIRBAIRN, *Hermeneutical Manual* (1859); MÜNSCHER, *Manual of Biblical Interpretation* (1865); IMMER, *Hermeneutik des N. T.* (1873). PHILIP SCHAFF.

**Hermes.** See MERCURY.

**Hermes** (GEORGE), a German theologian who under the influence of the "new philosophy" endeavored to carry out the doctrines of unity and identity into forming a common basis for Protestantism and Roman Catholicism. B. in Dreierwald, Westphalia, Apr. 22, 1775, he d. at Bonn May 26, 1831. Having studied theology at Münster, where he became in 1807 professor, he was subsequently teacher of Catholic theology at Bonn. "He had found," says Binder, "the futility of the attacks of Kant and Fichte on Christianity, and the truth of Roman Catholicism." He, however, busied himself for many years in trying to base the principles of the latter on those of the former, setting forth his views in the *Einführung in die Christ-katholische Theologie* ("Introduction to the Catholic Christian Theology"). His work was not in any respect heretical, but confined itself to negating the arguments of those who declared the instability of the Catholic dogma. He founded a school or doctrine termed *Hermesianism*, and his followers, the *Hermesianer*, occupied many important positions as preachers and teachers in Germany. He maintained that the principle of *pure reason*, which, as Kant teaches, is innate in every soul, enabling it to decide on all principal truths, should be applied to religion; or rather that the Church should teach its doctrines on this basis. But this principle was disapproved of at Rome, and a papal letter was directed against it (Sept. 16, 1835) by Pope Gregory, beginning with the words *Dum acerbissimus*. During the life of Hermes his school had great influence and made many converts. Binder attributes the delay in proceeding against it to the usual system of formalities followed at Rome in such cases. The fundamental principle of the *Hermesian* doctrine is, that human reason can grasp the truth, and that religion, being true, is or may be based on this "natural sense." But the Church holds a directly different doctrine, and does not look up to philosophy or science to authorize her doctrines, as the Roman Catechism declares "the mysteries which are contained in God's holy Church are to be understood only by faith, and not by reason." Hermes did in fact quite unconsciously seek to put the Catholic Church on that Protestant foundation of independent reason which from Luther to Döllinger has been so strongly characteristic of the Teutonic mind. Among the principal works referring to *Hermesianism* are the follow-

ing: *Hinweisungen auf den Grundcharakter des Hermesianischen Systems*, by J. B. BALTZER (1832, 8vo); *Blätter zur Orientierung in Sachen des Hermesianismus* (1838), by F. X. BIUNDE and J. J. ROSENBAUM; *Acta Romana*, by J. W. J. BRAUN and P. J. ELVENICH (documents relating to the condemnation, by the pope, of G. Hermes (1838, 8vo); *Acta Hermesianiana*, by A. J. ELVENICH; *Noxæ Annotationes*, by LANG (1839); *Apologie des Hermesianismus*, by J. B. LUTTERBECK (1835); *Ueber Glauben*, by J. J. ROSENBAUM (1838, 8vo); *Christ-katholische Dogmatik*, by G. HERMES; *Der Hermesianismus und Joh. Perrone* (Breslau, 1844).

CHARLES G. LELAND.

**Hermesi'anax**, b. at Colophon, lived in the times of Philip and Alexander the Great, and d. before the destruction of his native city by Lysimachus in 302 B. C. He wrote an elegiac poem in three books to his mistress Leontium, of which a large part of the third book has been quoted by Athenæus, and thus come down to us. It has been separately published by J. Bailey (London, 1839), together with a critical epistle by G. Burges.

**Hermesianism**, the religious philosophy taught by GEORGE HERMES (which see).

**Hermes Trismegis'tus** ("thrice-great Hermes," or Mercury), or **Thoth**, an Egyptian god, regarded as inventor of all science and learning; e. g. speech, writing, religion, geometry, architecture, and the arts. Every Egyptian book relating to religion or science was inscribed with his name, as if inspired by him; and according to Jamblichus there were of these 36,000. The name "thrice-great" is supposed to refer to the god's triple manifestation as philosopher, priest, and king. Certain dialogues on mystical theology, still extant, and which were very popular during the fifteenth and sixteenth centuries, were subsequently regarded as forgeries. They had been transmitted from an early age in a rude Greek form. More recent research has indicated that the Greek, by its very defects, possesses the character of a translation. The writer professed a belief in their authenticity, as Champollion the Younger had done. More recently a French Egyptologist, M. Pierrat of the Louvre, in the *Mélanges d'Archéologie* (4to, Paris, 1873, p. 112), has pointed out that many of the very peculiar phrases and ideas contained in the *Hermetic* books are to be found in the papyri and inscriptions. The works or fragments bearing the name of *Hermes Trismegistus* are as follows: (1) *Pemander, of the Nature of Things and of the Creation of the World*; (2) *Of Divine Wisdom and Power*; (3) *Asclepius*; (4) *The Aphorisms of Hermes*; (5) *On the Revolutions of Nativities*. Fragments of five other works are preserved by John Stobæus. The most recent text, Greek with the Latin versions, is the *Hermetici Trismegisti Pemander*, by Gustavus Parthey (Berlin, Nicolii, 1854). Among all the mysticism of the *Pemander*, etc., there is much that is grand and beautiful. The first editors of *Hermes Trismegistus* erred in attributing the works to Moses himself, or in giving to them a fabulous antiquity, while the later critics were as much in the wrong in boldly declaring that they were Neo-Platonic or Christian forgeries of the third century A. D.

CHARLES G. LELAND.

**Hermetic Writings** [from *Hermes* (Mercury), with whom the Greeks identified the Egyptian *Thoth*, the god of literature and learning], a name in its widest sense designating the whole body of Egyptian literature; but the name is especially given to a mass of works in Greek and Latin, fragments of which have come down to our time, and which profess to have been inspired by HERMES TRISMEGISTUS (which see). They treat of astrology, ontology, and other subjects, and are of no value. There were also a number of works written in the Middle Ages by alchemists, and in later times perhaps by the Rosierucians, which profess to have been written by *Hermes Trismegistus*. The Zabians of the East have writings in Greek which they ascribe to *Hermes*.

**Hermi'as** was a eunuch and slave in the household of Eubulus, tyrant of Atarneus and Assus, in Mysia, Asia Minor; but he gained his master's confidence, was made free, travelled to Athens, where he heard Plato's lectures in company with Aristotle, and succeeded Eubulus on the throne of Atarneus in 347. Aristotle spent several years at his court, but had to flee when Artaxerxes, king of Persia, sent an army to reduce all the petty tyrants in Asia Minor. Hermias was captured and sent to the Persian court, where he was put to death, but Aristotle raised a statue at Delphi in honor of him, and married his relative Pythias.

**Hermip'pus** lived in the middle of the third century B. C., and wrote a work containing the biographies of the Greek philosophers, historians, and poets. The work itself is lost, but it is frequently quoted by subsequent writers, and seems to have enjoyed a great reputation in antiquity.



The fragments which are found in other authors have been collected and edited by Lozynski (Bonn, 1832).

**Her'mit** [Gr. ἑρμῆτης; Lat. *eremita*, a "dweller in solitude"], a person who retires from human society and dwells alone; a title given especially to religious recluses, and particularly to those who do not live in common with others. So also the Augustinian monks, though living in monasteries, are called hermits, being accustomed to spend a part of their time in solitude. There are many other monastic congregations called hermits, notably certain lay members of the third order of St. Francis, who, being married before taking their vows, cannot be received in full into the order.

**Her'mitage**, post-v., county seat of Hickory co., Mo., 80 miles S. W. of Jefferson City.

**Hermit Crab.** See CRAB.

**Hermodactyl** ("Mercury's finger"), the name of a bulbous root sometimes used in medicine. It appears that some hermodactyls are produced from *Iris tuberosa*, and others from *Colechicum variegatum*, European and Asiatic plants. The ancients used hermodactyls for gout, but in modern times they are considered nearly or quite inert.

**Hermog'enes** [Ἑρμογένης] lived in the time of the emperor M. Antoninus, son of Calippus, and b. at Tarsus in Cilicia. He was noted for the early development of his oratorical powers, so that at the age of fifteen he attracted the attention of the emperor, who listened to his extempore discourses with great pleasure. When seventeen he became a public teacher of rhetoric, and at eighteen or twenty he composed his rhetorical works, which Suidas speaks of as most worthy of admiration, and which were for several centuries the established books of instruction. At the age of twenty-five he lost his intellectual power and sank into imbecility. Five of his works, forming a *Texvῆn ῥητορικὴ* ("System of Rhetoric"), have come down to our time: (1) On general issues; (2) On invention; (3) On the forms of oratory; (4) On the method of acquiring skill in speaking; (5) Preparatory exercises (*προπαιδευματα*). This last work was abridged by Aphthonius (A. D. 315), and was thus in time superseded. They are found in the *Rhetores Græci* of Walz (Stuttgart, 1832-36) and of Spengel (Leipzig, 1853-56, 3 vols.). The *Prognostics* were first published in Greek by Heeren (Göttingen, 1791), with Heeren's and his own notes by Veesenmeyer (Nuremberg, 1812). (See MÜLLER'S and DONALDSON'S *Greek Literature*, vol. iii. p. 156.)

H. DRISLER.

**Her'mon**, post-tp. of Penobscot co., Me., on the Maine Central R. R., 11 miles W. of Bangor. It has manufactures of coopersage. Pop. 1189.

**Hermion**, tp. and post-v. of St. Lawrence co., N. Y. It has iron ore and other minerals, and contains 3 churches. Pop. of v. 573; of tp. 1792.

**Hermion**, Mount, is the highest elevation of the whole Syrian system of mountains. It is formed by a spur from Anti Lebanon, which, separating the valley of Cele-Syria from that of the Jordan, unites to the W. with the range of Lebanon. Great Hermion, or Mount Hermion proper, is about 10,000 feet high. Its top is generally covered with snow, and is visible from Tyre and Damascus. Its sides are clad with white poplars. The Psalms speak of the "dew of Hermion," and modern travellers say that during the night their tents become as wet with dew as by a rainstorm.

**Hermop'olis Mag'na**, an ancient city of Egypt, was situated on the left bank of the Nile, near the boundary between Upper and Middle Egypt, on the site now occupied by the village of Oshmoonegn or Eshmoon. At the time of the Ptolemies it was a rich and magnificent city, prominent among whose buildings was the temple of Thoth or Teuth, the ibis-headed god, the inventor of the pen and letters, identified with the Greek Hermes. But it was entirely destroyed by the Mohammedans, who carried away its monuments for building purposes, and left nothing behind but large mounds of ruins and rubbish.

**Hermosi'llo**, town of Mexico, in the state of Sonora, stands on the river Sonora, at the entrance of an exceedingly fertile valley which produces wheat, wine, and all kinds of fruit in abundance, and carries on a very lively trade. Pop. 11,000.

**Hernan'do**, county of Florida, bounded on the W. by the Gulf of Mexico. Area, 1800 square miles. The soil is undulating and generally very fertile. It has extensive hard-wood forests. Rice is the largest crop, but the soil is adapted to all the products of the Southern States. Cap. Brookville. Pop. 2938.

**Hernando**, post-v., cap. of De Soto co., Miss., on the Mississippi and Tennessee R. R., 22 miles S. of Memphis, has a weekly newspaper, a female college, a male seminary, 4 churches, a very fine court-house, and 22 commercial houses. Pop. 730.

W. S. SLADE, Ed. "Press."

**Hern'don** (WILLIAM LEWIS), b. at Fredericksburg, Va., Oct. 25, 1813; entered the U. S. navy when fifteen years old; was engaged in the Mexican war, and employed in the National Observatory, Washington, D. C., for three years. He crossed the Andes from Lima eastward, and with Lieut. Lardner Gibbon conducted the exploration (1851-52) of the Amazon Valley. The published report of this expedition was in 2 vols. (1853-54), the first by Hern'don, the second by Gibbon. Hern'don was in command of the steamer Central America when she was lost (Sept. 12, 1857) in a storm on the voyage from the Isthmus of Panama to New York. There were on board some 580 persons, of whom 427 were lost, but the women and children were all saved. Hern'don went down with the ship, standing on the bridge in full uniform.

**Hern'ia** [Lat.], the protrusion of a viscus from the cavity to which it normally belongs; but the term is generally used to express the protrusion of an abdominal viscus, as when we speak of other forms of hernia we express it thus: *hernia cerebri*, *hernia corneæ*, etc. The predisposing cause of hernia is a weakness of some portion of the abdominal walls, and there are certain parts which are naturally weaker than others, as the inguinal, umbilical, and femoral regions. This weakness very often exists congenitally, and may be increased or produced by injury, disease, or pregnancy. Among the exciting causes may be mentioned violent muscular exertion, jumping, straining from lifting heavy weights or at stool, playing on wind instruments, etc. The usual contents of a hernial sac is a portion of the small intestine, or the omentum, but we may find portions of any of the viscera in it, especially when the abdominal walls are congenitally weak. The sac is formed of peritoneum, which is covered by the integument and subjacent fasciæ.

Hernia is generally divided in two ways: 1st, according to its situation, as inguinal, femoral, umbilical, phrenic, etc.; 2d, according to the condition of the protruded viscus, as reducible, irreducible, and strangulated. Reducible hernia is that variety in which the contents of the sac may be returned into its normal cavity without recourse to a surgical operation. It sometimes disappears spontaneously when the patient seeks the recumbent position, but more often needs a greater or less amount of pressure to be made in the proper direction. The symptoms of it are—the appearance of a soft and compressible swelling at some portion of the abdominal wall, which increases when the patient stands up and diminishes when he lies down; by placing the hand upon the tumor and directing the patient to cough a distinct impulse is imparted. The treatment usually adopted consists of the reduction of the contents, and the application of a suitable truss to prevent the re-protrusion. If the patient is young, this method will effect a radical cure in time, but in the adult recourse must be had to an operation to effect this.

Irreducible hernia differs from reducible in that the protruded viscus cannot be returned into its normal cavity. The general causes of it are adhesions between the sac and its contents, the growth of membranous bands across the sac, or enlargement of the contents. It is much more troublesome than the preceding variety; in the first place, it is much more inconvenient, and is always exposed to the danger of strangulation; the patient suffers from indigestion, constipation, colic, flatulence, and dragging pains in the loins. The treatment of this variety must be generally palliative, and consists of the patient's avoidance of all violent exercise; regulation of the bowels, which should never be allowed to become confined; and the wearing of a truss to support and protect the tumor.

"Hernia is said to be strangulated when it is constricted in such a way that the contents of the protruded bowel cannot be propelled onward, and the return of its venous blood is impeded." There is always more or less inflammation, caused by the constriction. The causes of this condition are sudden enlargement of the contents of the sac by feces or gas, or congestion or swelling of the neck of the sac. The symptoms are—pain, flatulence, a desire to go to stool, constipation, nausea, and vomiting, the vomited matter after a time becoming stercoraceous. The tumor is hard, and cannot be replaced in the abdominal cavity, and there is very little impulse transmitted to the hand when the patient coughs. The pain in the tumor continues to increase, and extends over the whole of the abdomen; the countenance assumes an anxious expression; the pulse becomes small and wiry, and the skin cold and clammy. Should the pain cease, and the tumor feel doughy and crepitate when handled, we may be sure that the intestine has mortified; when this happens, there is very little hope for the patient; in fact, the only chance for recovery now is by an artificial anus. The object of treatment is to return the intestine into its cavity. When this cannot be accomplished by manipulation, or manipulation combined



with warm baths and the administration of ether—the patient having first been placed in such a position that all the parts in the neighborhood of the trouble shall be completely relaxed—recourse must immediately be had to an operation. This consists of enlarging the constricted portion, so as to allow of the return of the gut, and consists of cutting down to the sac, and then either opening it and dividing the stricture, dividing the stricture without opening the sac, or by merely incising the neck of the sac.

EDWARD J. BIRMINGHAM.

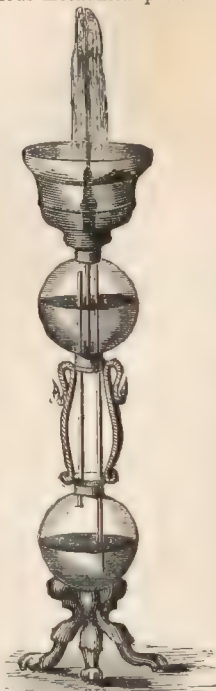
**Hero.** See **HEROIC AGE**.

**He'ro**, or **He'ron**, an ingenious mechanical philosopher, pupil of Ctesibius, who lived about 285–222 B. C., famous for an acquaintance with the principles of pneumatics and hydraulics quite in advance of his age. He wrote a number of books and invented a variety of machines, two of which, the *aeolipile* (see **ÆOLIPILE**) and the fountain which bears his name, are still among the familiar forms of illustrative apparatus in the physical lecture-room. Hero's fountain is shown in the annexed figure, in which it is seen that the elastic force of a confined body of air, increased by hydraulic pressure and reacting upon the surface of water in a closed reservoir, produces a jet which may rise (theoretically) above that surface to a height equal to the effective height of the pressing column.

F. A. P. BARNARD.

**Hero**, a priestess of the temple of Aphrodite at Sestos, on the coast of Thrace, was loved by Leander, a native of Abydos, on the opposite shore of the Hellespont. Guided by the light of the torch which Hero planted on the cliffs of Sestos, Leander used to swim across the sea to meet her, but one night the storm put out the torch, and when next morning Hero discovered the corpse of her lover floating on the waves, she threw herself into the sea. There is a Greek epic poem by Musæus, a ballad by Schiller, and a drama by Grillparzer on this subject, and it has been painted over and over again by the disciples of the school of David.

**Her'od THE GREAT**, king of the Jews, was b. in 62 B. C. at Ascalon in Judæa, and was of Idumean descent. When in 47 B. C. his father, Antipater, was made procurator of Judæa by Julius Cæsar, he himself received the government of Galilee, to which was afterwards added that of Samaria and Coele-Syria. He was expelled for a short time by Antigonus, the nephew of Hyrcanus II. and the representative of the Asmonean dynasty, but in Rome, whither he fled, he succeeded in gaining the favor of Antony; not only were his claims recognized by the senate, but the title of king of Judæa was conferred on him (40 B. C.). He established himself by force in Jerusalem, and by unheard-of cruelty he maintained his power. All members of the old dynasty, even his own wife, Mariamne, the daughter of Hyrcanus II., and the three children he had by her, were executed. And the older he grew the more suspicious and atrocious he became. The slaughter of the infants at Bethlehem, of which we are told in Matthew ii. 16, was so common and insignificant an affair that Josephus does not mention it. A few days before he died he had his son, Antipater, strangled. But, although cruel, his government was vigorous and brilliant. He was highly esteemed by Augustus. There was peace in Judæa; commerce and industry prospered; literature and art flourished. His buildings were especially magnificent; he founded Cæsarea, rebuilt Samaria under the name of Sebaste, and adorned Jerusalem with numerous splendid structures. The Jews, however, found in his government a leaning towards Rome, which humiliated them, and a general tendency towards Roman civilization, which they hated; and the latter part of his life was much troubled by conspiracies and riots. He was ten times married, and died between Mar. 13 and Apr. 5, a few weeks after the birth of Christ, of a horrible disease, the same as killed Sulla and Philip II. of Spain.—His son, **HEROD ANTIPAS**, by his wife Malthæa, a Samaritan, was by his will appointed tetrarch of Galilee and Perea. He divorced his first wife, and married Herodias, the wife of his half-brother



Hero's fountain.

Philip, and when John the Baptist remonstrated against this incestuous connection, he had him put to death. During a visit to Jerusalem for the purpose of celebrating the passover, Christ appeared before him, sent by Pilate as a former resident of his tetrarchate. In 42 A. D. he made a journey to Rome in order to obtain the royal dignity, but, through the intrigues of Herod Agrippa, he was exiled by Caligula, and d. in Lyons.—**HEROD AGRIPPA I.**, son of Aristobulus, brother to Herodias, and grandson of Herod the Great, was educated in Rome, and received from Caligula the tetrarchate of Judæa with the title of king, and after the banishment of Herod Antipas, Claudius gave him all the old provinces of Judæa. He was much liked by the Jews, especially for his vigorous measures against Christians; he had the apostle St. James the Greater beheaded and St. Peter thrown into prison. He d. early (44 A. D.).—**HEROD AGRIPPA II.**, a son of the preceding, was, like his father, educated in Rome, and resided there, at the court of Claudius, at the death of Agrippa I. He did not inherit his father's dominions, however; they were made a Roman province, and Herod Agrippa II. obtained at first (50 A. D.) only the small kingdom of Chalcis. Abilene and Trachonitis were subsequently added. In 60 A. D., when he went down to Cæsarea to compliment Festus, the Roman governor, the apostle St. Paul appeared before him. In the Jewish war he sided against his countrymen, and after the destruction of Jerusalem (70 A. D.) he resided in Rome, where he d. in 100 A. D.

REVISED BY R. D. HITCHCOCK.

**Hero'des At'ticus**, one of the most celebrated Greek orators, was b. at Marathon in 104 A. D., and d. at Athens in 180. M. Antoninus was one of his pupils, and during his reign he held public offices. He was immensely wealthy. His father left an annuity to each Athenian citizen. Still more remarkable was his eloquence. He was called the "tongue of Greece," and his speeches were compared to silver streams running in golden beds. Unfortunately, the only one of his works which has come down to us (*Περὶ Πολιτείας*, edited by Bekker in his *Oratores Attici*, 1824) is miserable, a maze of affected sophistry.

**Hero'dians**, a Jewish party in the time of Christ, first mentioned in Mark iii. 6. They were partisans of the Herod family, whose tyranny they preferred to that of the Romans. They appear to have been mostly Sadducees.

**Herodia'nus** was a Greek by birth, but lived for a long time in Rome, and wrote in the Greek language a work in eight books on the history of Rome from the death of M. Aurelius (180 A. D.) to the accession of Gordianus III. (238 A. D.), narrating events, as he informs us, which had occurred in his own lifetime. The work, which is still extant, is interesting, and is considered truthful and impartial in the main; the best editions of it are by Irmisch (5 vols., Leipzig, 1789–1805), by Weber (1816), and by Bekker (1826 and 1855).

**Herod'otus**, a Greek historian, often called the "father of history," was b. at Halicarnassus, a Doric colony in Caria, Asia Minor, in 484 B. C. Thus his life falls within the happiest and most glorious period of the history of the Greek nation. Like a spring flood the Persian power came rolling on, swelling through centuries by the absorption of Media, Babylon, Egypt, Asia Minor, Thracia, and Macedonia; and now it burst upon Greece. But its force was broken in the battles of Marathon (Sept. 12, 490), Thermopylæ (July 6, 480), Salamis (Oct. 5, 480), Plataea and Mycale (Sept. 23, 479). Harmless it retired, and the Greek nationality arose. Within a few generations some of the noblest and loftiest instruments of civilization were either invented—such as philosophy, history, tragedy, and comedy—or brought to greater perfection, such as public education, republican government, architecture, and sculpture. Herodotus became the inventor of the art of history. He belonged to a wealthy and influential family; among his relatives was the celebrated epic poet Panyasis. Under the reign of Lygdamis, Panyasis was killed, and Herodotus and his family expelled from Halicarnassus. He went to Samos, where he lived several years, and where he learnt the Ionian dialect, in which he wrote his book. He returned once more to Halicarnassus, and took part in the expulsion of the tyrant; but he soon again left his native city, and entered on the long and extensive travels which formed the necessary preparation for his great work. He wandered through the whole of Greece, studying the history of each place on the spot by making himself acquainted with its monuments and its traditions. Thus he acquired a most intimate acquaintance with the whole route which the Persian armies had taken; with Marathon, Thermopylæ, Salamis, Plataea and Mycale, where the great battles were fought; with Athens and other cities which formed the political, commercial, and intellectual centres of the Greek nation; with Delphi and Dodona, the sacred and awe-in-



spiring seats of the oracles: and in all the principal parts of his narrative he simply relates what he has seen himself or heard from eyewitnesses. No less intimate and comprehensive was his acquaintance with Egypt. He had visited Memphis and Heliopolis, and crossed the whole country from the Delta to Elephantine, and from the Libyan desert to the Red Sea. Modern travellers are still surprised at the accuracy of his observations and the correctness of his descriptions. In Asia Minor he knew from personal acquaintance every place he mentions, and in Asia proper he travelled as far as Colchis to the N. and Babylon to the S. The latter part of his life he spent in Thurii, a Greek colony in Southern Italy, established in 444 B. C., near the ruins of Sybaris. From his residence in this city he is often called the *Thurian* by the ancients, and here he probably wrote, or at least finished, his book. It is also probable that he died here, about 408 B. C. At what time and place he actually wrote his history is a much-disputed point. Lucian says at Halicarnassus, Suidas in Samos, and Pliny at Thurii, which indicates three different epochs of his life. Lucian furthermore says that he read it or recited it to the people assembled at the Olympian games, and adds that Thucydides was present and burst into tears from enthusiasm. According to Plutarch, he also read it at the Panathenæa at Athens (445 B. C.), and was rewarded by a grant of ten talents from the public treasury; and Dion Chrysostomus mentions that he read it to the Corinthians. However dubious and even contradictory these statements are, the general impression of all is, that Herodotus wrought for many years on his book, beginning it at Halicarnassus and finishing it at Thurii; and the character of the book itself, its style and method of composition, seem to confirm this impression. It narrates the history of the war between the Greeks and the Persians, but every new element which is introduced into the composition is explained to the reader in its whole signification by long digressions, tracing it back to its origin, and following up its development to the moment it enters the narrative; and thus the book actually gives the history of the world. It must not be understood, however, that the narration of the Greek-Persian war was a mere framework to which the history of the world is hung by the somewhat clumsy artifice of digressions. By no means; although in the details Herodotus is a minute and circumstantial chronicler, in the composition of the whole he is a great artist. His digressions are numerous, and, on account of their great elaboration, they may appear distracting at a first perusal, and burdensome even at a second; but in the final impression of the total work they simply act as a substructure on which stands the temple itself, the narrative of the Greek-Persian war. They give this narrative its pathos; they explain what this war was—namely, a war between two worlds, Europe and Asia; a war between two principles, barbarism and civilization; a war on whose fortune the destiny of mankind depended. This total view, which made Thucydides burst into tears when it dawned upon him, and which the world has accepted as an undoubted truth, is the great merit of the book of Herodotus. But it is not the only one. Modern scholars, especially certain modern English historians, blame Herodotus for his credulity and propensity for the wonderful; and it cannot be denied that in comparison with the tone and character of modern history the wonderful plays a very conspicuous part in his book. The blame is unjust, however—as unjust as if any one would compare Watt's first steam-engine with the latest produced and most improved, and then blame Watt for weakness in mechanical conception and awkwardness in mechanical construction. Herodotus wrote in an age whose consciousness, still half mythological, perceived the wonderful as the natural, and would have considered many of the ideas of modern history as impiety, or even insanity. Instead, therefore, of blaming him for credulity and propensity for the wonderful, it would be more just to praise him for the soberness of his observation and the soundness of his criticism; for in these two points he truly denotes an advance in the human intellect. He is called "the father of history" because he was the first who really succeeded in reaching the fact in its concatenation of cause and effect. The best editions are that of Wesseling (Amsterdam, 1763, folio); that of Schweighäuser (Strasbourg, 1806, 6 vols.; reprinted London, 1818–24, with an Herodotean lexicon; Greek and English separately, by Cary, Oxford, 1843); that of Gaisford (Oxford, 1824, 4 vols.; 3d ed. 1849), of W. Dindorf (Paris, 1841, in Dider's *Bibl. Græca*), of J. C. F. Bähr (Leipzig, 1830–35, 4 vols.; 2d ed. 1856–61), of Stein (in *Weidmann's Collection*, Berlin, 2d ed., 5 vols., 1868–71), of Abicht (in *Telner's Collection*, 5 vols., Leipzig, 1863), and of Blakesley (in *Bibliotheca Classica*, 2 vols., Cambridge, 1854). His *History* has been translated into English by Rev. G. Rawlinson (London, 1858).

**Hero'ic Age**, the more than half-mythical age of Gre-

cian history preceding the true historic period. In it the heroes, who were often of half-divine descent—great warriors, kings, navigators—are the central figures. "In these myths," says Ernst Curtius, "the people recalls to its mind, in their full life, those times when the monotonous existence of the old Pelasgians was interrupted, and new forms of worship, new openings for popular activity, new ways of life, continuing ever after with abundance of great fruits, were called into existence. These founders are figures like those of living men, but greater, nobler, nearer the immortals. They are no empty creations of the fancy, but in them the real deeds of the early times are illustrated and endowed with life. The tales of the heroes contain a certain documentary truth." In later times the heroic age furnished abundant material for dramatic and epic poetry, and the heroic character afforded many noble examples of fortitude, piety, purity, and justice which the Greek people too generally failed to imitate.

**Hero'ic Metre**, in English verse, is the unrhymed iambic pentameter, known as blank verse. In Greek and Latin poetry it is the common hexameter verse, in which the *Iliad* and the *Æneid* are written. German and Italian heroic verse is of the same metre as the English. The French heroic is an iambic hexameter. The name is given because these metres are deemed appropriate to lofty themes.

**Herold** (LOUIS JOSEPH FERDINAND), b. in Paris Jan. 28, 1791; d. near Paris Jan. 18, 1833; studied with Cherubini, and with distinction at the Conservatoire, and finally in Italy. His first pieces, which were comic and very successful in their day, are now obsolete. *Zampa* and the *Pré aux Clercs*, his greatest operas, still hold the stage in Europe, but are unknown here, except by fragments.

**Her'on**, a general name for a part of the birds of the family Ardeidae, wading birds found in all parts of the globe. In the same family are the egrets and the bitterns. Among the herons of the U. S. are the *Demigretta ludoviciana*, or Louisiana heron of the South; the *Garzetta candidissima*, or snowy heron; the *Herodias egretta*, or white heron; the *Ardea herodias*, or great blue heron, a splendid bird, but dangerous when wounded, as it aims severe blows of its long bill at the eyes of its captor; the great white heron, *Audubonia occidentalis*; the night herons (*Nycticardea* and *Nyctherodias*); the green heron, *Butorides virescens*, and many others. The common European heron (*Ardea cinerea*) was anciently esteemed for the table, and hunted by falconry or shot with the long-bow. It was at times forbidden to any but kings and great nobles to kill it, and when taken by falconry it was customary to let the heron's wounds be dressed, and then set it free. Heron-plumes, once highly prized, are still worn upon the helmets of some corps of British cavalry.

**Heroph'ilus** [*Ἡρόφιλος*], b. at Chalcedon, in Bithynia, about 300 B. C.; studied medicine under Praxagoras; removed to Alexandria in Egypt, and was there one of the founders of the famous medical school of that city; was a distinguished surgeon, and the most celebrated anatomist and zoötomist of antiquity. It is also stated (with probable truth) that he practised vivisection upon human beings, probably condemned criminals. Tertullian says he dissected no less than 600 living persons. It is to be remembered that the ancients regarded the dissection of the dead body as something almost impious, while they had comparatively few scruples with regard to inflicting pain upon the living. His fame is commemorated by the *torcular Herophili* (the name of the place where the superior longitudinal sinuses of the *dura mater* join the lateral sinuses). He was one of the fathers of what is called heroic practice, in which excessive doses of powerful drugs were used; and he did much to introduce the useless compounding of many drugs in one prescription—a custom which lasted till the present century. Of his writings only fragments remain.

**Heros'tatus**, an Ephesian, who in 336 B. C. set fire to the temple of Diana at Ephesus, one of the most magnificent buildings of antiquity, and destroyed it, simply in order to make his name immortal; he succeeded, though the Ephesians passed a decree that he should never be named.

**Her'pes** [from the Gr. *ἔρπω*, to "creep"], a name applied to several skin diseases, characterized by the development of a series of vesicles or clusters of vesicles, which generally run a definite, self-limited course. By far the most important of these diseases is *Herpes zoster*, *zuma*, or "shingles," as it is called. This may surround one thigh or one arm with a band of vesicles, or more frequently it starts from the backbone and follows an intercostal space half round the body. More rarely it goes half round the neck or half across the face. There is usually some neuralgic pain, and sometimes considerable fever. The disease must depend upon some abnormality in the nervous action, as it frequently maps out upon the surface the part of the integument supplied by some one branch of a nerve. The



vulgar have a great dread of "the shingles," and believe that when it so extends as to completely girdle the patient he will die. But, in the first place, it almost never does go more than halfway around the body, and, what is more, there would be no danger if it should, for the disease is a self-limited or cyclical one, and the patient is sure to get well if let alone. Other forms of so-called herpes, such as *H. circinatus*, are caused by parasitic vegetation, and should be treated with applications of sulphurous acid and water or other parasiticide agents.

REVISED BY WILLARD PARKER.

**Herpetology** [from the Greek *ἑρπῆς*, a "creeping thing," and *λόγος*, a "treatise"] is that branch of zoology which is dedicated to the natural history of REPTILES and AMPHIBIANS. Referring to those articles for information respecting the characters of the several groups, our remarks here will be confined to the indication of the growth of our knowledge and the best sources of information respecting them.

Little positive information existed among ancient or mediæval naturalists respecting the forms in question. In Aristotle are found isolated anatomical details respecting some species, but he did not recognize the group as a whole, combining the footed forms with mammals as oviparous quadrupeds, and isolating from them the serpents, with which he even, at least provisionally, combined some eels (*Book ii. ch. 10*, and *Book ix. ch. 25, § 4*); he nevertheless appreciated the resemblance between the serpents and saurians (*Book ii. ch. 12, § 10*), and once defines the former as land animals (*Book i. ch. 6 § 2*). Pliny, with less exact information, mixes much fable. No mediæval writer is worthy of mention. Gesner (1554), Aldrovandi (1640), and Jonston (1653) need only to be referred to as compilers. Ray (1693) published the first attempt at a systematic arrangement, in which, although nominally confounding the reptilian quadrupeds with the mammalian quadrupeds, he recognized the serpents as related, and combined them in an unnamed group, distinguished by having a heart with a single ventricle. Linnæus (1735-63) first introduced an essential reformation, definitely combining the oviparous quadrupeds (tortoises, lizards, etc.) and serpents in a single class, which he called Amphibia, and placed between the birds and reptiles. He distinguished this class by the (1) naked or scaly body, (2) acuminate teeth, and (3) absence of rayed fins; and, subsequently and erroneously, by the unilocular and uniauricular heart. He distributed its members into two orders: (1) *Serpentes*, without feet, and (2) *Reptilia*, with feet. Later, he made the class more heterogeneous by the addition to it of the branchiostegous fishes, being misled by the erroneous observations of Dr. Garden of South Carolina. He failed to notice any distinction between the true amphibians and reptiles, and even confounded the salamandroids and crocodilians with the typical saurians in one genus under the name *Lacerta*. His several combinations and divisions into forms without feet and with feet showed also an utter want of appreciation of the value of morphological characters in this group. Gmelin (1788), in his edition of the *Systema Naturæ*, removed from the class the branchiostegous fishes, and restricted it to the limits originally recognized by Linnæus. In the last edition of the *Systema Naturæ* published by Linnæus, 213 species were recognized, distributed among the following groups: (1) *Testudo*, 15; *Rana*, 17; *Draco*, 2; *Lacerta*, 47 (not 49); (2) *Crotalus*, 5; *Boa*, 10; *Coluber*, 97; *Anguis*, 16; *Amphibæna*, 2; and *Cæcilia*, 2. In the edition of the *Systema Naturæ* published by Gmelin, 365 species were recognized, apportioned to the groups as follows: (1) *Testudo*, 33; *Rana*, 35; *Draco*, 2; *Lacerta*, 77; (2) *Crotalus*, 5; *Boa*, 10; *Coluber*, 170; *Anguis*, 26; *Amphibæna*, 5; *Cæcilia*, 2; many of the additional species are spurious. Klein meanwhile (1755) published a *Tentamen Herpetologie*, distinguished by a singular ignorance of zoological science, as will be readily understood when it is known that he ranked with the serpents the ordinary earth-worms, the tape-worms, and the leeches. Laurenti in 1768 made a decided advance in herpetology. He recognized a class "*Reptilia*;" in it he included all the reptiles but the tortoises (which he did not mention) and amphibians. These he divided into three orders: (1) *Salientia*, including the frogs, toads, etc.; (2) *Gradientia*, including the salamandroids and saurians; and (3) *Serpentia*, including the serpents, as well as serpentiform saurians and pseudophidian amphibians. He recognized four genera of *Salientia*, 13 of *Gradientia*, and 15 of *Serpentia*. Lacépède in 1788 and 1790 divided the same animals into four "classes": (1) oviparous quadrupeds which have tails; (2) those which have none; (3) reptiles with two feet only, which may be either in front or behind; and (4) serpents, or footless forms.

Bronghiat in 1799 made another decided advance: he characterized the class better than any of his predecessors,

and apportioned its representatives among four orders: (1) *Chelonians*, including the tortoises; (2) *Saurians*, comprising the lizards and crocodiles; (3) *Ophidians*, comprising the serpents; and (4) *Batrachians*—i. e. the present class of amphibians, less the *Cæcilians*. He was doubtful respecting the systematic relations of the *Cæcilians*, but placed them provisionally with the *Ophidians*. The great advance in his work is evinced in his recognition of the orders, and more especially in the segregation of the forms combined under the name of *Batrachians*. This classification came into quite general vogue, and particularly among French writers, Daudin (1802-03), Cuvier (1817-29), and Duméril and Bibron, among others, having made it the basis of their respective works.

Merrem in 1800 and 1820 published editions of a system of amphibians in which he recognized two classes: (1) *PHOLIDOTA*, equivalent to reptiles proper, and (2) *BATRACHIA*, or amphibians. Among the *Pholidota*, three orders were recognized—*Testudinata*, *Loricata* (i. e. crocodiles), and *Squamata* (i. e. saurians and serpents). Among the *Batrachia*, also, three orders were established: (1) *Apoda* (i. e. *Pseudophidians*), (2) *Salientia*, and (3) *Gradientia*. De Blainville in 1816 recognized two classes among the amphibians of Linnæus: (1) the "Reptiles" or "*Squamifères ornithoides*," scaly; and (2) "*Amphibiens*" or "*Nudipellifères*," naked. The reptiles were divided into three orders: (1) *Chelonians*, (2) *Emydo-Sauriens* or *Crocodyliens*, and (3) *Sauropheiens* or *Bipéniens*, including two suborders: (A) "*Sauriens*" and (B) "*Ophidiens*." The amphibians were distributed among four orders: (1) the "*Batraciens*" (*Salientia*), (2) "*Pseudo-Sauriens*" (*Gradientia*), (3) "*Sub-Ichthyens*" (*Proteus* and *Sirens*), and (4) "*Pseudophydiens*" (*Cæciliæ*).

Merrem and De Blainville, in the appreciation of the mutual relations of the several forms and of the subordination in the values of characters, thus advanced far ahead of their predecessors; they were also the first to definitely include the *Apoda* or *pseudophidians* among the amphibians or *batrachians*. The first edition of Merrem's work not being available, and no satisfactory account being published, it is uncertain how far Merrem or De Blainville anticipated or borrowed from each other.

Thus had the general system of herpetology assumed nearly all the characteristics which now mark it. The successive stages of its improvement were manifested in the isolation of the four-footed forms from mammals, and the recognition of their affinity with the serpents; the recognition of the *batrachians* as a natural group, and the consequent depreciation of the importance of the members as exponents of affinity; the eventual separation as a class of the *batrachians* or *amphibians* from the reptiles; and at length the perception of the value of anatomical characters and the comparative unimportance of external resemblances in the estimation of the affinities of the various types. With this recognition came the separation of the crocodilians as an order distinct from the saurians. The tendency thus marked became more and more decided as time advanced. The details of the system were gradually improved by scientific zoologists, with the aid of anatomical investigations; and among the most notable in this work may be mentioned Johannes Müller, Stannius, Owen, Cope, and Huxley. A remarkable discovery was made also by Günther (1867) in the dissection of a curious New Zealand lizard-like reptile (*Sphenodon punctatum*), which strongly illustrated the insufficiency of external characters as evidence of the relations of these forms. That animal very closely resembles in its external appearance the agamoid lizards, and indeed had been referred without suspicion to that family till examined by Günther. A detailed study of its anatomy, however, indicated that it was in nowise related to the *Agamidae* or other typical lizards, but that it was really the representative of a peculiar order of reptiles, for which the name *Rhynchocephalia* was proposed. It has also been demonstrated by Prof. Cope and others that to this same order belonged species which had lived in the older ages of our globe, and as far back as the Devonian period.

While these improvements in the system of the living reptiles were being effected, paleontological investigations were rapidly bringing to light many remarkable types of the past world, which, on being subjected to the careful investigations of osteologists, were found to have remarkable relations with the living members of the class. The gigantic swimming reptiles of the Triassic seas were first confounded together in a peculiar order by geologists under the name *Enaliosaurians*, but subsequent observations indicated that they should be separated into two widely distinct orders, and several others were from time to time constituted for the reception of various species. The comparative examinations of the living and extinct forms naturally reflected mutual light upon each other. The herpetologi-



cal system is thus now tolerably understood. Much, however, yet remains to be done, especially by the paleontologists and embryologists, before we shall be conversant with the exact mutual relations of the several orders. Nothing certainly can be as yet predicated as to the degree of generalization of the known forms; and the sequence in the list of orders (as well as the combination of orders in *Perospondylia*) which is here appended must be considered entirely as a provisional arrangement, subject to great modifications hereafter.

While the general system was thus being perfected, numerous special investigators were engaged in the discovery and elucidation of new species. The old genera were gradually more and more definitely restricted and subdivided. Many of the newly-discovered species were also recognized as representatives of new genera, and the list began to increase in numbers and importance. Families were introduced as intermediate terms between the genera and higher groups, and, at first very comprehensive, were subsequently restricted in their limits; and in order to indicate their value at once, naturalists generally began to adopt for each the uniform patronymic termination *-idae* following the name of the typical genus of the including group. The naturalists that have described the most species within the last half century have been Duméril and Bibron of Paris, Gray and Günther of London, Peters of Berlin, and Cope of Philadelphia.

The orders now generally adopted for the inclusion of all these various members of the classes in question, recent and fossil, are as follows:

#### CLASS AMPHIBIA OR BATRACHIA.

- Order Labyrinthodontia (extinct forms).
- " Pseudophibia (worm-like forms).
- " Grahntia (salaman-lers, etc.).
- " Salientia (frogs, toads, etc.).

#### CLASS REPTILIA.

##### Sub-class Euchirota.

##### Super-order Perospondylia.

- Order Crocodilia or Loricata (crocodiles).
- " Anomodontia (extinct).
- " Dinosaurs (extinct).
- " Ornithosauria (extinct flying reptiles).
- " Rhynchocephalia.
- " Sauropterygia (extinct swimming reptiles).
- " Pythonomorpha (extinct snake-like lizards).
- " Sauria (lizards, etc.).
- " Ophidia (snakes, etc.).

##### Super-order Pleurospondylia.

- Order Chelonia or Testudinata (tortoises).

##### Sub-class Plesiochirota.

- Order Ichthyopterygia (extinct whale-like reptiles).

The anatomical investigations which have been prosecuted rendered it more and more evident that the amphibians and reptiles, notwithstanding their external resemblances, have very little true affinity with each other, and that, indeed, their closest relations in some respects are with other types; thus, (1) the amphibians are so closely connected with the fishes by means of the Labyrinthodonts in one class and the Dipnoans (*Lepidosteus*, etc.) in the other that by many (e. g. Huxley) they are combined in one peculiar group under the name Ichthyopsida; while, on the other hand, the reptiles and birds agree so thoroughly, and when the extinct forms are recalled differ in so few characters, that they are also united in a special group designated the Sauroptera.

It only remains to add references to the principal authorities which the student can most advantageously use. The volumes and articles published have been very numerous, but only the following need be specially named: *Épistologie générale, ou histoire naturelle complète des Reptiles*, by DUMÉRIL and BIBRON (Paris, 1834-55, 9 vols.); *The Catalogue of British Reptiles*, by Dr. J. E. GRAY (Part I., Testudinata, London, 1855; Supplement, 1870; Appendix, 1872; Part II., Emydosaurians, Rhynchocephalia, and Amphisbomians, London, 1872, 4to.); *Catalogue of the Specimens of Snakes in the Collection of the British Museum*, by Dr. J. E. GRAY (London, 1849, 12mo.); *Catalogue of Colubrine Snakes in the Collection of the British Museum*, by Dr. ALBERT GÜNTHER (London, 1858, 12mo.); *Iconographie générale des Ophidiens*, by MOISS. JAV. and SOULLETT (Paris, 1860-72, 8vo and 4to.); *Catalogue of the Specimens of Lizards in the Collection of the British Museum*, by Dr. J. E. GRAY (London, 1845, 12mo.); *Catalogue of the Batrachia Salientia in the Collection of the British Museum*, by Dr. ALBERT GÜNTHER (London, 1858, 8vo); *Re-*

*vision der Schwannschlangen-Gattungen nebst Beschreibung einiger neuen oder weniger bekannten Arten dieser Familien*, by A. STRAUCH (Mém. Acad. Sc. St. Pétersbourg, v. xvi., No. 1, 1870, 4to.); and *Anatomische Abhandlungen über die Peromphibranchiaten und Derontomen*, by Dr. J. G. FISCHER (Hamburg, 1864, 4to.). The principal recent authorities on the American reptiles and batrachians are HOLBROOK (*North American Herpetology, or a Description of the Reptiles Inhabiting the U. S.*, Philadelphia, 1836-43, 3 vols., 8vo); BAIRD and GIRARD (*Catalogue of North American Reptiles in the Museum of the Smithsonian Institution*, Part I., Serpents, Washington, 1853, 8vo, etc.); AGASSIZ (*Contributions to the Natural History of the United States of America*, first monograph, North American Testudinata, Boston, 1847); and COPE (in numerous memoirs in the *Proceedings and Transactions of the Academy of Natural Sciences of Philadelphia*, etc.). The most recent guide to the reptiles of Europe is Dr. E. SCHREIBER'S *Herpetologia Europæa, Eine systematische Beschreibung der Amphibia und Reptilien, welche bisher in Europa aufgefunden sind* (Braunschweig, 1874).

THEODORE GILL.

**Herpeton tentaculatus**, a serpent brought from tropical countries, and chiefly noteworthy for the singular appendages which are attached to its muzzle. These are covered with scales, and are of no food use to the serpent.

**Herrick**, post tp. of Bradford co., Pa. Pop. 1099.

**Herrick**, tp. of Susquehanna co., Pa. Pop. 950.

**Herrick** (JOHN RUSSELL), S. T. D., b. at Milton, Vt., May 12, 1822; graduated at the University of Vermont 1847; studied at Andover two years, and graduated at Auburn Theological Seminary 1852; from 1851 to 1857 was over a Congregational Presbyterian church, Malone, N. Y.; professor of systematic theology in Bangor, Me., 1867 to 1873; became pastor at South Hadley, Mass., in 1874; received the degree of D. D. from Union College in 1867; same year S. T. D. from his alma mater. Author of *Positivism in Boston Lectures* (1870), also of various articles, philosophical and theological, in reviews.

**Herrick** (JOSUAH), b. at Beverly, Mass., in 1792; removed to Maine, where he became a sheriff; was deputy collector of the port of Kennebec, Me., 1819-41, 1847-49, and 1850-54; member of Congress 1822-25; and in 1856 register of probate for York co. D. at Alfred, Me., Aug. 30, 1874.

**Herrick** (ROBERT), b. in London Aug. 20, 1561; was educated at Trinity Hall, Cambridge, and took his master's degree 1577; took orders and became vicar of Dean Prior's, Devon, 1629; and d. there in Oct., 1674. He is one of the best of English lyric poets and song-writers, his chief fault being the indelicacy which too often disfigures the erotic poems in which his genius is best displayed. His pastoral relations were suspended for a time during the civil war, but were resumed at the restoration of Charles II. His chief publication was the *Hesperides* (1647-48).

**Herrick** (STEPHEN SOLON), M. D., b. at West Randolph, Vt., Dec. 11, 1833; graduated at Dartmouth 1854; was an instructor in Kentucky and Mississippi 1854-59; took his medical degree at the University of Louisiana 1861; assistant surgeon in Confederate army and navy 1862-65; visiting surgeon Charity Hospital, New Orleans, 1865-69; managing editor *New Orleans Medical and Surgical Journal* 1866-67; professor of chemistry in the New Orleans School of Medicine 1867-70. His essay on *Quinine* (1869) won the prize of the American Medical Association. Author of various professional papers.

**Herring** (*Clupea*), a genus of fishes which furnish a large supply of food to mankind. There are several sp-



The Herring.

cies, the chief of which are the *C. harengus* of Northern Europe and America, and the *C. pallasii* of the Pacific coast of the U. S. The celebrated white-bait is the young of the common herring. The herring fisheries of America are prosecuted chiefly along the New England coast, and especially in British American waters. In Europe the great herring fisheries are those of Great Britain, Ireland, Scandinavia, the Netherlands, and the north of France. Herrings at tolerably regular periods visit extensive lines of coast, and were formerly believed to migrate periodically from the Arctic seas, but this belief is not now generally held by scientific observers. They are

\*The "catalogues" enumerated are really descriptive monographs of all the known species, whether in the Museum or not.



generally caught in gill-nets or scoop-nets. The annual catch of herrings must amount to many hundreds of millions. So important was the Dutch fishery in former days that it was said that Amsterdam was built on herring-bones. A large part of the so-called herring caught in the U. S. are alewives, which are in no wise inferior to the real herring, which they much resemble. Herrings are smoked and dried, pickled, or eaten fresh.

The most important herring of our Pacific coast appears to be the *C. mirabilis*, which in size, appearance, and habits resembles the common herring, but has fewer vertebrae and a ray less in the anal fin. It is not as large as the *C. harengus*, but is said to be equal in flavor. It can be taken in very large quantities, and its fishery will soon become an object of national importance. The "herring" of the great lakes is *Coregonus clupeiformis*, a sort of white-fish.

**Herrnhut**, town of Germany, in the kingdom of Saxony, was founded in 1722 by a colony of Moravian Brethren, who were driven from their homes by the Jesuits, but were received and established here by Count Zinzendorf. The town has only 1000 inhabitants, but it enjoys a comparatively great reputation, partly because it has become the assembling-place or metropolis of the UNITED BRETHREN (which see), partly because the life led in this town commands respect for its simplicity, honesty, purity, and vigor. The colored paper and the linen fabrics manufactured here are very celebrated, and known under the name of *Herrnhuter Papier* and *Herrnhuter Leinwand*.

**Her'ron** (FRANCIS JAY), b. at Pittsburg, Pa., Feb. 17, 1837; graduated at the Western University of Pennsylvania 1863; entered the U. S. army Apr. 1861, as captain 1st Iowa Vols., and engaged in the battles of Dug Springs, Ozark, and Wilson's Creek; promoted to be lieutenant-colonel 9th Iowa Vols., and in command of the regiment through campaigns in Missouri, Arkansas, and Indian Territory; engaged in the battle of Pea Ridge, where he was severely wounded. Appointed brigadier-general of volunteers July, 1862, and in command of Army of the Frontier at battles of Prairie Grove and Van Buren; for conduct at former promoted to be major-general of volunteers Nov. 19, 1862. In command of the left wing of investing forces at Vicksburg, and of the army and navy expedition that captured Yazoo City; subsequently of 13th army corps on Texas coast till assigned to command the northern division of Louisiana. In May, 1865, negotiated, and in June received, the formal surrender of the Trans-Mississippi army and all Confederate forces W. of the Mississippi. Appointed one of the commissioners to negotiate treaties with Indian tribes July, 1865. Resigned commission as major-general and Indian commissioner Aug., 1865. Was U. S. marshal district of Louisiana 1867-69, and secretary of state of Louisiana 1870-72. G. C. SIMMONS.

**Her'schel** (CAROLINE LUCRETIA), b. at Hanover Mar. 16, 1750. She was appointed assistant astronomer to George III. of England in 1781, with a moderate salary. She attended her brother, Sir William, in all his night-watches, which generally lasted till morning; wrote from his dictation, as he swept the heavens with his telescope, his observations; noted the clocks; reduced and arranged his journals; prepared the zone catalogues for his sweeps, and performed for him all the laborious mathematical calculations necessary for the reduction of his observations. She discovered independently eight comets, besides numerous nebulae and clusters of stars. At the death of her brother in 1822 she returned to her native city, where she spent the remainder of her life with her only remaining brother, honored and beloved by all. She was elected member of the Royal Astronomical Society in 1832, and d. at Hanover Jan. 9, 1848. MRS. S. B. HERRICK.

**Herschel** (Sir JOHN FREDERICK WILLIAM), BART., b. at Slough, near Windsor, England, Mar. 7, 1792. He was educated at home under the guidance of his parents and his aunt. Associated always with mature minds, breathing the very atmosphere of science, the boy spent his singular childhood in the silent house where the star-watchers slept. He went direct from his home to Eton, and from there to St. John's College, Cambridge, where he graduated in 1813 as senior wrangler and Smith prizeman. In the same year he read before the Royal Society a mathematical paper, and was elected, at the age of twenty-one, a fellow. In 1831, William IV. bestowed upon him the Hanoverian Guelphic order, and five years later, at the coronation of Victoria, he was created baronet. Several gold medals were awarded to him by the Royal Society and the Astronomical Society of London, and he was made D. C. L. by the University of Oxford. He was successively elected rector of Marischal College, Aberdeen, president of the Astronomical Society, and finally permanent master of the mint, which last position his enfeebled health forced

him to resign in 1855. He was honorary or corresponding member to the academies of Brussels, St. Petersburg, Vienna, Göttingen, Turin, Bologna, Naples, Copenhagen, Stockholm, and others, besides being chevalier of the Prussian order of Merit. In 1829 he married Margaret Brodie, daughter of Rev. Dr. Alex. Stewart, by whom he had nine daughters and three sons. He d. at Collingwood Apr. 13, 1871. From 1813 to 1822 he devoted himself to mathematics, chemistry, and optics, as his memoirs testify. He then began his astronomical work in earnest. In 1825 he began, in connection with Sir James South, a series of very important observations. Though his especial tastes lay in the direction of physics, his filial devotion determined his lifework. He passed in review the nebulae discovered and catalogued by his father; while engaged in this work he catalogued between 3000 and 4000 double stars. In order to perfect the work begun by his father, he went, at his own expense, in 1833, to the Cape of Good Hope. That the results might be accurately comparable, he used the same instrument used by his father. He spent four years at the Cape observing, and five years more reducing and arranging his observations, which appeared in 1847 under the title *Results of Astronomical Observations made during the years 1834-38 at the Cape of Good Hope, being the completion of a Telescopic Survey of the whole visible heavens, commenced in 1825*. This included seven treatises upon—1, nebulae; 2, double stars; 3, apparent size of stars; 4, distribution of stars and constitution of Milky Way; 5, Halley's comet, etc.; 6, satellites of Saturn; 7, solar spots. While in South Africa he inaugurated a valuable system of simultaneous meteorological observations, and instituted a fine public-school system. He prepared two elaborate and exhaustive treatises upon "Light" and "Sound," for the *Encyclopædia Metropolitana* (1830-31), and wrote for Lardner a treatise upon the study of natural philosophy, which gave a strong and immediate impulse to the study of natural science in England; also a treatise upon astronomy, which was afterwards expanded into his *Outlines of Astronomy*. In all, Sir John added to the 2500 nebulae discovered by his father, 2208 of his own discovery, the whole number known being 5200. He performed a great service to photography by the discovery of a process for making the impressions permanent. Not the smallest part of his work was that of popularizing without falsifying science. These discoveries, together with those recorded in 131 papers contributed to various scientific societies, compose the results of fifty-eight years of labor, included between the day of his graduation and the day of his death. The entire labor of this enormous work was performed by himself, except that which was purely mechanical in the use of his instruments. MRS. S. B. HERRICK.

**Herschel** (Sir WILLIAM) was b. in Hanover Nov. 15, 1738. Besides music, to which he was educated professionally, he received instruction in French and metaphysics in his early years. At the age of fourteen, being forced to earn his own bread, he became a member of a Hanoverian band; in this capacity he came to England in 1759, where the story of his life for some years is a record of bitter privation silently and heroically endured. He became successively master of a military band, organist at Halifax, and organist at the Octagon chapel at Bath. In spite of innumerable professional duties, he pursued his abstract studies with ardor, sometimes going to them after fourteen hours of professional labor. He learned Latin, Italian, and something of Greek, with no aid but that of a grammar and dictionary, and mastered alone an obscure mathematical treatise upon music. The harmony of sound soon led, by the way of optics, to a study of the "harmony of the spheres." A small Gregorian telescope fell into his hands, and waked into passionate life the longing which determined his future career. Finding the most ordinary telescope beyond his means, he determined to construct one. The fact that he made and polished 200 metal specula before he succeeded to his own satisfaction reveals the secret of his successful life. In 1781 he discovered, by the aid of one of his own telescopes, a new planet, called by him Georgium Sidus, by his contemporaries Herschel, but now known under the name of Uranus. This brought him under the notice of George III., who bestowed upon him the position of special astronomer to the king, a pension of 300 guineas a year, and a residence at Slough, near Windsor Castle. He married, in 1788, Mary, daughter of Mr. Adee Baldwin, a widow, by whom he had one son, John F. W. Herschel. He was made member of the London Royal Society, of the Academy of Sciences, Paris, and president of the Royal Astronomical Society, London. The Hanoverian Guelphic order was bestowed upon him by the regent, and the title of LL.D. by the University of Oxford, besides other distinctions. In his eighty-fourth year, on Aug. 23, 1822, Sir William Herschel died without a pang. His disposition was marked by



sweetness and benevolence; his character by directness and simplicity, by untiring patience and indomitable energy; and his mind by breadth of view and extreme caution. His work is comprehended, in great part, in memoirs presented before the Royal Society of London, which "constitute," says Arago, "one of the principal riches of the celebrated collection known under the title of *Philosophical Transactions*." The front-view telescope suggested by Jacques Lemaître was perfected by Herschel; the mechanical contrivances by means of which he mounted and adjusted his forty-foot telescope, with its speculum weighing a ton, showed him to be possessed of high mechanical genius. He so improved the construction of telescopes as to be able to use magnifying powers of 6000 times in a reflecting telescope seven feet long. Though we cannot give even the titles of the papers contributed by him to the *Philosophical Transactions*, we shall take a hasty survey of those discoveries—recorded in them from 1780 to 1822—which are permanent acquisitions to science. In optics he discovered the dark heat-rays of the solar spectrum, and made many experiments upon radiant heat, upon Newton's rings, and upon the illuminating power of the various prismatic rays. In his researches upon the solar system he made many remarkable observations upon the physical constitution of the sun; he discovered the planet Uranus and his six satellites, as well as two satellites of Saturn. He added much to the subject of the form, time of rotation, and comparative magnitudes of the asteroids and planets. He discovered that the moon possessed no atmosphere, and made many valuable observations upon comets. But the real work of the Herschels, father and son, lay beyond the limits of our system in the sidereal depths. Sir William made many and accurate observations upon variable and binary stars; in his investigations upon sidereal parallax, though he failed to find it, he made the astounding discovery that the sun, with all its attendant planets, is rushing on through space toward a point situated in the constellation Hercules. By means of a twenty-foot telescope he made a survey of the whole of the northern heavens, cataloguing and placing the stars as they came within the telescopic field. To the known nebulae, 500 in number, he added 2500 of his own discovery, and under his trained eye and powerful telescopes numbers of what had been considered nebulae resolved themselves into clusters and systems of self-luminous suns. He is well denominated by his biographer "one of the greatest astronomers that ever lived in any age or country." Mrs. S. B. HERVEY.

**Hersey**, post-v. and tp., cap. of Osecola co., Mich., near the junction of the Flint and Père Marquette and the Grand Rapids and Indiana R. Rs., and at the confluence of the Hersey and Muskegon rivers. It has a court-house, a jail, 2 churches, a graded school, a printing-office and weekly newspaper, 4 hotels, several stores and shops, a wagon factory, 3 large saw and shingle mills, a planing-mill, a grist-mill, and an express office. It is in the midst of a fine agricultural and lumber district. Pop. of tp. 286. J. F. RADLITTE, Ed. "OSECOLA OUTLINE."

**Hersfeld**, town of Hesse-Nassau, Prussia, on the Fulda, has important manufactures. Pop. 6431.

**Hertford**, town of England, the capital of Hertfordshire, on the river Lea. It has several educational institutions. Pop. 7161.

**Hertford**, county of North Carolina, bounded on the E. by the navigable Chowan River and on the N. by Virginia. The surface is generally level. Corn is the principal agricultural product. Cap. Winton. Pop. 9275.

**Hertford**, post v., county-seat of Perquimans co., N. C., on the navigable Perquimans River, 12 miles from its mouth. Pop. 486; of tp. 1188.

**Hertfordshire**, or **Herts**, county of England, bounded by the counties of Essex, Middlesex, Buckingham, and Bedford. It contains 391,141 acres of fertile and well-cultivated land, consisting of chalk overlaid with gravel and loam, and presenting a pleasantly undulating surface. The products of its meadows and orchards are brought to the London market. Malt is a very important product. Cap. Hertford. Pop. 73,294.

**Hertz** (HENRIK), b. at Copenhagen Aug. 25, 1798, and d. there Feb. 26, 1870. With the exception of a tour through Germany, France, and Italy in 1833-34, he spent his whole life in his native city in a quiet way, and devoting himself exclusively to literary work; in 1840 the Rigsdag gave him a pension. But several of his works caused a great commotion, especially his *Partial Epistles from Paradise* (1830), whose satire and criticism made people furious, though at the same time they could not help being charmed by the wit, elegance, and freshness of the style. He has written other satirical, lyric, and epical poems, and also some novels; but his talent was eminently dramatic. He

used to write a new drama every winter, and many of them have become very dear to his countrymen, such as his tragedy *Scend Dyrings Haug* (1837), his character comedies *Spærskassen* (1836) and *Et Offer* (1833), his romantic comedies *Niøn* (1848) and *Den Yngste* (1851); some of them have been performed in all the principal theatres of Germany, France, and England, such as *Kong René Datter* (1846), twice translated into English, and not seldom performed in America, and *Scheich Hassan* (1841). His general character as an author shows a perfect training—he never failed in what he undertook to do; and a perfect veracity—not one adjective in all his volumes was ever allowed to tell a lie. CLEMENS PETERSEN.

**Heruli**, a Germanic race who first appear in history in the third century A. D. on the shores of the Euxine. They were conquered by the Ostrogoths under Hermanric, and bands of Heruli appear after this in all parts of Europe. They swelled the train of Attila, and are later found among the enemies of the Huns. In the valley of the Theiss, on the lower Danube, and in Illyria they founded governments, and were everywhere among the bravest and most barbarous and unruly of the Germanic peoples. Odoacer was called king of the Heruli, but was not of this race. After the fall of the Western empire (476 A. D.) the Heruli became one of the dominant races, but the subject Lombards rose and almost annihilated them about 512 A. D. From that time they were important only as soldiers in the service of the more powerful tribes.

**Hervé** (ENRIARD), b. in 1835 at St. Denis (Réunion Island); entered, after brilliant studies in colleges, the famous Paris Normal School, where he had as fellow-mates Prévost-Paradol, About, Sarcy, Weiss, Taine, all the pleiad of modern French polemicists and writers. Hervé contributed to many Paris journals, and with Weiss founded in 1869 the *Journal de Paris*, of which he is the present editor, and which supports the cause of a liberal constitutional monarchy, modelled after the British constitution. Hervé is the author of *One Page of Contemporaneous History* and of a *History of the Liberal Ideas in England*.

FÉLIX ALCAIGNE.

**Hervé** (assumed name of FLORIMOND RONGER), b. at Houdain, near Arras, June 30, 1825, was at first dramatic artist and manager of small theatres. He took afterwards to composing opéras bouffes, like *L'Œil Crevé*, *Les Turcs*, *Chilpéric*, *Le Petit Paquet*. FÉLIX ALCAIGNE.

**Hervey** (JAMES), b. at Hardingsstone, Northamptonshire, Eng., Feb. 26, 1713; studied (1731-38) at Lincoln College, Oxford, where, from his acquaintance with John Wesley and from Zimmerman's writings, he received strong religious impressions. He took orders in the English Church and held various rectorships, notably that of Weston Pavey, where he d. Dec. 25, 1758. Author of *Meditations and Contemplations* (1746 and 1747), which became exceedingly popular, notwithstanding its turgid and extravagant style, which found many admirers, attracted partly by the devout spirit of the author; of *Theron and Aspasia* (3 vols., 1755), consisting of dialogues upon religious topics—a work which called forth replies from Robert Sandeman and John Wesley; and other works, among them posthumous *Letters to John Wesley*, which, it is believed, suffered much from the reckless interpolations of Hervey's editors. He was a man of learning, but not of intellectual power.

**Herwarth von Bitenfeld** (KARL EBERHARD), b. at Grosswerther, Prussian Saxony, Sept. 4, 1796; entered the military service in 1811. He took part in the campaign against France in 1814, and took two hostile pieces at the storming of Montmartre. In 1817 he received the command of the 1st regiment of the guard, in 1850 of the 16th brigade of infantry, in 1854 of the confederate fortress of Mentz, in 1860 of the 7th army corps. In 1863 he became a general of infantry, and commanded in 1864 the Prussian troops against Denmark under Prince Frederick Charles, who was commander-in-chief of the allied Austrian-Prussian force. June 29 he took the island of Alsén. After the peace of Vienna he was appointed chief commander in the duchies of the Elbe, and in 1865 he received the command of the 8th army corps. In 1866 he was commander-in-chief of the army of the Elbe, gained victories in the encounter at Hünnerwasser and Münchengrätz (June 26 and 28), and played a very conspicuous part in the battle of Königgrätz by crossing the Bistritz and attacking the villages of Probus and Pruno. The Austrian left wing rested on these two points, and by storming and taking them he completely destroyed this wing of the enemy. In 1870, in the war against France, he was appointed governor-general on the Rhine and of all the western provinces, which difficult and responsible position lost a great deal of its importance, as the war was carried on in the enemy's country. On Apr. 8, 1871, Herwarth retired from active service as field-marshal-general. AUGUST NIEMANN.



**Herzberg** (EWALD FRIEDRICH), b. at Lottin, in Pomerania, Sept. 2, 1725; studied law at the University of Halle, and entered in 1747 the service of the Prussian ministry of foreign affairs. He wrote in 1756 the famous *Mémoire raisonné*, founded on papers stolen from the archives of Dresden, and intended to defend the invasion of Saxony by Frederick II.; he also wrote a memoir in defence of the first partition of Poland in 1772; and the peace of Hubertburg in 1763, as well as the formation of the so-called "Fürstenbund" in 1755 against Austria, was his work. Frederick II. appreciated him very much, and made him first minister of state, but after his death Herzberg's influence soon decreased, though Frederick William II. made him a count and president of the Academy of Science of Berlin. The elevation of Reichenbach in 1799 proved a failure, and Herzberg retired. In 1793, when the second division of Poland and the unfortunate war against France had brought Prussia into a critical position, he offered his services once more, but the offer was not accepted, and the old man felt this disappointment so keenly that he fell sick and d. shortly after, May 25, 1799.

**Herzegovina**, province of Bosnia, in European Turkey, bounded W. by Dalmatia and S. by the Gulf of Cattaro and by Montenegro. Area, 6420 square miles. It is peopled largely by Slavic races; is occupied by the ridges and valleys of the Dinaric Alps; produces much grain, tobacco, and honey. Two-thirds of its people are of the Greek faith, and of the remainder one-third are Roman Catholics, the rest Mohammedans. The name is corrupted from Herzog ("duke"), because at the time of the Moslem conquest it had for some years been governed by a line of independent dukes. Cap. Mostar. Pop. 290,000.

**Herzen** (ALEXANDER), b. at Moscow Mar. 25, 1812. In 1834 he was imprisoned for a short time, and banished to Viatka, near Siberia, on account of the radical ideas he entertained without concealing them. Having been pardoned in 1839, he was appointed clerk in one of the government offices at St. Petersburg, but his ideas had not changed, nor his desire for making them known, and consequently in 1842 he was ordered to reside in Novgorod. At the death of his father in 1847 he inherited a large fortune, and he now sought permission to go abroad. It was granted, and, steadily watched by the Russian police, he travelled for several years in Italy and France. In 1852 he settled in London; in 1865 he removed to Geneva; he d. in Paris Jan. 21, 1870. His most important literary undertaking was no doubt the *Kolokol* ("The Bell"), a Russian periodical, issued through many years, first in London and then in Geneva, and very extensively read in Russia. But besides some novels and sketches of a lighter description, though generally very interesting—as, for instance, *Whose is the Fault? Doctor Krupin* both in 1847, *Recollections of my Travels* (1854), etc.—he wrote a great number of political and polemical works, as, for instance, *Russia and the Revolution* (3 vols., 1866), *Russia and the Old World* (1864), *Mémoires de l'Épiscopat Catholique, écrits par elle-même*, with an introduction 1869, *Bibliotéca Domini* (3 vols., 1864), etc., which exercised great influence on Russian civilization. He was the channel through which the ideas of Western Europe flowed into Russia, but this channel was provided with a filter; some impracticable ideas may have slipped through, but much unclean matter was stopped. Of the revolutionists of Europe, Herzen is considered one of the noblest and one of the most powerful.

**Herzog** (HANS), b. at Aarau in 1830; devoted himself to technical studies, and took charge of the factory of his father. He was very fond of studying military science, especially artillery; served as a volunteer in the Würtemberg artillery; visited the Sardinian camps, and was often present as a spectator at the German manoeuvres. After serving for many years in the militia, he was appointed inspector of the confederate artillery. As the Franco-German war of 1870-71 made it necessary for Switzerland to take some military measures in order to protect her frontiers, Herzog was appointed commander-in-chief of the army in July, 1870. With the corps of 37,000 men which Switzerland raised he formed a line of observation, beginning in the valleys of the Jura, at Delsberg and Pruntz, increasing in strength along the banks of the Birr, Ergolz, and Rhine, continued over Schaffhausen into the canton of Zurich, and ending on the Aar at Brugg. As the war drew away from the Rhine in August, the greater part of this army was disbanded. Herzog resigned, but gave a report of the army organization which showed that the fighting capacity of the Swiss army was a mere illusion. He was persuaded, however, to assume the command once more when Bourbaki's army approached, and occupied the frontier with 30,000 men. In this position he mediated the passing of the French army, defeated at Belfort, across the Swiss frontier.

AUGUST NIEMANN.

**Hesiod** [*Ἡσίοδος*], next to Homer the oldest of the Grecian poets whose works are known to us, and founder of the epic-didactic school of poetry at the foot of Mt. Helicon in Boeotia, as Homer was the representative of the epic Ionian school of Asia Minor. The two schools had little in common except the epic form and dialect, for while Homer sang the exploits of heroes and sought to inspire admiration for adventurous enterprises, Hesiod inculcates the duty of labor and frugality, and treats of the daily round of domestic life. From these characteristics Cleomenes claimed the former as the bard of the Spartan warriors, while Hesiod was termed by him the poet of the Helots. Of the period when he flourished and the circumstances of his life we know little. What little is known is derived from his own writings; for while Homer, in whom there is greater objectivity than in any other poet, has left in his productions no personal allusions, Hesiod has introduced in many passages incidental accounts of his life and family relations. But in neither poet is any indication given of the period in which he lived. Nor is there any external testimony worthy of confidence. Herodotus (ii. 53) says that Hesiod and Homer lived 400 years before his time, and not more, which would give their date about 840 B. C. Most writers make the two contemporary, while some place Hesiod before, others 100 years later than, Homer. (The various statements are collected in CLINTON'S *Festi Hellenici*, vol. i. pp. 359-361.) Götting coincides in the opinion of Herodotus, while Grote, from the internal evidence of style and sentiment, places him shortly after 700 B. C. Hesiod was of Æolian parentage, b. at Asara in Boeotia. His father had been a resident of Cyme, a town of Æolis in Asia Minor, but had removed to Asara, where he possessed and cultivated a farm, which he left at his death to his two sons, Hesiod and Perses. After the division, Perses, the younger brother, who seems to have been fond of lawsuits and the harassing business of the agora, managed by bribing the judges to defraud his brother of a portion of his inheritance. Hesiod thereupon in disgust left his native Asara and removed to Orchomenus, where he spent the rest of his life. He further intimates that he was engaged in farming pursuits, and the precepts which are embodied in his *Works and Days* appear to be the result of a practical acquaintance with agriculture. The way in which he was led to attempt poetic composition is related in the opening of the *Theogony*. The Muses, who frequented Mt. Helicon, on one occasion met Hesiod as he was pasturing his flocks at the foot of the mountain. They thereupon bestowed on him the gift of poetry, and consecrated him to their service by presenting him a laurel branch. The only other incident in his life is his visit to Chalcis in Euboea, to take part in a poetical contest at the funeral celebration in honor of King Amphidamas, in which he gained a tripod as the prize, which he dedicated to the Muses. From this arose the story of a poetical contest between Homer and Hesiod, which gave rise to a production (*Ἀγὼν Ὅμηρου καὶ Ἡσίοδου*), still extant, and often printed with the works of Hesiod. His death was said to have been brought about through the false suspicions of two youths of Locris. His bones were subsequently removed, by command of the oracle, to Orchomenus, where a tomb was erected to his memory, and he was honored as a hero. The works ascribed to Hesiod are numerous, but some of these are not his own productions, but belong to the school of which he was the founder: (1) *Ἔργα καὶ ἡμέραι* ("Works and Days"), a poem treating of the duties of the farmer and the best method of conducting the operations of agriculture, also inculcating justice, maintaining the dignity of honest labor, laying down rules for the regulation of life and the rearing of children (the "Works"); followed by a calendar of the days of the month on which it is advantageous or otherwise to undertake any labor (the "Days"). This poem is the only one accepted by the Boeotians about Mt. Helicon as genuine, though regarded as somewhat interpolated. (2) *The Theogony* (*Θεογονία*), which treats of the genealogy of the gods, being in great measure a mere enumeration of names, but containing some episodes of considerable beauty. From the battle of the Titans and the gods in this Milton borrowed in his battle of the angels. Herodotus recognizes the genuineness of this poem when he says that Hesiod and Homer formed a theogony for the Greeks and gave names to the gods. In its present form it has undergone many variations and been largely interpolated. The ancients regarded as a sort of continuation of the *Theogony* the poem called *Ῥοῖαι*, sometimes called *Ῥοῖαι μεγάλαι* or *κατάλογοι γυναικῶν*, an account of the women who had been loved by the gods, and who had become mothers of the great heroes and demigods from whom the princely houses of Greece were derived. The name is said to be formed from the expression used in introducing each character, *ἦ οἱ*. The work is now lost. (3) *The Shield of Hercules* (*Ἀσπίς Ἡρακλέους*) is the title of a poem made up apparently



from other works of Hesiod: a part of it at least is believed to have belonged to the *Hoia*, and only a portion is devoted to the description of the shield, and this is an imitation of Homer's shield of Achilles. The titles of other poems ascribed to Hesiod are—*Ἰνναιος*, *Μεταμορφῶς*, *Ἐργῆσις ἐν τετρασίν*, and *Χερσῶνος ὑποθήκαι*. The best editions of Hesiod are by Th. Gaisford in *Poetae Minores Graeci*, vol. i.; by Götting (Gotha, 1843, 2d ed.); by Van Lennep (Amsterdam, 1843-47, 3 vols.); by F. A. Paley (London, 1861). Chapman has translated the *Works and Days* into English under the title *Hesiod's Georgics and Book of Days*, and Elton has given the entire poems. (See MÜLLER'S *Hist. Greek Lit.*, vol. i. p. 77; MURE'S *Hist. Greek Lit.*; GROTE'S *Hist. of Greece*, vol. i.; CREUZER u. HERMANN, *Briefe über Homer und Hesiod* (Heidelberg, 1817); GUENIAUT, *De la Théogonie d'Hésiode* (Paris, 1855); BARR, in *Poetry's Real-Encyclopedia*.) H. DRISLER.

**Hes'peler**, a v. of Waterloo tp. and co., Ont., Canada, on the Great Western Railway, 59 miles from Toronto, has manufactures of worsted, woollen, cotton, and other goods. Pop. of sub-district, 797.

**Hes'per**, post-tp. of Winneshiek co., Ia. Pop. 1041.

**Hesperides**, three or four, or even seven in number, were the daughters of Atlas and Hesperis. To their guardianship were entrusted the golden apples which Gea gave Hera as a bridal present, and which Heracles stole and brought to Eurystheus. Not only their number, but also their descent and the place of their garden, is variously given in the Grecian mythology.

**Hesper'omys**, a genus of Muridae, including the white-footed or deer-mouse of the Northern States, and some thirteen other species of North American mice.

**Hes'se** [Ger. *Hessen*; Lat. *He'ssia*], a mountainous territory in the western part of Central Germany, situated between the Neckar, Rhine, Main, Lahn, and Fulda. It was inhabited by the tribe of the Catti at the time of Germanicus, but the Catti became lost as an individual tribe among the Franks, and when these emigrated to Belgium and France, the Hessian territory became nearly depopulated. Meanwhile, the Saxons pushed into the country from Thuringia, and for a period Hessa was united with the Thuringian principality; but at the death of Henry Raspe in 1247 a succession-war broke out between his nephew, Henry of Misnia, and his niece, Sophia, married to Henry, duke of Brabant, which ended in 1263 in a separation of the two countries. Sophia obtained Hessa, and her son, Ludwig the Child, was acknowledged as landgrave, took up his residence at Cassel, and founded the Hessian dynasty. One of his descendants, Philip the Magnanimous, divided his land at his death in 1567 between his four sons, William IV., Ludwig IV., Philip II., and George I. But Ludwig IV. died in 1601 and Philip II. in 1682, without children, and thus only two branches of the family were continued: that of Hesse-Cassel, descending from William IV., and that of Hesse-Darmstadt, descending from George I. The elder branch, that of Hesse-Cassel, ceased to reign Aug. 17, 1806, when its dominions were incorporated with Prussia; but it reigned long enough to acquire quite a conspicuous place in history, for no family was ever meaner, more treacherous, or more infamous; and as if to intensify the character of their history, most of its members possessed a peculiar art of mixing their stupidity and their crimes with the ridiculous. Frederick II., landgrave from 1760 to 1785, hired to England 22,000 of his subjects to fight against the Americans (1776-84), and was paid therefor 21,276,778 thalers. He had sixteen palaces, some of them large enough to contain sixteen landgraves, yet he left a mysterious treasure, which his son in the days of trouble deposited with the Frankfort Jew, Rothschild. This son, William I., made first a bargain with Napoleon, and rose accordingly in dignity from landgrave to elector in 1803; but unable to predict whether France or Prussia would carry the day, and having prepared himself for siding with Prussia if that should prove the way to profit, he was discovered by Napoleon and expelled shortly after the battle of Jena (Nov. 1, 1806); his dominions were incorporated with the kingdom of Westphalia. After Napoleon's fall he returned to his electorate (Nov. 21, 1813), with many golden promises to his subjects of constitution, representative government, etc., all of which he broke as soon as he discovered that constitution and representative government had something to do with the finances. His intrigues, however, in Vienna to be elected king by the congress, like the electors of Saxony and Bavaria, and the indignation of the other kings on account of this impertinent demand, form a very entertaining episode. He d. Feb. 27, 1821. Under his son and successor, William II., the discord between monarch and subjects became dangerous, and when in 1830 a revolution actually broke out, he followed his father's example: he promised

everything on one day, and broke his promises the next. Still worse was Frederick William I., who succeeded his father Nov. 20, 1847. When the revolution of 1848 came, nothing was too dear to him: censorship of the press, religious restrictions, arbitrary judicatory authority, irresponsible financial measures, etc.,—he gave up all, and granted an excellent constitution, but in 1852 foreign soldiers sat in courts-martial and condemned Hessian civil officers because they had declined to act against the constitution on which they had made oath. From 1831 to 1861 the population of the Hessian electorate decreased more than 6 per cent., and it was a great benefit, not only to Hesse, but to Germany and to civilization in general, when in 1866, the elector happening to side with Austria, Count Bismarck had him carried as prisoner to Stettin and his dominions incorporated with Prussia.

The younger branch, that of Hesse-Darmstadt, is still reigning. One of its members, Ludwig I., joined the confederation of the Rhine and obtained from Napoleon large accessions of territory and the title of grand duke. He followed Napoleon faithfully until after the battle of Leipzig, when he was fortunate enough to join the allies just in time to be accepted. After 1814 he promised, like all the German princes, to give a constitution, but he redeemed his word conscientiously, and the country was in a prosperous condition when he d., Apr. 6, 1830. His grandson, Ludwig III., who succeeded to the throne June 16, 1848, concluded a special military convention with Prussia in 1867, according to which the army of Hesse became a part of the army of the North German confederation, and as such it took part in the Franco-Prussian war in 1870. CLEMENS PETERSEN.

**Hes'se-Darm'stadt**, German grand duchy, consists of two large and eighteen small separate districts, situated partly between Prussia, Bavaria, and Baden, partly within the Prussian frontier. Area, 2961 square miles. Pop. 852,894; namely, 583,399 Protestants, 228,080 Roman Catholics, and 23,373 Jews. The country is mountainous or hilly, covered by Vogelsberg, Odenwald, and spurs of Taunus and Westerwald, but the soil is very productive and well cultivated. Wheat, wine, fruit, and tobacco are raised; some iron, salt, and brown coal is mined; linen and woollen fabrics, leather and straw goods, are manufactured; the carriages from Offenbach are celebrated. The annual revenue amounts to \$1,500,000; the expenditures to \$4,250,000; the public debt to \$5,500,000. Cap. Darmstadt.

**Hes'se-Nas'sau**, province of Prussia, formed in 1866 of the electorate of Hesse-Cassel, the duchy of Nassau, the landgraviate of Hesse-Homburg, and the free city of Frankfurt, is situated between Hesse-Darmstadt, Bavaria, and the provinces of Saxony, Hanover, Rhenish Prussia, and Westphalia. Area, 6021 square miles. Pop. 1,600,370. The surface is mountainous, occupied by the Spessart, Rhön, Westerwald, and Taunus, but the soil is very fertile and well cultivated. Agriculture, cattle-raising, and manufacture of cloth, iron, jewelry, and pottery are the chief occupations. Much and excellent wine is produced. Mineral springs are numerous, and the watering-places of Ems, Wiesbaden, Schlangenbad, and others are celebrated.

**Hes'sian-Fly** [so called because it was believed to have been brought from Germany by the Hessian troops during the Revolution], the *Cecidomyia destructor*, a dipterous insect which is very destructive to wheat in parts of the U. S. In spring and autumn the larvæ crawl in between the stalk and the sheath of a leaf, and remain near the ground, head downward, sucking the juice. In five or six weeks they enter a semi pupa or "flaxseed state," from which they go into the pupa, and then become perfect insects. They are destroyed in great numbers by insect parasites, and burning the stubble in the autumn will destroy a great proportion of their larvæ.

**Hes'yebasts** [Gr. *ἡσυχασταί*, "quietists"], a body of mystics in the Greek Church, chiefly monks of Mt. Athos, who professed that by retirement and contemplation they could come to behold the divine glory called the "Lamb of light," because it was regarded as the same as that which shone at Christ's transfiguration on Mt. Tabor. They believed that the best position they could assume for beholding this light was to sit and gaze upon the navel. They flourished in the fourteenth century, but the heaven of their doctrine is not yet extinct in the East. Barlaam was their great opponent.

**Hesych'ius** [Ἡσυχῆος], a grammarian of Alexandria, under whose name a valuable Greek lexicon has come down to us. Nothing is known of his life, and his date is so uncertain that critics vary in regard to it from 300 A. D. to the tenth century. The former, more generally accepted, and the forms and references which imply a later date are believed to be interpolations. The work is based on the con-



lier lexicon of Diogenianus, and is valuable as containing explanations of words and forms and literary and archaeological information derived in part from writers now lost. The explanations of words from the Scriptures and from Christian writers are the additions of later hands. The best editions are by Alberti and Ruhken (Leyden, 1746-76, 2 vols., fol.), and by M. Schmidt (5 vols. 4to, Jena, 1858-61); the *Glossæ Sævæ* separately by Ernesti (Leipsic, 1785). (See RANKE, *De Lex. Hesych. vera origine*, etc., Quædlinburg, 1831.)

H. DRISLER.

**Hesychius**, of Miletus, a philosopher and historian, surnamed Ἰλλούστριος (the Latin *illustris*), lived in the sixth century A. D. under the emperor Justinian. He wrote a synoptical history (Ἱστορικὸν ὡς ἐν συνόψει κοσμικῆς ἱστορίας) of the world, in six parts, from Belus, king of Assyria, to the death of Anastasius I. Of the sixth part a portion, relating to the origin of Constantinople, still remains. He was also the author of a work treating of persons distinguished for their learning (Περὶ τῶν ἐν παιδείᾳ διαλαβάντων σοφῶν), arranged under the letters of the alphabet, probably extracted from the work of Diogenes Laertius. Best edition of both treatises by Orelli (Leipsic, 1820).

H. DRISLER.

**Heterocer'cal** [Gr. ἕτερος, "another," and κέρκος, "tail"], a name applied to the tails of those species of fish which have the vertebral column extended into the upper lobe, which is the larger of the two. A symmetrical fish-tail is called *homocer'cal*. The terms were introduced by Agassiz. The cartilaginous fishes and many extinct species have heterocer'cal tails, and fishes with homocer'cal tails have, while imperfectly developed, tails of heterocer'cal character. This fact was formerly held to indicate a relatively low rank for fishes with heterocer'cal tails; but this opinion is not generally accepted.

**Heteropy'gia** [from ἕτερος, "abnormal," and πύγι, "anal region"], a group of fishes represented by a single family (Amblyopsidae), belonging to the order Teleostei and the sub-order Haplomi, and especially distinguished by the abnormal position of the vent under the opercular region, and consequently far in advance of the pectoral fins (and hence the name). The fishes are subfusiform in outline, with minute scales on the body, but none on the head, with the dorsal and anal fins opposite to each other, and with the ventral fins very small and abdominal or entirely wanting. The margin of the upper jaw is formed wholly by the intermaxillaries. The intestinal canal has two turns; the stomach is well defined and caecal; and pyloric appendages are present. The species are viviparous. To this family belong four species, which have been referred to three distinct genera: (1) *AMBLYOPSIS* (which see), including the celebrated large blind fish of the Mammoth and some other caves of Kentucky and Indiana (*Amblyopsis spelæus*), in which there are no functional eyes and ventral fins are present; (2) *Typhlichthys*, represented by a small species (*Typhlichthys subterraneus*), which is also found in the Mammoth Cave, as well as in some other subterranean streams in Kentucky, Tennessee, and Alabama, which is also destitute of eyes, but has no ventral fins; and (3) *Chologaster*, containing two species (*C. cornutus*, Ag., discovered in rice ditches in Carolina, and *C. Agassizii*, Putnam, found in subterranean streams in Tennessee), both having eyes and being destitute of ventral fins. *Amblyopsis* and *Typhlichthys* have each a single pyloric appendage on each side, and the ovary is at each side of the stomach, and the head has tactile ridges; while *Chologaster* has two pyloric appendages on each side, and the ovary is placed behind the stomach, and the head is without ridges. The species of *Amblyopsis* sometimes reaches nearly five inches in length; those of *Typhlichthys* and *Chologaster*, less than two. The affinities of these fishes have been generally supposed to be with the killifishes or minnows (Cyprinodontidae), but their relation to those forms is not close, although there is some resemblance in general appearance.

Much speculation has been spent upon the question of the origin of the blind fishes, but it is sufficient to state that they are very closely related to perfectly seeing fishes (*Chologaster*) found in the streams of the same region, and that at the same time there are other differences between the two forms than those of sight; therefore we cannot attribute the parentage of the blind fishes directly to the eyed ones. Inasmuch, however, as we know by experiment and the occurrence in entire groups of animals of the tendency towards atrophy of parts that are disused, it is tolerably certain that the want of sight could be readily effected by confinement to dark caves, and we should doubtless search for the original progenitors of the blind fishes in formerly existing eyed ones. (See PUTNAM (J. W.) in *Annual Report of the Peabody Academy of Science* for 1871, and in *American Naturalist* for Jan., 1872.)

THEODORE GILL.

**Heteroso'mata** [from ἕτερος, "unequal," and σῶμα, "body"], a sub-order of teleocephalous fishes, peculiar among the vertebrates in the asymmetry of the body, to which the name alludes. The animal is very much compressed, with dorsal and abdominal edges trenchant, and generally it rests on the sandy or muddy bottoms of the water flat on one side, and hence the inferior is white, while the side which is kept uppermost is dark; the ventral fins are jugular or thoracic; the dorsal and anal fins very elongated; the scapular arch is destitute of a mesocoracoid bone. They are most nearly related to the cod-fishes and allied tribes. In the early embryonic stage these fishes are symmetrical, but they very soon assume that dissimilarity of the sides which is characteristic of the mature condition. Their development has been studied by Malm, Steenstrup, Thompson, Traquair, Schröde, etc. Steenstrup (1864) contended that the combination of the eyes on one side was effected by a transfer of the upper one from the blind side through the tissues below the arch formed by the frontal bone of its own side to the opposite one. But a more consecutive study of the development and anatomy of the various forms seems to establish the fact that this transfer is rather effected by a rotation of the eye and contiguous parts from the one side to the other. The rotation of the eye has been explained on the principle of its tendency, while the fish is yet young and symmetrical, but prone to lie on one side, to turn towards the light; this tendency, confirmed and established by slow degrees, finally culminated in the habit now universal. The least generalized of this type is the *Reinhardtus hippoglossoides*, a kind of halibut found in the Arctic seas and as far S. as the Banks of Newfoundland. The sub-order embraces two families (PLEURONECTIDÆ and SOLEIDÆ) and numerous species.

THEODORE GILL.

**Heth**, tp. of Harrison co., Ind. Pop. 1615.

**Hetman**. See ATAMAN.

**Hetz'el** (PIERRE JULES), b. at Chartres in 1814, began as the partner of Paulin, the celebrated publisher of the works of the greatest modern French writers. In 1848, Hetzel exercised a great influence in favor of the republican movement, and occupied several offices in the capacity of an under-secretary in two ministries, and finally as general secretary of the executive power. During the empire Hetzel busied himself exclusively with publishing the books of Victor Hugo, Georges Sand, etc., and he wrote also, under the pseudonym of "Stahl," some highly moral books, like *The Familiar Moral*, *A Student's Travels*, *New and Safe Adventures of Tom Thumb*, *The Spirit of Woman and Women of Spirit*, etc.

FÉLIX AUCAGNE.

**Heug'lin, von** (THEODOR), BARON, b. at Hirschlanden, Württemberg, Mar. 26, 1824; travelled in the East 1850-52; became Austrian consul at Khartoom, and explored Abyssinia and the White Nile Valley 1852-54; travelled along the Gulf of Aden and the shores of the Red Sea 1856-58; from 1860 to 1865 was again engaged in African explorations; made a journey in the region of Spitzbergen and Nova Zembla 1870-71. Author of *Reisen in Nordostafrika* (1857), *Ornithologie Nordostafrikas* (1860), *Systemat. Uebersicht der Säugethiere Nordafrikas* (1867), *Reise nach Abessinien*, etc. (1868), *Reise in das Gebiet des weissen Nil* (1869), etc. D. Nov. 5, 1876.

**Heus'ser** (MRS. META), the best female song-writer in the German language, and a woman of rare genius sanctified by deep piety, b. Apr. 6, 1797, the fourth daughter of Pastor Diethelm Schweizer, in the mountain-village of Hirzel, canton Zürich, Switzerland, within 8 miles of Mount Rigi, where she resided till her death Jan. 2, 1876. She married Dr. Heusser, an eminent physician, and became the mother of a large family, but her household duties did not prevent her from singing "like the bird on the tree," giving utterance to her love of nature and nature's God, and the joys and sorrows of her heart. She never dreamed that her lays would ever be given to the world, but her friends thought differently, and after many vain efforts they obtained her consent to publish anonymously some of them in Knapp's *Christoterpe* (1834). They were most favorably received, and passed into many collections and German hymn-books of Europe and America. In 1857, Albert Knapp edited a volume of her poems (under the title *Lieder einer Verborgenen*), which was followed by another volume (Leipsic, 1867) under her real name, which at last became generally known. A selection from both volumes has recently been translated into English by Miss Jane Borthwick (translator of *Hymns from the Land of Luther*), under the title *Alpine Lyrics* (Edinburgh and London, 1875). Koch, in his *History of German Church Poetry* (3d ed.), well characterizes her poems in these words: "From contemplation of the glorious Alpine world, and the atmosphere of spiritual freedom which she daily and hourly breathes out of the Sacred Scriptures, have sprung



the tender yet deeply reflective poems which have made Meta Heusser the most eminent and noble among all the female poets of our whole Evangelical Church. Her lays flow freely from the fresh fountain of a heart in constant, holy communion with God." PHILIP SCHAFF.

**Heus'tis** (JABEZ WIGGINS), M. D., b. in 1786 in St. John, N. B. It is believed he graduated in the College of Physicians and Surgeons of New York City; made a cruise in a man-of-war as surgeon's mate, and on his return was appointed surgeon in Gen. Jackson's army, and served throughout the Southern campaigns. Dr. Heustis was a ready writer, and from 1816 to the time of his decease, which occurred from blood-poison contracted by a puncture made while operating, he wrote on the topography and diseases of Louisiana, etc., and contributed largely to the *American Journal of Medical Sciences*. In 1835 he removed from Cahawba (where in 1825 he was selected to welcome La Fayette) to Mobile, but was at the Talladega Springs when he d., 1841. Few in the South were more active in the profession than he, or more deserving.

PAUL F. EVE.

**Heves**, town of Hungary, carries on a considerable trade in wine, wheat, tobacco, flax, and hemp, raised in its vicinity. Pop. 5700.

**Heves** (JOSEPH), a signer of the Declaration of Independence, b. of Quaker stock at Kingston, N. J., in 1730; was educated at Princeton, and went into business, first in Philadelphia, and then at Edenton, N. C.; was a member of the General Congress from North Carolina 1774-77, and again in 1779. In Congress he took a prominent part in the performance of public business. D. at Philadelphia Nov. 10, 1779.

**Hew'it** (AUGUSTINE FRANCIS), a Roman Catholic (Paulist) priest, a son of N. Hewit, b. at Fairfield, Conn., in 1820; graduated at Amherst in 1839; studied theology at East Windsor, Conn., and became an Episcopal minister. In 1846, while residing in North Carolina, he became a Roman Catholic; was ordained in 1847; joined the Paulists in 1848, and afterwards was appointed professor of philosophy, theology, and Holy Scripture in the Paulist seminary, New York. Author of *Problems of the Age, Light and Darkness*, and of several translations, and of many articles in periodicals.

**Hewit** (HENRY STUART), M. D., b. at Fairfield, Conn., Dec. 25, 1825; studied at Yale College; was a pupil of Drs. Van Buren and Mott; graduated 1847 at New York University; was an assistant surgeon (1847-52) in the U. S. army, serving in Mexico and on the Pacific coast; practised three years in California; became a Roman Catholic 1855; returned to New York; served 1861-65 as a surgeon of volunteers on the staffs of Gens. Grant, Schofield, etc.; was eminent for charitable labors. Son of Rev. Nathaniel

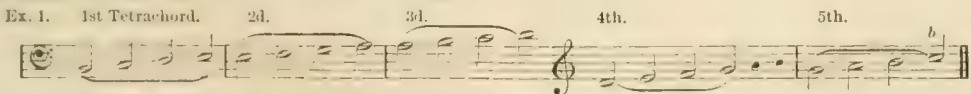
Hewit and grandson of James Hillhouse. D. in New York Aug. 19, 1875.

**Hewit** (NATHANIEL), D. D., b. at New London, Conn., Aug. 28, 1788; graduated at Yale in 1808; taught for some years, and in 1811 was licensed to preach; studied theology at Andover; held Presbyterian and Congregational pastorates at Plattsburg, N. Y., 1815-17, and at Fairfield, Conn., 1818-27; engaged in the temperance reform 1827-30; held pastorates at Bridgeport, Conn., 1830-62, receiving an assistant in the latter year. He was one of the founders of the East Windsor (now Hartford) Theological Seminary, and an able and eloquent defender of the Old School theology. D. Feb. 3, 1867.

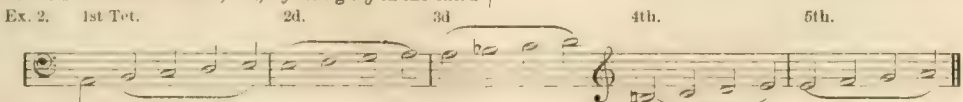
**Hew'itt** (ABRAHAM STEVENS), A. M., b. at Haverstraw, N. Y., July 31, 1822; graduated at Columbia College 1842; studied law, but engaged in the manufacture of iron; was commissioner to the French Exposition of 1867; was elected in 1874 to the 44th Congress (1875-77) from the Tenth district of New York; has been secretary of the Cooper Union for the Advancement of Science and Art, New York City, from its organization to the present time (1875); and is widely known as an expert in questions relating to the iron manufacture. Author of the official *Report on the Iron and Steel of the Universal Exposition of 1867*.

**Hew'ston** (GEORGE), A. M., M. D., b. at Philadelphia Sept. 11, 1826; graduated A. M. at the Central High School, Philadelphia, 1845; M. D. at the Philadelphia College of Medicine 1850; received the same degree in 1860 from the University of Pennsylvania; was professor of anatomy in the first-named medical college, and afterwards became professor of the theory and practice in the University of California, a position which he still holds (1875); was supervisor of San Francisco 1873-75; president of the Odd Fellows' Library of San Francisco, etc., and member of various scientific societies.

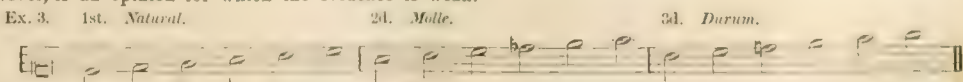
**Hex'achord**, in music, a series of six notes in direct succession, forming a portion of a scale. The extension of the musical scale and its division into hexachords are attributed to Guido, a monk of the eleventh century. Under the system of the ancient Greeks, which continued for ages to influence all music, both ecclesiastical and secular, the scale was divided into *tetrachords*, or portions of four notes each. As the Greek scale comprised only about fifteen notes, or two octaves, these tetrachords could not apparently exceed four and a fraction in number; but the Greeks, by an ingenious use of some extraneous elements, obtained no less than five. According to our modern reckoning—taking B in the bass, as the Greeks did, and following their mode of division—the four tetrachords would not fill the double octave, and a fifth tetrachord added would reach beyond it, as at *a, b* in Ex. 1:



But under the Greek system the five tetrachords were obtained—1st, by adding an initial note A, which note was called the *Proslambanomenos*; 2d, by using B $\flat$  in the third

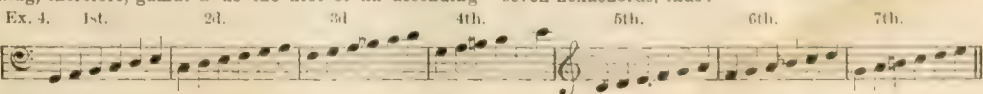


It is evident that the fourth and fifth of these tetrachords are merely repetitions in the octave of the first and second, but, as Dr. Burney remarks, "the several sounds of which they are composed have in the Greek music different denominations," and also were no doubt different in their treatment and effect. Guido's system, imperfect and unsatisfactory as it is, was nevertheless an advance towards the modern and only rational system of the division of the scale—viz. into successive *octaves*. It is commonly supposed also that Guido invented the mode of writing his hexachords and other music on lines and spaces. This, however, is an opinion for which the evidence is weak.



It is known, however, that in Guido's time more notes than these were in use, he himself having invented the gamut, which began on the lower line of our modern bass staff. Taking, therefore, gamut G as the first of an ascending

series of notes, and E of the last example as its termination, we have a succession of twenty-two notes (including B flat), which admits of easy arrangement in the form of seven hexachords, thus:





The system of hexachords is of no practical use in modern music, being superseded by the simple and natural division of the scale on the normal type of the series of notes forming the octave.

WILLIAM STANTON.

**Hexam'eter** [Gr. ἑξαμέτρος, "of six metres," ἕξ, "six," μέτρον, "measure"], in Greek and Latin prosody, is the name of the heroic verse of Homer, Virgil, Ovid, and others. Ancient rhythm is based chiefly on the distribution of long and short syllables, while the less delicate ear of the moderns is satisfied with the alternate presence or absence of accent. Taking a succession of Virgil's lines (bk. 1, l. 8-10)—

Mā'sā mī' | hī cāv's | ās mēm'ō | tī, qvō | nū'mīnē | hē'so, |  
qvīp'ē dū' | tē's, rēg | ī nū'c | ās, tōt | vōl'vērē | cāv's |  
īnsī' | nū'mīnē | tī tē vī | tō, tōt | ās | tōt | ās.

and representing them in English, syllable for syllable and accent for accent,

Mūse relate | those trea | sūnsconsum | mātēd, | cāuses of | tōrture,  
whence the ob | dinate | quīnē | fūm | d gō's | dīvīnā | hī |  
sūp | r'vōr mī's | vīr'te, an | dē'such m | pō'sing mī's | tōrture.

we find that the feet are composed of dactyls (— ' ') and spondee (— —), with the accents entirely absent or present at any point—in some cases (as mā'sā mī'—) two being present in a single dactyl. Looking farther, we find that any foot from the first to the fourth may be dactylic or spondaic at pleasure; the fifth in nearly every case is a dactyl, and the sixth a spondee. This recurrence of final dāc'y'lūs-spōndēe would not be sufficient to enable the listener to seize the metre; he is therefore aided by an initial accent on each of these feet (see ADONIC VERSE); and, as if this were not enough, Virgil in many cases separates them from the four feet with mixed accents, by making the fifth foot accentless, or what we may term *neutral*, because it has neither the irregular accent of the earlier feet nor the regular accent of the close. The following is a longer specimen (bk. 1, l. 23-33):

Remembering this, Saturnia, thinking o'er various conflicts  
waged at Troy's stronghold for Argōs, dear to remembrance:  
not now had grief availed, causes resentful escaped from  
her angry soul. Paris, whose verdant rankles sorely her bosom,  
a stigma on slighted form, and also still in Ganymede,  
a nation despoiling cruelly for evils unrepit'd,  
she (these urging) scatters far from Latium the Trojans  
over wide ocean—those relies left by ruthless Achædes  
and Grecian heroes. Many years they wander'd in sailing  
atond thrō' num'rous waters, fite alluring them onward.  
Founding such a nation, requir'd these adūs laboris.

To an ear trained to the strong accent of German and English verse the rhythm of such lines is not readily appreciated, and accordingly efforts have been made to prove that the *Æneid* must be commended with "Arma virumque cāno," instead of cāno: for, according to Priscian, no Latin words have a final accent. Richard Roe (*Principles of Rhythm*, 1823) goes so far as to say of the ancients that "there is reason to believe that their perceptions of quantity were confused and imperfect"—where the imperfection is his own.

The misnamed hexameters of Southey, Coleridge, and other moderns are mere hexametroids, or accidental hexapodies in mixed rhythm, and without dactyls and spondee, as shown in two of Prof. Longfellow's lines, in which "rudly" is supposed to be a spondee, and "then through those" an equivalent dactyl:

Filling it | full of | fives and the | nū'fī's | fuses of | children. . .

Then through those realms of shade, in multiplied reverberations,  
the second line of which has quantitative matter enough for seven feet, and other lines would pass for distichs of *Hiawatha*, as—

Lauds | burg is | not for | zation, |  
nor Ban | Sō air, | nor Port | Royal. |

These spurious hexameters belong to what Guest (*English Rhythms*, i. p. 177) mentions as "these slovenly verses the 'tumbling' metre. . . the impudent license of the tumbling metre." Such forms tend to the perversion of Latin scansion, and to the destruction of just ideas of the nature of feet. They have neither the rhythm of Latin nor of English verse, but, on the contrary, they constitute an offensive system which is tolerated only because it is supposed to be classic.

S. S. HALDEMAN.

**Hex'apla** [Gr. "the sixfold"], a celebrated edition of the Septuagint text of the Old Testament, the original Hebrew, the Hebrew in Greek letters, the Greek versions of Aquila, Symmachus, and Theodotion. Besides these, there were columns containing parts of three other Greek versions, whose authors are not known. Origen was the author of this great work, which he originally prepared as a tetrapla, giving four columns only. The Hexapla had also marginal notes, and marks indicating variations, retrenchments, and additions in the texts. The Hexapla is not extant except in fragments, of which the most complete edition is that of the Benedictine Montfaucon (2 vols. folio, Paris, 1714).

**Heyst-op-den-berg**, town of Belgium, in the province of Antwerp, has some cloth-factories and corn-mills. Pop. 5676.

**Hey'ward** (THOMAS, JR.) was b. in St. Luke's parish, S. C. in 1716, and was the son of a wealthy planter, Col. Daniel Heyward. The son studied law in London, and was early and prominently connected with the Revolutionary movement in North Carolina. He was (1775-78) one of the signers of the Declaration of Independence, and was afterwards a judge in his native State, holding also a military command. He was 1789-81, a prisoner in the hands of the British. D. in Mar. 1809.

**Hey'wood**, town of England, in the county of Lancaster, on the Roach, has large iron-foundries and extensive manufactures of cotton fabrics. Pop., with surroundings, 19,454.

**Heywood** (CHARLES), U. S. M. C., entered the marine corps as second lieutenant Apr. 5, 1858; became first lieutenant early in 1861, and captain in November of that year; served on board the Cumberland in her encounter with the Merrimack, Mar. 8, 1862, and in the flagship Hartford at the great battle of Mobile Bay, Aug. 5, 1864; and is very highly spoken of in the despatches of his commanding officers. Received the brevets of major and lieutenant-colonel for "gallant and meritorious conduct."

FOXHALL A. PARKER.

**Hey'worth**, post-v. of Randolph tp., McLean co., Ill., on the Illinois Central R. R., 12 miles S. of Bloomington. Pop. 300.

**Hezeki'ah** ("The Lord hath strengthened"), thirteenth monarch of Judah, son and successor of Ahaz. He reigned twenty-nine years (726-697 B. C.). He was a devout man, a severe enemy of idolatry, and the restorer of the ancient worship. He warred successfully against the Philistines, and refused to pay the established tribute to Tiglath-Pileser, king of Assyria, in consequence of which Jerusalem was besieged, and Hezekiah was forced to purchase peace by a heavy mulct in silver and gold and by the loss of parts of his dominions. It is probable that Sennacherib, the Assyrian general, next marched into Egypt to punish the Ethiopians and Egyptians, Hezekiah's allies, that he was repelled by Tirhakah, and that the miraculous destruction of 185,000 Assyrians took place in a second invasion, after the failure of the Egyptian campaign. Hezekiah was soon after visited with a severe sickness, from which he was miraculously healed. The remaining years of his reign were peaceful and prosperous. D. 697 B. C.

**Hiacoomes**, an Indian minister of Martha's Vineyard, b. about 1610; converted under the preaching of Thomas Mayhew; learned to read, and began himself to preach in 1653 to his people, among whom he labored with much success and with great faithfulness. In 1670 he was ordained by Eliot and Cotton as pastor of the Indian church of Martha's Vineyard, organized in that year. He is believed to have been the first Indian convert in New England. D. about 1690.

**Hiawas'see**, post-v., county-seat of Towns co., Ga., 85 miles N. of Athens.

**Hiawa'tha**, post-v., cap. of Brown co., Kan., 42 miles W. of St. Joseph, on the St. Joseph and Denver City R. R. It has 4 churches, 1 bank, 1 newspaper, a steam flouring-mill, 2 grain elevators, 2 hotels, several schools, and the usual number of stores. It is situated in a fine agricultural region, with excellent water-power. Pop. about 800.

A. N. RULEY, ED. "DISPATCH."

**Hib'bard** (BILLY), b. at Norwich, Conn., Feb. 24, 1771; joined the New York Methodist conference 1798, and labored with great success in New York and New England. D. Aug. 17, 1844. His memoirs have been published.

**Hibbard** (FREEBORN GARRETSON), D. D., b. at New Rochelle, N. Y., Feb. 18, 1811; entered the Methodist Episcopal ministry; labored 1830-60 chiefly in the State of New York; was editor of the *Northern Christian Advocate*, Auburn, N. Y., 1860-64; resumed active labor, and became presiding elder of the Geneva district. Author of *Baptism* (1841), *Geography and History of Palestine* (1845), a work on *The Psalms* (1852), *The Religion of Childhood* (1864); edited the *Sermons* (1869) and the *Works* (2 vols., 1872) of Bishop Hamline.

**Hiberna'tion** [from the Lat. *hibernus*, "pertaining to winter"], a condition into which certain mammals (bats, rodents, Insectivores, bears, etc.) and many inferior animals, both vertebrate and invertebrate, pass in cold weather, the temperature of the blood being lowered nearly to that of the air, and many of the vital functions entering a state of abeyance. The power of the will over the muscles is quite suspended, and respiration is nearly abolished, while the muscular irritability in the case of the higher



hibernating animals is remarkably increased. Meanwhile a very great loss of weight occurs from the slow destruction of the store of fat which the animal has laid up in the autumn. It is evident that animals feeding on insects and succulent vegetables could never survive a northern winter but for the state of hibernation which suspends the need of food. Accordingly, while northern bats and some bears hibernate, those of tropical regions do not do so.

Somewhat analogous to hibernation is the long slumber which many reptiles, mollusks, and other inferior organisms undergo in the dry season in very hot countries. The animal becomes more or less completely desiccated, and from the loss of moisture the functions of life are suspended. This suspension also serves to preserve animal life in very untoward conditions. Cuvier states that the tenrecs (Insectivores) of Madagascar remain torpid through the hot season, but this statement has been denied.

**Hibernia, Ibernia, Ivernia, and Ierne** are the names under which Ireland is mentioned by the ancient writers—by Aristotle, Diodorus Siculus, Strabo, Pomponius Mela, Pliny, and Ptolemy.

**Hibernia**, post-v. of Morris co., N. J.

**Hibiscus** (Gr. *ἵβισκος*), a large genus of malvaceous trees, shrubs, and herbs, often with large and showy flowers. The herbaceous species are numerous in the U. S., and are known as rose-mallows. Among the cultivated species are the *Gumbo* (which see), the *H. cannabians*, or Decaenae hemp of India, a useful fibre-plant, and *H. Syriacus*, the ornamental, shrubby althaea of gardeners. Other species, mostly tropical, are cultivated for their fruit or seeds or the beauty of their flowers. One of the most interesting species is *Hibiscus tiliaceus*, a very large but not tall tree, growing in Florida, the East and West Indies, and the South Sea Islands. Its wood is light, tough, and very useful; its bark yields material for matting and cordage, and the same bark is used as food in the Pacific Islands.

**Hib'ler**, tp. of Edgefield co., S. C. Pop. 1607.

**Hic'cough**, or **Hic'cup** [Lat. *singultus*], a clonic spasm of the diaphragm and of the glottis, accompanied by a sharp sound, produced by the rush of air into the larynx from without. It may attend an over-distension of the stomach with food, and sometimes accompanies intoxication. In young children it often is the forerunner of intestinal disturbances. When persistent, it is, in some diseases, such as low fevers, peritonitis, and gangrene, a rather grave symptom. Lumps of ice frequently swallowed or small doses of antispasmodic medicines will usually relieve obstinate hiccough.

**Hick'man**, county of Kentucky, bounded on the W. by the Mississippi River. Area, 240 square miles. It is level and fertile, producing tobacco and corn as the chief staples. It is traversed by the Mobile and Ohio R. R. Cap. Clinton. Pop. 8453.

**Hickman**, county of W. Central Tennessee. Area, 350 square miles. It is a hilly and fertile region, having good water-power and deposits of iron ore. Cattle, corn, tobacco, and wool are staple products. Cap. Centerville. Pop. 9856.

**Hickman**, tp. of Scott co., Ark. Pop. 1310.

**Hickman**, city, cap. of Fulton co., Ky., on the Mississippi River, at the terminus of the Nashville Chattanooga and St. Louis R. R. It has 2 academies, 6 churches, a city library, a steam furniture and wagon factory, and several steam flouring-mills. The Masons, Odd Fellows, and Good Templars have flourishing lodges here. It has 1 weekly newspaper. Pop. 1120, composed largely of Germans.

GEO. WARREN, Ed. "Courier."

**Hick'man's**, post tp. of Tusculum co., Ala. Pop. 592.

**Hick'ok** (LAWRENCE PRESSER), D. D., LL. D., born at Bethel, Conn., Dec. 29, 1798; graduated at Union College 1820; ordained and settled as pastor of the Congregational church at Kent, Conn., 1824; removed, and again installed pastor at Litchfield, Conn., 1829; became professor of theology in Western Reserve College 1836, and in the Auburn Theological Seminary 1844; was again transferred to Union College as vice-president and professor of mental and moral philosophy 1852, where for eight years he was associated with Dr. Nott in the government and discipline of the college, and where for the eight years succeeding he had sole charge thereof, being officially inducted into the presidency only at Dr. Nott's death, 1866. At the age of seventy, in fulfillment of a purpose long cherished, he retired from all public and official station, and removed to Amherst, Mass., where he has since resided, devoting his time to philosophical studies. Besides occasional sermons and addresses, he has been a frequent contributor to such periodical publications as the *Christian Spectator*, *Bibliotheca Sacra*, *Biblical Repository*, *Presbyterian Quarterly*, etc., on various theological and philosophical themes. His more

extended published works are—*Rational Psychology* (1848), *System of Moral Science* (1853), *Empirical Psychology* (1854), *Creator and Creation* (1872), *Humanity Invented* (1872), and *Logic of Reason* (1875).

Dr. Hickok has from the first held firmly the necessary distinctions in the intellectual functions of the sense, the understanding, and the reason, and the peculiarity of his philosophy is seen in his clear idea and discriminative use of the reason. The sense perceives single phenomena; the understanding puts these together in judgments according to the relations given in experience, while the reason attains an insight of these faculties of perception and judgment, which beholds in the phenomenal relations of experience the necessary prerequisites, without which such an ordered experience could not have occurred. This knowledge of the necessary conditions for experience reaches to the distinguishable forces underlying all physics, and the life-power—a combination of force and feeling—underlying the organic world; and nature thus becomes known in its intrinsic connections, and not alone in its apparent collocations and sequences. The reason also has an insight of its own being and activity, involving a conscious selfhood and personal agency, and putting the human in a sphere of freedom and responsibility to which the mere animal never attains. In this same insight also is attained the ultimate standard of the beautiful, the true, and the good, and the whole rational region of art, philosophy, and morals lies open to man, but into which the brute consciousness never comes. The finite reason also knows the Absolute Reason as its own necessary source and original, and therein finds open the transcendent themes of doctrinal theology and practical piety. In Dr. Hickok's separate works these first principles are applied particularly to psychology, physics, aesthetics, ethics, and divinity—the same philosophy ruling unchanged in them all—but are maturely and completely developed only with the teachings of his latest publication.

J. H. SEELYE.

**Hick'ory**, the common name of trees of the genus *Carya* (order Juglandaceæ), erroneously called walnut trees in New England. The hickory trees are North American. Besides the PECAN TREE (which see), there are four species (*C. alba*, *microcarpa*, *tomentosa*, and *salicifolia*) known as shellbark or shagbark hickories, having excellent timber and nuts generally edible, the bark of the trees becoming very rough. The pignut or bitter hickories (*C. porcina*, *amara*, *myristiciformis*, and *aquatica*) have more generally a smooth bark; inedible nuts, and rather inferior wood. Hickory timber is excellent for handspikes, axehelves, spokes, barrel-hoops, and the like. It is prized as fuel, but will not stand the weather. The oil of the nuts is recommended for oiling clocks and delicate machinery. The nuts are marketed in considerable quantities. There are numerous varieties of the hickories, so that the botany of the genus is rather obscure.

**Hickory**, county in S. W. Central Missouri. Area, 414 sq. m. It is uneven, but fertile, producing tobacco, corn, wool, and live-stock. Cap. Hermitage. Pop. 6452.

**Hickory**, tp. of Carroll co., Ark. Pop. 660.

**Hickory**, tp. of Cass co., Ill. Pop. 513.

**Hickory**, tp. of Coles co., Ill. Pop. 1402.

**Hickory**, tp. of Schuyler co., Ill. Pop. 557.

**Hickory**, post-v., county-seat of Newton co., Miss., on the Vicksburg and Meridian R. R., 116 miles E. of Vicksburg. Pop. 155.

**Hickory**, a v. of Catawba co., N. C., on the Western (N. C.) R. R. It has 3 schools, 3 churches, 1 coach factory, 1 saddle and harness factory, 3 hotels, 1 tobacco factory, flour and saw mills, tannery, and 1 weekly newspaper. W. F. AVERY and J. T. MURRILL, Eds. "PILGRIM PRESS."

**Hickory**, tp. of Forest co., Pa. Pop. 513.

**Hickory**, tp. of Lawrence co., Pa. Pop. 915.

**Hickory**, tp. of Mercer co., Pa. It embraces Sharon, Sharpsville, and other villages. Pop. 7700.

**Hick'ory Flat**, post-tp. of Chambers co., Ala. P. 1460.

**Hick'ory Grove**, tp. of Jasper co., Ia. Pop. 462.

**Hickory Grove**, tp. of Scott co., Ia. Pop. 1328.

**Hickory Grove**, tp. of Warren co., Mo. Pop. 1763.

**Hickory Grove**, tp. of Grant co., Wis. Pop. 907.

**Hick'ory Hill**, tp. of Wayne co., Ill. Pop. 878.

**Hick'ory Moun'tain**, tp. of Chatham co., N. C. Pop. 960.

**Hick'ory Plains**, post tp. of Prairie co., Ark. P. 1050.

**Hick'ory Point**, tp. of Marion co., Ill. Pop. 1136.

**Hick'ory Ridge**, post tp. of Monroe co., Ark. P. 778.

**Hick'ory Tav'ern**, p. tp. of Catawba co., N. C. P. 1391.



**Hicks** (ELIAS), an eminent minister of the Society of Friends, b. at Hempstead, L. I., Mar. 19, 1748; at the age of seventeen years was placed as an apprentice to a carpenter, and became master of that trade; subsequently followed the business of building houses. In the more advanced period of his life he engaged in agriculture. When about twenty-seven years of age, he began, to use his own words, "to have openings leading to the ministry," and was "deeply engaged for the right administration of discipline and order in the Church, and that all might be kept sweet and clean, consistent with the nature and purity of the holy profession which Friends made before the world." In 1781 and subsequently he visited the meetings and families of Friends extensively through the country, working at his trade in the intervals passed at home, whereby he obtained means to pay his own expenses, declining to have them borne by the society, which made provision for its travelling ministers in necessity. He held it to be no less a religious duty to work than to preach when called, of which his journal bears frequent record, as follows: "Spent two days in my salt-meadows assisting my men in securing the hay. On my return visited a poor widow with the surplus of our provisions. . . . Closely engaged in temporal business, but did not forget my accountability to my great Lord and Master. I see no time when it would be right to indulge in idleness. . . . Occupied in collecting relief for the poor in the city of New York (1814). Labored hard in my harvest-field; and although sixty-six years of age, found I could wield the scythe nearly as in the days of my youth." Such was the high esteem in which he was held by all classes of people in his neighborhood that he was frequently chosen as an umpire to settle differences. Very early in life he denounced slavery as a crime, and preached persistently against it. As early as 1811 he published a valuable essay on the subject, and exerted constant personal influence to induce persons who held slaves to set them free. But this fell short of the measure of justice in his view, and he obtained for many of the emancipated wages for their time in addition. He was a bold and fearless preacher, both in deed and word. His religious visitations were not confined to members of his own society, but extended to distant sections of country where few such resided. His meetings were crowded by people of every sect and opinion. He was an impressive speaker, with direct and clear enunciation, of commanding presence, and profoundly serious deportment in his public appearance. The following sentence from his journal is characteristic of his career as a minister and servant of God. "Spent Second and Third days in preparing my business for setting out on my journey. As I trust and believe a dispensation of the gospel is committed to me, woe is unto me if I preach not the gospel!" He was the subject of much misrepresentation in his religious opinions by bigots and by many dissenters from the original doctrines of Friends. The name Hicksite was given as a reproach to that part of the old Society of Friends with which he continued in fellowship, but was never recognized by it or him, his true relation being well described in the memorial of the immediate meeting to which he was attached: "He felt himself called upon, under the influence of the love of the gospel, to admonish his brethren to rally to the ancient standard, the light of truth manifested in the heart, and to follow no man any farther than he should be found a follower of Christ." A journal of his religious travels was published (1832), *Observations on Slavery* (1811), and *Doctrinal Epistle* (1824). There have been published since his death a volume of his sermons and one of his letters. (See QUAKERS.) J. S. GIBBONS.

**Hicks** (THOMAS), a descendant of Elias Hicks, b. in Newtown, Bucks co., Pa., Oct. 18, 1823; came to New York to study art in 1838; exhibited a picture, *The Death of Abel*, in 1841; went to Italy in 1845, to Paris in 1848, where he studied under Couture; returned and made New York his residence. Mr. Hicks has painted composition pictures, out-door and in-door scenes, and landscapes, but his reputation rests on his portraits, of which he has painted a great number, many of distinguished men; among them, Dr. Kane in the cabin of his vessel, Dr. Cogswell in his library, Edwin Booth as Iago. He is cultivated in his profession, laborious, genial, and greatly beloved by his friends. Elected to Nat. Acad. of Design in 1851. O. B. FROTHINGHAM.

**Hicks** THOMAS HOLLYDAY, b. in Dorchester co., Md., Sept. 2, 1798; was elected to several important offices, and in 1849 became a member of the Maryland constitutional convention; was governor of Maryland 1858-62, standing firmly for the Union in those trying days; U. S. Senator 1863-65. D. at Washington Feb. 13, 1865.

**Hicks'ford**, post-v., county-seat of Greenville co., Va., 62 miles S. of Richmond, on the Petersburg and Weldon R. R., at the junction of the Gaston branch, and on the Meherrin River. Pop. 116; of tp. 2367.

**Hicks'ville**, post-v. of Queens co., N. Y., in Oyster Bay tp., on the Long Island R. R., 25 miles from New York, at the junction of the Port Jefferson branch, has 1 weekly newspaper.

**Hicks'ville**, post-tp. of Defiance co., O. Pop. 1287.

**Hi'co**, tp. of Fayette co., Ala. Pop. 286.

**Hico**, tp. of Halifax co., Va. Pop. 3576.

**Hidal'go**, county in S. W. of Texas. Area, 3200 square miles. It is bounded on the S. by the navigable Rio Grande. Most of the soil is light, and the climate is very dry. The county is adapted to pasturage. Cattle and wool are the staple products. Salt is produced from the salt-lake Sal del Rey. Cap. Edinburg. Pop. 2387.

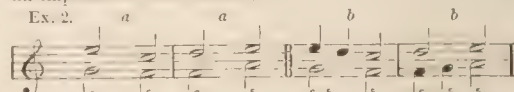
**Hid'den**, in music, a term applied to certain errors in counterpoint which are not obvious, direct, and open violations of rule, but more or less concealed, implied, or covered up. These errors are chiefly indirect or implied consecutive fifths and octaves. The rule, *e. g.*, that two perfect fifths must not immediately follow in the same parts in equal motion, is *directly* violated when we write as at *a* or *b* in Ex. 1:

Ex. 1.



But in Ex. 2, though the notes at *a, a*, do not actually *express* fifths, yet the effect on the ear is nearly as offensive as if the fifths were direct, because it is impossible to move from the first note of the upper part to the second, or from the third note of the lower part to the fourth, without *passing through* or *over* the interval of a fifth, and thus creating an impression like that at *b, b*:

Ex. 2.



Such fifths are therefore said to be "hidden" or implied, and should be avoided, either by placing the parts in contrary motion, or by a change of the harmony. That similar remarks will apply to hidden *octaves* will be evident without an example. WILLIAM STANFORD.

**Hides**, in commerce, the skins of large animals, such as domestic cattle, horses, and the buffaloes of the Old World. They appear in commerce either dried, salted, or in the undried and natural state. Hides are used chiefly in the manufacture of leather, and the fragments and waste go to the glue-maker. The hair is also saved for plasterers' use, and is used to some extent in upholstery. (See also LEATHER.) Domestic hides are those sold in the green state, and manufactured into leather in the country where produced. The hides of general commerce are the product of South America, South Africa, Australia, India, California, Russia, etc. The hides of sheep, goats, deer, etc. are known in commerce as "skins."

**Hierap'olis**, the birthplace of Epictetus, was situated in Phrygia, Asia Minor, between the rivers Lycus and Meander, and was celebrated for its warm mineral springs. Among its ruins, which are a mile and a half in circumference, is one of the most complete and best preserved Greek theatres. The place is mentioned by St. Paul in his Epistle to the Colossians (iv. 13). Its present name is *Pambook Kalesi* (the "cotton castle"), which is probably derived from the singular appearance which the deposit of the springs has given to the place. It is totally deserted.

**Hierap'olis** (*i. e.* "sacred city"), or **Bamby'ce**, a once splendid but now utterly ruined city of Cyrrhæstia, in Syria, five days' journey from Antioch, on the road to Seleucia and Babylon. It stood on a rocky barren plain, and derived its prosperity from the caravan trade. Its palmy days were under the Seleucidæ. Extensive ruins mark its site.

**Hi'erarchy** [Gr. *ἱερός*, "sacred," and *ἀρχή*, "rule"] or **Hieroc'racy**, the power, post, dignity, or office of a *hierarches*, a steward or president of sacred rites, one supreme in holy things, a high priest, a hierarch; especially in ecclesiastical Greek, the episcopate or patriarchate. The word is unknown to the classic Greek and to the Septuagint and New Testament. In the work of the sixth century, of a Neo-Platonic cast, attributed to DIONYSIUS the ALEXANDRINE (which see), the angelic orders are the prototypes of the ecclesiastical hierarchy. He enumerates three orders of angels, with three hierarchies in each—seraphim, cherubim, thrones; dominations, powers, principalities; virtues, archangels, angels. (See MORELL, *Diet. Historique*.) Milton adopts in *Paradise Lost* every one of these titles, though he does not use them all in any one place or in the order given. The word *hierarchy* came to be applied to



the orders of clergy in the Christian Church—the ecclesiastical hierarchy. It is sometimes transferred to other spheres of government, as the political, military, social hierarchy—the hierarchy of the court of Constantinople. It is, however, most commonly applied to the orders of clergy in the Christian Church, the ecclesiastical hierarchy, or to the body of priests in the various systems, in which they are regarded as divinely instituted administrators of holy things. It is also applied to the rule which they exercised as at once priests and civil magistrates—the Egyptian, the Hindoo, the Hebrew hierarchy.

Among the Hebrews the administration was hereditary. It was a lineal hierarchy, and its headship was in the high priest. In the Christian Church the hierarchy is the government of the Church by the clergy. It took its historical shape as the congregations increased in number and came into closer conjunction. The government of the Church is conceded to have originally been, at least relatively, popular in part (democratic hierarchy), and to have changed more and more into a spiritual aristocracy (aristocratic hierarchy). The line of historical advance is generally supposed by Protestant writers to have been from a government of perfect co-ordination among the presbyters—bishops of a congregation to the congregational and parochial episcopate, then to the diocesan episcopate. From this arose the metropolitan system, in which a governmental superiority was exercised by the bishops of the chief cities of the provinces. Then came the system of patriarchates, under which the bishops of the great sees of Rome, Constantinople, Antioch, Alexandria, and Jerusalem were recognized as patriarchs of the metropolitan. Civil events destroyed the prominence claimed for the last three. The tendency to unification remained fixed at the patriarchate in the Eastern Church, but advanced in the Western Church till it culminated in the papacy. Among the earlier representatives of this tendency was Leo I. (440-461). In the ninth century this papal hierarchy was greatly strengthened by the PSEUDO-ISIDORIAN DECRETALS (which see). They systematized and professed to give historical vouchers for the tendency of the era, which made the pope a spiritual monarch, regent and lord of Western Christendom, to whose rule neither princes nor councils were able to put any well-determined limits. This great hierarchy, preserving the unity of its purpose and plan amid the confusions of the time, supplementing by moral power the feeblenesses of civil rule, preserved order when social life without such a bond might have been reduced to chaos. Something governmentally equivalent to the papacy was a necessity of the Middle Ages. From the eleventh century to the thirteenth it had a political supremacy which was not successfully challenged. This it owed especially to several popes of distinguished ability and force of character. Gregory VII. (1073-85) is more readily recalled by his earlier name, Hildebrand, which made Hildebrandism the synonym of that hierarchical system of which he was so great a master. Clear in vision, iron in will, cautious and bold, he did much to subordinate the civil authority to the ecclesiastical. He made the papacy a universal theocracy of all Christian states, with the pope as Christ's vicar, by whom kings reigned; people and princes were simply, in different degrees, the virtual subjects of the pope. Innocent III. (1198-1216), in many respects the greatest of the popes, whose history is the history of his era, finished the work of Hildebrand and brought the hierarchy to the summit of its glory and power. Political independence and unlimited spiritual authority were the objects of his struggle. He brought to it the greatest qualities of Hildebrand, with others of the highest order, and the mightiest powers of Christendom bowed before him. Boniface VIII. (1294-1303), not inferior in intellectual force to his predecessors, but destitute of their nobler qualities, urged to the extreme point their principles of domination over the temporal power. As in him the loftiest assertion of the hierarchical claims to power over the state came to a crisis, so with his reign began that great reactionary movement of the fourteenth century by which that power was narrowed in various ways. His great opponent was Philip (IV.) the Fair of France (1268-1314). The pope interfered as umpire in the war between France and England, and in favor of the latter. The pope sent a legate; the king threw him into prison; the pope pronounced the king a heretic; the king called the pope a fool; the pope issued a bull; the king burned it; a council excommunicated the king, and the agents of the king seized the pope on his throne and held him captive. The Roman people said of him, "He crept in like a fox, he lorded it like a lion, and died like a dog." But harsh judgment did not cease with his death. He has been "damned to everlasting fame" by Dante, who assigns him a place in hell, as a Simonist, between Nicholas III. and Clement V. The French king came forth victorious in this conflict. Clement V. (1305-77) was the mere

tool of the French policy, and formally transferred the curia to Avignon, where it remained during the "Babylonian exile" (1305-77). The French party elected John XXII. (1316-44). In the contest between Louis of Bavaria and Frederick of Austria for the imperial crown, John took sides against Louis. Louis was chosen by the electors; appealed to a general council against the pope; was excommunicated (1324); was crowned at Rome (1327); procured the temporary deposition of John, and the nomination, though not the permanent establishment, of Nicholas V. as a counter-pope. The residence of the popes in France, the great schism (1378-1429), with one pope at Rome, another at Avignon, for a time three popes (1409), the great reformatory councils of Pisa (1409), of Constance (1414-18), of Bâle (1431-43), and the character and conduct of John XXIII. and other popes, greatly weakened the papacy. Though it seemed to come forth triumphant from the struggle, it had received deep wounds. The Church was yearning for reformation. Many symptoms of reaction from the Hildebrand type were manifest, and at length the great struggle of the sixteenth century began.

The influence of the Reformation on the hierarchical claims was very marked. The part of European Christendom which sympathized with that movement entirely rejected all these claims. All the Reformers, and none more radically than Luther, declared in the most uncompromising manner against the whole hierarchical system. But even the states which adhered to the Roman Catholic Church found their power increased by the new tendencies of the minds of men. Vast changes took place in political relations, and the powers claimed for the pope were more and more restricted. Various concordats marked the definition and limitation of the hierarchical power. The progress of events has made the civil and hierarchical powers more completely independent of each other. Civil constitutions, the regulation of police and finance, show the influence of the modifications of the polity of the Church. (See POLITY, ECCLESIASTICAL. For the latest history of the hierarchy see PITS IX.)

The divisions of hierarchical power made in the theology of the Roman Catholic Church may be stated thus: I. The authority which belongs to the Church is connected either with her agency as the distributor of divine grace and blessings, especially of the sacraments, or with the preservation and control of the Church's life. In accordance with this, the power correspondent with the authority is divided either into three parts, *potestas ordinis*, *magisterii*, and *jurisdictionis* (so Walter, Hinschius), or into two, the *potestas ordinis* (the power derived from ordination, and embracing the *potestas magisterii*, or teaching function) and the *potestas jurisdictionis*, or ruling authority. The second classification is that of St. Thomas Aquinas (*Bowyer*, iv. 97), and of the majority of theologians, and accords with the Catechism of the Council of Trent (ii. 7. 7). (See RICHTER, *Lehrbuch d. K. u. L. Kirchenrecht* bearb. v. Dore, Sieb. Auflage, 1874, § 91.)

II. The *potestas ordinis* respects the spiritual goods, especially the sacraments, which those in holy orders are to distribute to believers. It rests in its fulness on the bishops, from whom, by ordination, it passes over to the priests in *quantitative restriction*. The sacrifice of the mass, which is the supreme point of this power, appertains to both bishops and priests, and in virtue specially of this fact the bishops and priests constitute one priestly order—*ordo*. In apostolic times the deacons were aids to the bishops and priests, and at a later period, for the same end, there were appointed subdeacons, acolyths, exorcists, lectors, and vestiarii, all of whom receive the necessary gifts for their offices by ordination. Hence the organs of the Church in the sphere of *ordo*, the sphere of the power conferred by holy orders on bishops, priests, and ministers. Under this last name are grouped all the clergy but those of the first order, which embraces the bishops and priests. This is called the hierarchy of (holy) orders—*hierarchia ordinis*.

III. The *potestas jurisdictionis*, or governmental power, is divinely committed to the bishops and the pope. Between the diocesan bishop and the pope exist by human right the gradations of archbishops, primates, exarchs, or patriarchs. The priest, with no *potestas jurisdictionis*, exercises the *potestas ordinis* in his parish; the bishop with the *potestas jurisdictionis* rules the clergy of his diocese; the metropolitan has as his suffragans the bishops of his province; the primate ordinarily has under him several metropolitans or archbishops; the patriarch is the superior of the metropolitans; and the pope, patriarch of patriarchs, primate of primates, metropolitan of metropolitans, bishop of bishops, priest of priests, and servant of the servants of God, is earthly head of the whole Church on earth. This is the *hierarchia jurisdictionis*. (See DEDMAN, *Dict. n. d. Cultu. Catholico*, 1889.)

The hierarchy of orders is of divine institution; the hier-



rarchy of jurisdiction is of ecclesiastical institution. The former may exist without the latter, but the latter exists by virtue of the former. In the hierarchy of order respect is had to the sacramental "character" impressed in ordination; in the hierarchy of jurisdiction respect is had to degree. As regards the hierarchy of orders, the diocesan bishop and the primate are on the same level; the parish priest is the same as the vicar-general, and is the superior of the cardinals when they are deacons. It is in the hierarchy of jurisdiction the gradations exist which have been enumerated. There is also in some cases a simple honorary hierarchy. (See PASCAL, *Orig. et Raison de la Liturgie Catholique*, art. "Hiérarchie.")

The theory on which the papal hierarchy rests is that the one catholic Church of Christ on earth is a divine monarchy, under one catholic head, the pope, who is the oecumenical pastor of all the churches. The prelates under him govern particular churches, participating in the solicitude, but not possessing the plenary power, which belongs to the pope alone. To the spiritual rule, supreme in the pope and subordinate in the prelates, the whole laity, from the humblest to the most exalted, owe obedience. In the great body of the older Roman Catholic divines who have been distinguished as defenders of the hierarchy the names of those now most frequently quoted are Bellarmine and Petavius. (For the literature of recent date on the questions of the hierarchy, see PAPAL INFALLIBILITY.) In the Roman Catholic system the hierarchy is usually treated of under *Ordo*, the sacrament of holy orders. *Ordo* is defined as (1) the ecclesiastical hierarchy, or estate of the ministers of the Church; and (2) the act by which they are constituted a part of that estate—ordination. (See BAILLY, *Theol. dogm. et moral.* (Lugano, 1822), v. 340; PERRONE, *Prælect. Theolog.* (Paris, 1852), ii. 439.) "It is an article of faith that there exists in the Church a plurality of orders, constituting the sacred hierarchy—to wit, the episcopate, the presbyterate, and the diaconate." (BOUVIER, *Instit. Theolog.*) "If any man shall say that there is not in the Catholic Church a hierarchy instituted by divine ordination, which consists of bishops, presbyters, and ministers, let him be anathema." (Can. 6, Sess. 23, Council of Trent.) Under the "ministry" is embraced certainly the deacons. How many more, or whether any more, are included, is left an open question. (Bouvier, iv. 96.) The theology of the fifth and sixth centuries, in which the priestly office was greatly exalted, is sometimes styled the hierarchical theology. (See GELASIVS, LEO I.) Offences against the hierarchical government are called sacrilege of the hierarchy. The celestial hierarchy of Cellot is the rule of the Trinity, of Christ, the Virgin, and the angels in heaven. (TRIVOLX, *Dictionn. Universel*, 1710.)

In Protestant theology the term hierarchy is sometimes used in a generic sense to designate the sacred and divine rule of the Church established by Christ. The body of Protestant divines hold that Christ instituted no hierarchy in the ecclesiastical sense, but condemned it; that he endowed his Church with no civil power; and that the functions of its teachers and officers are purely moral and spiritual. From these views many of the writers of the Church of England dissent, rejecting the papal supremacy and what is involved in it, but holding in substantial the rest of the hierarchical views of the Church of Rome. (See BLUNT, *Dict. of Doctrin. and Hist.* *Theolog. arts.* "Hierarchy," "Jurisdiction.") The Lutheran Reformers (at Augsburg, 1530) rejected the whole theory of the hierarchy. Retaining the twofold division of the *potestas ordinis* and *potestas jurisdictionis*, they defined the former as covering only the ministry of the word and sacraments—the latter as involving no more than the cognizance of doctrine, the office of the keys, absolution and excommunication; and that both powers are by divine right conferred on one and the same body of ministers, all of whom are equal. (*Augsb. Confess.*, Abus. vii.) In the official reply of the Roman Catholic divines (the *Confutatio Pontifica*) they assert over against this that "the bishops not only have the power of the ministry of the word of God, but also the power of regimen and coercive correction." (Given in full in FRANKE, *Lib. Symbol.*, App. 63; HASE, *do. Prolegom.*, 84.) On this the *Apology* (xiv. 13) says: "We are satisfied with the old division of power into the *potestas ordinis* and the *potestas jurisdictionis*." It defines both in substance as defined in the Confession. The Reformers at the same time expressed their desire to retain the canonical polity and the grades existing in the Church, even though they rested on human authority, provided the bishops would cease their cruelty to the evangelical churches.

In Protestant theology the name *hierarchy* is also applied to the divinely instituted government in the three great institutions, the Family, the Church, and the State.

The literature of the subject, direct and indirect, is very large. The dogmatic and polemic works of a general kind

largely take it up. Those on the Church and the associated topics more particularly discuss it. The great names connected with special discussions of the monarchy, priesthood, power of order and jurisdiction, the papal power and infallibility, are—Sander (1571), Palatin (1794), Rocaberti (11 vols. folio, 1695-99), Pineda (1588), Maimburg (1685), Ballerini (1776), Veith (1781), Fischer (1819), Pinel (1829), Rothensee (1836-38), Ellendorf (1841), Himioben (1840), Vestermayer (1867-70), on the Roman Catholic side. On the Protestant side may be mentioned the names of Chamier (1601), Brochmand (1628), Salmasius (1608), Calixtus (1650), Hase (1871). To these are to be added the special historical works on the constitution of the Church, the hierarchy, and the papacy, and works on church polity. (See POLITY, ECCLESIASTICAL, the articles on the different forms of church government, CONGREGATIONALISM, EPISCOPAL SYSTEM, INDEPENDENCY, PAPACY, PRESBYTERIANISM; articles on the ecclesiastical orders, BISHOP, ELDER, PRESBYTER, PRIEST, DEACON, ACOYTE; ecclesiastical dignities, POPE, EXARCH, ARCHBISHOP, CARDINAL, ARCHDEACON, PRIMATE, METROPOLITAN, PATRIARCH; divisions of ecclesiastical territory, DIOCESE, PARISH, PROVINCE; rites connected with the clerical office, INSTALLATION, INVESTITURE, ORDINATION.)

C. P. KRAUTH.

**Hi'ero** [Ἱέρων], tyrannus of Syracuse, in Sicily; was victor at Olympia 488 B. C. (*Miller*); succeeded Gelon, his brother, in 478; conquered Naxos and Catana in Sicily; defeated the great fleet of the Etruscans 474, and in the same year won a victory at the Pythian games. He was a generous patron of art and letters. In 472 and 468 he won his second and third victories in the Olympic games. Pindar celebrated these victories in his odes. D. in 467 B. C.

**Hiero**, king of Syracuse, was a natural son of one Hierocles, b. before 306 B. C.; served with distinction under Pyrrhus; became general of the Syracusans; sent a supply of corn to Rome 272; routed the Mamertines at the river Longanus, and was declared king in 270 B. C.; waged a disadvantageous war with Rome 264-263 B. C., after which he was a most faithful ally of that power. He was a popular ruler, and his reign as a whole was one of splendor and prosperity. There are many coins, inscriptions, and other existing remains of Hiero's time. D. 216 B. C.

**Hierocles**, a grammarian, so called by way of distinction from the philosopher and others of the name, wrote a guidebook (Συνέκδημος), containing an account of the 64 provinces of the Eastern Roman empire, and of the 935 towns situated in them. Its date is probably about the beginning of the sixth century A. D. It was inserted by Wesseling in his *Vet. Rom. Itineraria* (Amsterdam, 1735); also edited by Bekker at the end of his *Constantinus Porphyry*, in the *Byzantine Historians* (Bonn, 1840).

**Hierocles** [Ἱεροκλῆς], a New Platonist, lived in the middle of the fifth century, and taught philosophy at Alexandria. Very little is known of his life. He wrote a commentary on the golden verses of Pythagoras, which is useful for the understanding of the Pythagorean doctrines; also a work in seven books on Providence, Fate, and Freewill, of which Photius has preserved a few fragments; and a third treating of morals, no longer extant. To this Hierocles is sometimes ascribed a collection of *Facetiae*, entitled *Ἀσπεία*, but it belongs to a later writer. The best edition of the *Commentary* is by Mullach (Berlin, 1853); of the *Facetiae*, by Schier (Leipsic, 1768) and by Eberhard (Berlin, 1869).









H. DRISLER.

**Hieroglyph'ics** [Gr. ἱερογλυφικός, from ἱερός, "sacred," and γλῶφῃ, "carving"]. All writing began with pictorial representation. As only a small part of the words in any language can be directly represented by pictures, the first step to a system that allowed of the expression of all words whatever was taken when the picture which represented any given word was allowed to represent any other word having a different meaning and proximately the same sound. This may be illustrated by supposing the picture of a gate to be made to stand also for *gai*, or for the first two letters *ga*, or for the consonant *g*. If, while the transfer is made of the signification of the character from the entire word to the single letter, the character itself is worn down into a conventional form, and a single character is adopted out of all those that might represent a letter, then the passage has become complete from the system of the pictorial hieroglyphic to that of the alphabet. All alphabets have arisen in this way, but not all hieroglyphics have reached the purely alphabetic stage.

The hieroglyphics of Egypt are the only ones that contain a literature of any value, and the term is generally applied to the Egyptian system from which it first had its name. There are scanty traces of the original picture-writing in the Assyrian and Chinese; the inscriptions from Hamath, as yet unread, are hieroglyphical, and the more civilized natives of aboriginal America had their systems

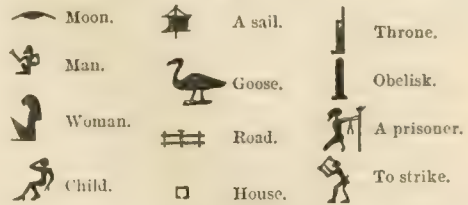


of hieroglyphics, though exceedingly rude and undeveloped. It was a false notion of the Greeks that of the three kinds of writing used by the Egyptians, two—for that reason called hieroglyphic and hieratic—were employed only for sacred, while the third, the demotic, was employed for secular purposes. No such distinction is discoverable on the more ancient Egyptian monuments, but we retain the old names founded on misapprehension. The hieroglyphics consist of full pictures carved on stone and brilliantly colored according to conventional rules or the fashion of the dynasty in which they were prepared. The characters themselves suggested to both the ancients and the moderns that they were the symbols of ideas rather than the signs of sounds. The number of these signs being a thousand or more, gave color to the idea that they were exclusively diagraphical. Greek authors even gave the meaning of a few signs. This misapprehension of the force of the characters continued till the beginning of the present century. In 1799 the famous Rosetta Stone was dug up by one of Napoleon's officers belonging to his expedition into Egypt. It contained inscriptions, partly mutilated, in hieroglyphics, in demotics, and in Greek. The name of Ptolemy occurred in the Greek, and in the corresponding portion of the hieroglyphic there was a number of characters enclosed in a ring, which it was conjectured might be the sign of a proper name. De Sacy first announced the phonetic character of these proper names, and Champollion and Thomas Young simultaneously caught the secret of the characters, and announced the combination of phonetic with ideographic elements. Fortunately, there was found at the Isle of Philæ a little obelisk with an inscription both in Greek and in hieroglyphics, containing the names of a Ptolemy and of his sister Cleopatra. A ring containing the same characters as those on the Rosetta Stone was conclusively proved thus to be the name of Ptolemy, while another ring could contain nothing other than the name of Cleopatra. Very fortunately, these two names contain the letters *P*, *T*, and *L* in common, and these were soon fixed, and the others followed. The monuments of the Roman epoch contained a large number of names in rings, and these were speedily unlocked with this key, and found to embrace a full series of the Roman emperors, with the title emperor (*αὐτοκράτωρ*) added. The names of the old Egyptian kings followed, some of them familiar, as Psammetichus and Ramses. The process thus outlined was sufficient to give the value of all the more common hieroglyphic signs. The next step was to read and translate the portions not marked as proper names. For this recourse was had to the Coptic, which was known to be the immediate descendant of the old Egyptian. Champollion first applied himself to short sepulchral monuments on which the proper names were connected by words that evidently expressed relationships. These terms he found to agree with the Coptic, and by various stages the discovery was perfected by him and by his associates in the study. The history need not be pursued farther. At present a hieroglyphic inscription may be read nearly as fluently as one in the classical languages, and apparatus for study is abundant in texts, and especially in the magnificent dictionary of M. Brugsch, published in 1867-68.

The Egyptian hieroglyphical characters are either ideographic, syllabic, alphabetic, or determinative. All writing originated in ideographs—pictures of objects to be suggested by them to the reader. The Egyptians very early passed through the pure ideographic stage into the syllabic, and even the alphabetic, but the idea of the alphabet, depending wholly on ultimate vocal analysis, never dominated in their writing, as it did in the Phœnician. Even in our own writing we employ some purely ideographic signs, like *+*, plus, and *§*, section, although they are not, like the original ideographs, pictorial. A vast number of objects could be directly drawn, as, for example, portions of the body, the head, ear, eyes, eyebrows, lips, nose, mouth, arm, hand, either open or shut, leg, foot; also numerous actions, as writing, building, and walking; also such objects external from man as sun, moon, star, the lotus-flower, the lion, water (represented by a line of waves), etc. A combination of single figures might express an appropriate idea. Thus, if a wavy line  expressed water, an ellipse enclosing the wavy line  would represent a cistern. If a circle represented the sun, a half circle with rays streaming upward  would represent sunrise, and a circle half sunk below a line  sunset. A canopy  represented the heavens, and a star underneath the canopy  suggested night; while a circle in the same position  represented midday; and the same canopy with something like tunnels running through it  represented rain. Of these pictorial objects there are about 400. Their range is considerable, but abstract ideas and connecting words, most verbs, and all inflected forms cannot be expressed by mere pictures. A complete sentence

is impossible by this system. Its limitations are soon reached.

FIG. 1.



The next step was that of allowing the figure not merely to represent the idea and its name, but the sounds by which that word is expressed. Thus, the figure becomes entirely the representation of a sound, and no longer of an object. This may be illustrated by the picture of an altar, which might also stand for the word *alter*. But the Egyptians regarded the consonants as the substantial parts of a word, and, disregarding the vowels, the same figure might stand for *later*, *letter*, *litter*, or *ultra*. Thus, the owl, *mulak*, might also stand for *melich*, king; the hymna, *hoite*, for *hote*, an hour; the serpent, *hop*, for *hepi*, a cave, and the obelisk, *maein*, for the god *Anun*. Since the Egyptian ear did not distinguish the surd (sharp) from the sonant (flat) consonants, the range was somewhat further extended. Thus, the finger, pronounced *tep*, would represent any other word whose consonants were *tp*, *tb*, *dp*, or *db*; as, for example, *taipe*, a magazine, and *tba*, ten thousand.

The next stage was to allow any character to stand for only the first one or two sounds in the word which it primarily represented, generally for the first consonant and vowel, but in the case of a few characters, called by Brugsch fundamental, for the first sound only. A single letter or syllable may often be represented by a number of different signs. Thus, *A* might be represented by an arm, an eagle, or a reed; *T*, by a serpent or a hemisphere. The sense often guided the selection of the character. Thus, in writing the Greek word for emperor (*αὐτοκράτωρ*) the eagle, symbol of the Roman power, would be selected to represent *a*. Of the syllabic characters there were 400 or 500. The accompanying table includes the common alphabetic characters:

FIG. 2.











Phonetic power or sound.	Characters in common use.	Characters rarely used.	Phonetic power or sound.	Characters in common use.	Characters rarely used.
A			D		
Â			TS		
I			M		
U or OU			N		
F			R or L		
B			S		
P			SH		
K			KH		
Q			HH		
G			H		
T					

The Egyptians paid regard to vowels only as they were needed to avoid ambiguity in writing. Where there might be doubt which of two words was to be read, or in the case of words having an initial vowel, or of monosyllables with a final vowel, and especially of foreign proper names, it became necessary to express the vowels. These were not put in their place between their consonants, but either after or under the consonants which formed the word. Thus the three fundamental characters given in the order *n*, *p*, *n* are to be pronounced *mp*, not *np*. The scribes often found it necessary to employ certain signs, not as characters to be



pronounced, but as suggestions to the reader how to read other ambiguous signs. Thus, a figure like a hill—pronounced *tw*, and meaning *much*—indicated that the characters preceding it were to be read not as single letters, but in their larger content, as full syllables with two or more consonants. Sometimes the character was repeated for the same purpose. When the characters had settled into their almost completely phonetic use, a word spelled out was often followed by its pictorial representation. Thus, were it desired to write *sukhi*, a crocodile, instead of simply giving a picture of the crocodile, which might signify either *sukhi* or *sk*, the word might be spelled out by its consonants: first an *s*, expressed by a siphon and pronounced *sepp*; then *k*, expressed by the breast, *kibe*. To show that these two characters are not to be pronounced syllabically, *sepp* *kap*, as they may be, but consonantly, *sukhi*, the figure of the crocodile, *sukhi*, is appended. This system of determinatives had considerable extension, of which the following are examples:

FIG. 3.

	Names of foreign countries.		Names of animals.
	Names of places in Egypt.		Evil or hurtful actions.
	Encloses royal names.		Articles of clothing.
	Names of enemies.		Articles of metal.
	Objects in wood.		Disaster, storm, confusion.

The direction of the hieroglyphic writing was unfixed. On the same monument it was in one place read vertically and in another horizontally. The common way was from right to left, as in Hebrew. In the older temples the characters were raised; but after the fifth dynasty they were generally cut in intaglio, often very deep, as in the temple at Zepe, where Bruce found them six inches deep. The portions cut out were sometimes filled with white lime, or often with mastic or richly colored enamel.

The hieratic writing was an abbreviation of the hieroglyphic. Most of the papyrus is inscribed in this character. In the seventh century B. C. a still more abridged style, called demotic, came into use, in which no trace can be recognized of the original pictures, although there is in it the same mixture of both the phonetic and the ideographic characters.

WILLIAM H. WARD.

**Hieromax.** See YARMUK.

**Hieronymites** [from St. Jerome, or *Hieronymus*], properly the hermits of St. Jerome, were originally Franciscan Tertiaries of the Strict Observance. In 1373 the new order was accredited by Pope Gregory XI., and received an Augustinian rule. P. F. Pecha and one Vasco were its founders. Charles V. entered the order upon his abdication. This order, once very rich and extensive, is now small and feeble.—Another small congregation called Hieronymites was founded at Pisa by one of the Gambacorti about 1390. It still exists.

**Hier'ophant** [Gr. *ιεροφάντης*], the mystagogue, prophet or priest of Demeter who had charge of the Eleusinian Mysteries, and initiated new members into those mysteries. He must be a descendant of the hero Eumolpus, unmarried, and unblemished in character and in body. He preserved and expounded the unwritten law.

**Hies'ter** (JOSEPH), b. of parentage of remote Silesian origin in Bern tp., Berks co., Pa., Nov. 18, 1752; became a merchant of Reading in 1771; raised, equipped, and commanded a company in the Revolutionary army; was wounded at the battle of Long Island, and imprisoned a year in the Jersey hulk; wounded again at Germantown; a member of the constitutional conventions of 1787 and 1789; was a member of Congress 1797–1805 and 1815–21; governor of Pennsylvania 1821–23. D. at Reading, Pa., June 10, 1832.

**Hig'gins**, tp. of Perry co., Ark. Pop. 292.

**Higgins**, tp. of McDowell co., N. C. Pop. 401.

**Hig'ginson** (FRANCIS), b. in England in 1588; graduated at St. John's College, Cambridge, and became a parish clergyman of Leicester, but was deprived for nonconformity, and in 1629 became teacher of the congregation at Salem, Mass., where he d. Aug. 6, 1630. He wrote *New England's Plantations* (1630).

**Higginson** (FRANCIS J.), U. S. N., b. July 19, 1846, in Massachusetts; graduated at the Naval Academy in 1861; became a lieutenant in 1862, a lieutenant-commander in 1866; served on board the Cayuga, as aide to Capt. Bailey, in the great victory of New Orleans, and was wounded in the very gallant boat-expedition from the Colorado Sept.

14, 1861, which succeeded in destroying the Confederate privateer Judah, moored to a wharf at the Pensacola navy-yard.

FOXHALL A. PARKER.

**Higginson** (SIR JAMES MACAULAY), K. C. B., b. in 1805; in 1824 he joined the Bengal army, and served during the Bhurtpore campaign and assault of that fortress in 1826; was appointed to the staff of the army in 1828, and filled the positions of aide-de-camp to Lord William Bentinck, governor-general of India; military secretary to the governor of Agra; private secretary to the governor-general of Canada, and in 1839 accompanied Lord Metcalfe to Jamaica as secretary to the governor; following that statesman to Canada, he was made civil secretary and superintendent of Indian affairs. From 1846 to 1850 he was governor and commander-in-chief of the Leeward Islands, when he was transferred to the governorship of Mauritius (1850–57); created companion of the Bath in 1851, a knight-commander 1856; retired from active service in 1857.

**Higginson** (JOHN), a son of Francis Higginson, b. at Claybrooke, Leicestershire, England, Aug. 6, 1616; came to Salem with his father; became a teacher of Hartford; was a short-hand writer to the Massachusetts synod of 1637; chaplain of Saybrook; assistant minister of Guilford, Conn., 1641–59; minister of Salem, Mass., 1660–1708. He was a popular preacher, and left some valued writings. D. Dec. 9, 1708.

**Higginson** (THOMAS WESTWORTH), b. Dec. 22, 1823, in Cambridge, Mass.; graduated at Harvard College 1841; received the degree of A. M. 1869; studied divinity at Cambridge; was ordained at Newburyport, Mass. (First Religious Society), in 1847, the year he left the Divinity School; was Free-soil candidate for Congress in 1850; went to Worcester, Mass., in 1852 as minister of the Free church; resigned in 1858, and left the ministry. Mr. Higginson had taken a leading part in the anti-slavery conflict that preceded the civil war; had visited Kansas in 1856; was acquainted with John Brown, and was active in sustaining the Free-State men in the West. On Sept. 25, 1862, he was made captain in the 51st Massachusetts Vols.; on Nov. 10 accepted the colonelcy of 1st South Carolina Vols., colored; was wounded Aug., 1863, and mustered out Oct., 1864. He has since lived in Newport, R. I., devoting himself to literature and the work of social reform; is a vice-president of the Free Religious Association, a leader in the cause of woman suffrage, and an earnest friend of the higher education of the youth of both sexes in public schools and colleges. His efforts to introduce modern ideas and men into the management of Harvard College, and to have its facilities extended to women, have been assiduous. Mr. Higginson is the author of several volumes of collected essays: *Out-door Papers* (1863), *Army Life in a Black Regiment* (1870), and *Atlantic Essays* (1871); wrote a novel, *Malbone, an Oldport Romance* (1869), *Oldport Days* (1874); a history, *Yankee Folks' History of the U. S.* (1875); besides various pamphlets and magazine articles, memoirs of Lydia Maria Child and Margaret Fuller Ossoli in *Eminent Women of the Age* (1868), and a memoir of T. W. Harris, prefixed to his *Entomological Correspondence* (1869). He also edited (in connection with S. Longfellow) a book of poems, *Thalatta* (1853), a translation of Epictetus (1865), *Harvard Memorial Biographies* (2 vols., 1866), *Child-Pictures from Dickens* (1868), *Brief Biographies of European Statesmen* (1875). Is also well known as a lyceum lecturer. He visited Europe in 1872.

O. B. FROTHINGHAM.

**Hig'ginsport**, post-v. in Lewis tp., Brown co., O. It is on the Ohio, 46 miles above Cincinnati. Pop. 530.

**Hig'ginsville**, post-v. of Verona tp., Oneida co., N. Y. Pop. 219.

**High**, in music, a term indicating acuteness of sound, generally by way of comparison or contrast with other and graver sounds. Thus, of two sounds, notes, or parts, one is said to be higher than the other because it is more acute, though both notes may chance to be in the graver portion of the scale. In a general and indefinite way all musical sounds are said to be either high, low, or of a middle grade. Hence, the use of the terms *ascending* and *descending* when we change from the graver part of the scale to the more acute, and *vice versa*.

WILLIAM STRAUNTON.

**High Bridge**, post-v. of Hunterdon co., N. J., on the New Jersey Central R. R., 54 miles W. of New York. Here are extensive iron-works and a remarkable railroad bridge.

**High Forest**, tp. and post-v. of Olmsted co., Minn., 15 miles S. of Rochester. Pop. of v. 249; of tp. 1243.

**High'gate**, post-tp. of Franklin co., Vt., on Missisquoi Bay (Lake Champlain), and on the Canada line. It is also on the Central Vermont R. R. (northern division), 13 miles N. of St. Albans. It is a place of summer resort, has 4 churches, 4 hotels, and manufactures of castings, scythes,



and leather. It has sulphurous mineral springs, which are very useful in certain skin diseases. Pop. 2260.

**High Lake**, tp. of Emmett co., Ia. Pop. 182.

**Highland**, county in the S. S. W. of Ohio. Area, 460 square miles. It lies between the Scioto and Little Miami valleys, and is well cultivated and fertile. Cattle, grain, and wool are staples. The manufactures include carriages, flour, harnesses, etc. It is traversed by the Marietta and Cincinnati R. R. Cap. Hillsborough. Pop. 29,133.

**Highland**, county of Virginia, bounded on the W. and N. by West Virginia. Area, 400 square miles. It is very mountainous. Live-stock, grain, and wool are staple products. Cap. Monterey. Pop. 4151.

**Highland**, tp. of Shelby co., Ala. Pop. 657.

**Highland**, tp. of Grundy co., Ill. Pop. 930.

**Highland**, post-v. of Madison co., Ill., 30 miles E. of St. Louis, on the St. Louis Vandalia and Terre Haute R. R. It contains 2 public schools, 4 churches, 1 Catholic university, 2 large flouring-mills, 1 foundry, 1 bank, 1 woollen-mill, and 1 newspaper. Pop., composed of Swiss and Germans, 1757. AD. F. BANDELIER.

**Highland**, tp. of Franklin co., Ind. Pop. 1796.

**Highland**, tp. of Greene co., Ind. Pop. 1321.

**Highland**, tp. of Vermilion co., Ind. Pop. 2294.

**Highland**, post-tp. of Clayton co., Ia. Pop. 834.

**Highland**, tp. of Guthrie co., Ia. Pop. 229.

**Highland**, tp. of Tama co., Ia. Pop. 503.

**Highland**, tp. of Union co., Ia. Pop. 247.

**Highland**, tp. of Wapello co., Ia. Pop. 959.

**Highland**, tp. of Washington co., Ia. Pop. 753.

**Highland**, tp. of Winneshiek co., Ia. Pop. 922.

**Highland**, post-v. of Iowa tp., Doniphan co., Kan., is the seat of Highland University (Presbyterian) for both sexes, and has a coal-mine. It is near the Atchison and Nebraska R. R., and 25 miles N. by W. of Atchison. P. 282.

**Highland**, tp. and post-v. of Oakland co., Mich., on the Flint and Père Marquette R. R., 28 miles S. of Flint. Pop. 1241.

**Highland**, tp. of Osceola co., Mich. Pop. 58.

**Highland**, tp. of Wabashaw co., Minn. Pop. 716.

**Highland**, a v. of Saline co., Neb., 17 miles S. W. of Lincoln.

**Highland**, a v. of Lincoln co., Nev. Pop. 21.

**Highland**, tp. of Sullivan co., N. Y., on the Delaware River. It contains many small lakes. Here was fought the battle of the Minisink, July 22, 1779, between the Indians in the British service, under Brant, and the American militia. Pop. 958.

**Highland**, post-v. of Ulster co., N. Y., opposite Poughkeepsie, with which it is connected half hourly by ferry. It contains a seminary for both sexes, 3 churches, 7 flouring-mills, 1 foundry, a felloe-factory, 1 weekly newspaper. It has 3 daily lines of steamers to New York. The inhabitants are largely engaged in the grape-culture. Pop. about 700. W. F. HENDRICK, Ed. "JOURNAL."

**Highland**, tp. of Defiance co., O. Pop. 946.

**Highland**, tp. of Muskingum co., O. Pop. 784.

**Highland**, tp. of Adams co., Pa. Pop. 421.

**Highland**, tp. of Chester co., Pa. Pop. 958.

**Highland**, tp. of Clarion co., Pa. Pop. 524.

**Highland**, tp. of Elk co., Pa. Pop. 98.

**Highland**, tp. of Greenville co., S. C. Pop. 1261.

**Highland** (called also *Franklin*), post-v. of Iowa co., Wis., 12 miles S. by W. of Avoca. P. of v. 182; of tp. 3016.

**Highlanders**, properly the Gaelic or Celtic inhabitants of the Highlands of Scotland. In the British army the term designates the eight regiments of foot soldiers who wear the old Highland costume, each with its own distinctive tartan. These are the 12d, 71st, 72d, 74th, 78th, 79th, 92d, and 93d regiments. The 91st (Argyleshire regiment) is also sometimes reckoned with the Highlanders. There are several Highland volunteer regiments.

**Highland Falls**, post-v. of Cornwall tp., Orange co., N. Y., on the Hudson, 2 miles below West Point; has hotels and 4 churches, and is a place of summer resort.

**Highland Park**, post-v. of Deerfield tp., Lake co., Ill., on Lake Michigan and on the Chicago and Northwestern R. R. (Milwaukee division), 22 miles N. of Chicago.

**Highlands**, of the Hudson, are the broken hills which stretch from S. W. to N. E. through Rockland, Orange, Putnam, and Dutchess cos., N. Y., being the N. E. continuation of the Blue Ridge, and extending farther N. E. in the Taconic and Green Mountains of Western New Eng-

land. The passage of the Hudson through the Highlands is marked by very fine scenery, and it is remarkable as almost the only instance in the U. S. of a navigable river-passage through a great mountain-range. The Highlands are mainly composed of azoic rocks, with rugged and steep sides and a somewhat scanty soil. The highest peaks do not reach higher than 1700 feet above tide.

**High Market**, tp. of Lewis co., N. Y. It has 3 cheese-factories. Pop. 1051.

**High Places**. In the Old Testament frequent mention is made of high places, where the people unlawfully went to worship strange gods. The custom of erecting shrines upon hilltops is a very ancient and widespread one, and seems to have arisen from the belief that the tops of hills were nearer the abode of Deity. In spite of the strong denunciations of the practice in the Jewish law, the custom became a prevalent one, and such men as Samuel, David, and Elijah conformed to it, but in later times a reform occurred, and the more devout kings of Judah actively destroyed the high places.

**High Point**, tp. and post-v. of Decatur co., Ia., 13 miles S. of Woodburn. Pop. 796.

**High Point**, post-tp. of Guilford co., N. C. Pop. 1627.

**High Prairie**, tp. of Leavenworth co., Kan. P. 1300.

**High Priest**, in the hierarchy of the Hebrews, the principal religious dignitary of the nation. By the Mosaic law the office was held for life, and was hereditary in the line of Eleazar, son of Aaron, the first high priest. But in the New Testament times the office had ceased to be hereditary, and was held at the will of the civil ruler. Some of these officers in those times were men of low birth. One of the most brilliant periods of this pontificate was that of the Asmonæan princes (Maccabees), some of whom joined regal to priestly authority.

**High Shoals**, tp. of Rutherford co., N. C. Pop. 904.

**High'spire**, post-v. of Lower Swatara tp., Dauphin co., Pa., on the Pennsylvania R. R., and on the N. E. bank of the Susquehanna, 5 miles below Harrisburg. Pop. 612.

**High'towers**, tp. of Caswell co., N. C. Pop. 1502.

**Hights'town**, post-b. of Mercer co., N. J., 14 miles N. E. of Trenton, on the Amboy division of the Pennsylvania R. R. It is an incorporated borough, containing 3 educational institutes, 6 churches, 2 foundries, 2 hotels, chain, plough, and door factories, 1 newspaper, and 2 national banks. Pop. of borough, 1347.

THOS. B. APPLEGET, Ed. "GAZETTE."

**High Was'sie**, tp. of Pulaski co., Va. Pop. 1897.

**Highway**, a road or way over which the public at large have a free right of passage. The term, in popular usage, is commonly restricted to ways upon land, as carriage- or foot-roads or turnpikes, but it is employed in law as a generic designation, including not only ways of this kind, but also watercourses which are, in a similar manner, open to public convenience, as, for instance, natural streams. Ferries are also sometimes comprehended within the same category. Highways upon land are created either by express dedication of the owner, by prescription, or in pursuance of legislative authority. Dedication occurs when the owner of the property appropriates it to the public use as a common passage-way, and there is a sufficient acceptance of the privilege on the part of the public, evidenced either by positive acknowledgment and assent or by constantly enjoying the advantage offered. A right is obtained by prescription by a continuous, undisturbed use of the land as a common way for a particular period of time established by law, usually twenty years. The validity of a claim originating in this manner is sustained by the fiction of a presumed grant or dedication by the owner on account of his long acquiescence in the violation of his proprietary rights. (See *PRESCRIPTION*.) But much the most common mode of establishing public ways is by the exercise of the governmental prerogative of taking private property for public uses. Laws have been enacted, both in England and in the several States of the Union, regulating the methods by which new roads may be laid out as occasion may require. The authority in this country is usually delegated to towns or bodies of commissioners, who, in conjunction with a jury, determine upon the necessity of a road, its direction, and extent. The commissioners may also have power to direct its construction and make all necessary repairs. As this is an interference with the rights of private owners under the law of EMINENT DOMAIN (which see), a separate compensation must be made for the loss which they sustain in consequence. This power must never be capriciously or arbitrarily exercised, but only to satisfy a public necessity. Highways by water, in the case of natural streams, exist independently of the granting of any privilege by dedication or of any



legislative interposition—by force of the natural right which every citizen possesses of free passage along all watercourses not of artificial construction.

The establishment of a highway does not necessarily give the public a right of ownership in the soil over which the privilege of passage is exercised. It is a general rule, applying both to highways upon land and to watercourses above the point where the tide ebbs and flows, that the property in the soil is vested in the adjoining owners. If a single individual own the land upon both sides of a road or stream, he has in general also the exclusive title to the entire highway as far as the limits of his estate extend; but if the proprietors upon the opposite sides be different persons, the right of each extends to the middle of the highway. The right of the public in such a case constitutes merely an easement, and though this is so far restrictive upon the owner's management and control of his property that he can do nothing to deprive the public of their privilege of free passage or to incommode them, yet it must be enjoyed simply as a right to travel over the land, and an obligation rests also upon the public not to interfere with the owner's interests further than the appropriate use of the way demands. If there are trees or grass growing along the line of a road, the adjoining owner has an exclusive right to them, as against all but the public, and can maintain an action against any one who attempts to carry them away. In like manner, he may obtain redress for injuries occasioned by encroachments upon the soil, or unlawful excavations, or any violation of his rights as owner which is not strictly incidental to the public privilege. If there are mines beneath the surface of the highway, he may continue to work them, provided he does not deprive the public of the right of way or impair their exercise of it. Under similar limitations he may construct water-pipes or drains, excavate cellars, etc. below the surface. But the public right of easement, especially in villages and cities, sometimes includes particular privileges not directly incidental to the right of transit, but so important and essential for the common welfare of communities that they are deemed to be included within the interest which the public acquires by establishing the highway. For instance, the soil may be opened for the construction of sewers or gas- or water-pipes for the convenience of neighboring residents. But acts of this nature can only be done by virtue of public authority, and if any individual or combination of individuals attempt to lay gas- or water-pipes without obtaining special powers for that purpose, they commit an actionable offence for which the owner may seek redress. But nothing additional to such privileges as these is embraced within the easement which the public acquires: and if the legislature authorizes the use of the soil for other purposes, this is a new exercise of the right of eminent domain, for which further compensation must be made. Thus, it has been held that the construction of a steam-railroad is not a legitimate exercise of the easement, and that for such a use of the highway additional compensation must be made to the adjoining proprietors. Grants of property bounded upon a highway carry with them the same interest in the soil of the road as the grantor previously possessed, even though there be no distinct statement to that effect. Such a presumed conveyance can only be prevented by the use of precise expressions in the deed of transfer, limiting the boundary to the edge of the way. The statute law may, as it sometimes does, provide that the entire interest in the land over which the highway passes shall vest in the public. This is the case with the modern streets in the city of New York.

The public right of transit must be entirely unrestricted. If obstructions be placed in the way impeding free travel, they will constitute public nuisances, and will afford ground for an indictment or for a private action by any person especially discommoded. They may also be abated or removed by any one, so far as may be necessary to permit him to continue on his way. Moreover, in order that the privilege of passage may be enjoyed with as little inconvenience as possible, it is the duty of every traveller to observe proper care to avoid collisions and accident. To promote this desirable end, it has been made the rule in England that vehicles in passing each other must keep to the left. In the U. S. the regulation is exactly the reverse—that they must keep to the right. The obligation of this requirement ceases when one of the vehicles is confined to a specific line of travel, as a horse-car, and in such a case the other carriage may turn to either side. In England the repair of highways is a duty obligatory upon the inhabitants of the parishes, and they may be indicted if they suffer defects to continue after knowledge of their existence. In the U. S. the liability is created by statute. In New England the duty is imposed upon the towns, and a statutory right of action is given against them if any injury be sustained by a traveller in consequence of their

neglect. In other States the obligation devolves, as a general rule, upon municipal corporations, such as cities and villages, while towns, which are usually considered quasi corporations, are sometimes made liable, as in New England, or the roads within their limits are placed under the charge of specially-appointed commissioners, who may be subjected to an action if they fail to make repairs after they are provided with the means to obtain the requisite funds. If a person brings an action for an injury sustained through a defect in the highway against the body bound to make repairs, he must show that they had knowledge of the existence of the alleged defect, or a reasonable opportunity and means of obtaining such knowledge. If the defect or obstruction be caused by a resident adjacent to the highway, and the city or town be compelled to respond in damages to a person injured in consequence, a suit for indemnification may be instituted by the city, etc. in its turn against the party primarily responsible by reason of his unauthorized act or culpable negligence.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Hi'ka**, post-v. of Manitowoc co., Wis., on Lake Michigan, 12 miles N. of Sheboygan.

**Hi'ko**, post-tp. of Lincoln co., Nev., 215 miles S. of Elko. Pop. 54; of tp. 110.

**Hi'lary**. Four persons of this name are prominent in church history: I. **HILARY OF ARLES, SAINT**, was b. at Arles, in S. Gaul, about 401 A. D.; was persuaded by Honoratus, afterwards (426–429) bishop of his native place, to enter the monastery of Lerins; in 429, on the death of Honoratus, was chosen his successor in the see of Arles, and d. there May 5, 449. Zealous in discipline and strong of will, he had a bitter controversy with Pope Leo the Great, which, however, was amicably settled at last. He was learned, eloquent, and charitable to the poor. His sermons, it is said, were sometimes very long (four hours), so that his hearers were driven into the novelty of sitting. His *Life of Honoratus* is in the *Acta Sanctorum*, Jan. 16. —II. **HILARY OF POITIERS, SAINT**, “the Athanasius of the West,” of distinguished but heathen parentage, was b. at Poitiers in Central Gaul, near the end of the third century; became a Christian in mature life after prolonged and careful investigation; was chosen bishop of Poitiers about 350; in 355 was banished to Phrygia, because he would not sanction the condemnation of Athanasius; returned to Poitiers in 360, and d. there Jan. 13, 368. He was one of the ablest men of his century—clear-headed, incisive, resolute, learned, and eloquent. The leading characteristic of his career was the sharp and steady war he waged against Arianism. The earliest edition of his works was by Erasmus (Bâle, 1523); the best is the Benedictine, by Constant (Paris, 1693; republished, with additions, by Maffei, Verona, 1730). (See *REIKENS'S Hilarius von Poitiers*, 1864.) —III. **HILARY THE POPE**, was b. (date unknown) in Sardinia; while deacon at Rome, under Pope Leo the Great, was sent as legate to the “Robber Council” at Ephesus (449 A. D.); succeeded Leo in the papal chair in 461, being consecrated Nov. 12, two days after the death of Leo; and d. at Rome Feb. 21, 468. He was zealous for the faith and strict in discipline. A synod which met in Rome Nov. 12, 465, passed five canons, inspired by him, endorsing the canons of Nice, and forbidding, amongst other things, the ordination of men twice married or marrying widows, and forbidding bishops to nominate their successors. (See *Acta Sanctorum*, Feb. 21.) —IV. **HILARY THE DEACON**. A Roman deacon of this name was sent by Pope Liberius (352–366 A. D.) to a council (attended by 300 bishops) which met at Milan in 355. He appears afterwards to have joined the schism of Lucifer (who d. 371), bishop of Cagliari (Lat. *Calaris*) in Sardinia. He has generally been identified with the unknown author (*AMBROSIASTER*) of the commentary on the Pauline Epistles, wrongly ascribed to Ambrose of Milan; who also wrote the *Questiones Veteris et Novi Testamenti*, wrongly ascribed to Augustine. But this identification is now questioned. The commentary on St. Paul's Epistles contains passages which have important bearings on questions of church polity.

R. D. HITCHCOCK.

**Hil'burn**, tp. of Madison co., Ark. Pop. 424.

**Hildburghausen**, town of Germany, in Saxe-Meiningen, was once the capital of Saxe-Hildburghausen. It is on the river Werra and the Eisenach-Coburg Railway; has a gymnasium, a teachers' school, and institutions for deaf-mutes and for the insane, besides manufactures of considerable importance. Pop. 5148.

**Hil'debert of Tours**, the most celebrated Latin poet of his time, b. at Lavardin, in the Vermandois, in 1057, and educated in the monastery of Clugny. In 1097 he was appointed bishop of Mans, and in 1125 archbishop of Tours, where he d. Dec. 18, 1134. His dogmatical essays have in-



terest on account of their systematic form. A collected edition of his works was published in 1708 by Beaugendre.

**Hildebrand.** See GREGORY (VII.).

**Hil'desheim**, town of Germany, in Hanover, on the Innerste. It contains several fine old monuments, as, for instance, the cathedral, built in 1015, with its famous bronze gates and glass-paintings; the church of St. Godehard, built in 1133; and the church of St. Michael, built in 1022. It has a lively trade in corn, linen, and yarn. It is a Roman Catholic bishop's see. Pop. 20,804.

**Hil'dreth** (RICHARD), the son of Rev. Hosea Hildreth (1782-1835), b. at Deerfield, Mass., June 28, 1807, and graduated at Harvard in 1826; was admitted to the bar at Boston; in 1832 became editor of the Boston *Atlas*; resided 1834-35 in Florida, where he wrote *Archy Moore* (1837), an anti-slavery tale, republished in 1852 as *The White Slave*. He translated Dumont's version of Bentham's *Theory of Legislation* (1840, 2 vols.), and published *History of Banks* (1837), a *Life of W. H. Harrison* (1839), whom he vigorously supported for the Presidency, and *Despotism in America* (1841), an anti-slavery work. He resided (1840-43) in Demerara, where he edited two free-labor journals. He published a *Theory of Morals* (1841) and a *Theory of Politics* (1853), but his great work is a *History of the U. S.* (6 vols., 1849-56), written in a style pure but without adornment. The author's standpoint is anti-Jeffersonian. He also produced *Japan as it Was and Is* (1855) and *Atrocious Judges* (1856), prepared from Lord Campbell's *Lives*. He was for several years on the editorial staff of the New York *Tribune*, and became U. S. consul at Trieste in 1861. D. at Florence, Italy, July 11, 1863.

**Hildreth** (SAMUEL PRESCOTT), M. D., b. at Methuen, Mass., Sept. 30, 1783; studied medicine with Dr. Kittridge of Andover; removed from New Hampshire to Belpré, O., in 1806, and to Marietta, O., in 1808. He was a valuable contributor to periodicals, and prepared various scientific and genealogical papers, etc. He wrote a *History of the Diseases and Climate of South-eastern Ohio* (1837), *History of Bellefonte in West Virginia* (1837), *Pioneer History* (1840), *Lives of Early Settlers of Ohio* (1852), and other works. His valuable library and scientific collections he gave to Marietta College. D. July 24, 1863.

**Hil'gard** (EUGENE WALDENAR), PH. D., b. in Zweibrücken, Rhenish Bavaria, Jan. 5, 1831; emigrated with his father to Bellville, Ill., 1835-36; in 1849 returned to Europe, and studied at the Academy of Mines, Freiberg, Germany; also at the universities of Zürich and Heidelberg, graduating at Heidelberg in 1853; in 1855 returned to the U. S., and became assistant State geologist of Mississippi; in 1857 was in charge of the laboratory at the Smithsonian Institution, Washington, D. C.; in 1858 was appointed State geologist of Mississippi. Since 1871 he has held that office in connection with the chair of agricultural chemistry in the State University at Oxford, Miss. In 1873 he took a similar position in the University of Michigan, and in 1874 was elected professor of agriculture in the University of California, which position he still occupies (1875). Author of a report on the geology and agriculture of Mississippi, and various papers on chemical and geological subjects, chiefly on the geology of Louisiana and of the Mississippi delta, in the *Am. Jour. of Science*; is a member of the National Academy of Sciences.

**Hil'gard** (JULIUS ERASMUS), b. Jan. 7, 1825, in Zweibrücken, Germany; emigrated in 1835 to Illinois with his father, from whom he received a classical education; studied civil engineering in Philadelphia; in 1845 entered the Coast Survey service, which has been the principal sphere of his labors, and to the success of which he has largely contributed. His writings on geodetic methods, tides, and terrestrial magnetism are published in the Coast Survey reports and in various scientific journals. In 1862 he took charge of the Coast Survey office, and of the construction of standard weights and measures, a position which he still retains; in 1863 he was named a member of the National Academy of Sciences; in 1872 took an active part in the international metric commission which met at Paris, and was chosen a member of its permanent committee. He at the same time conducted a determination by telegraph of the longitude between America and Europe, including that between the observatories of Greenwich and Paris. Was elected president of the Am. Asso. for the Adv. of Sci. in 1874.

**Hil'gard** (THEODORE CHARLES), M. D., b. in Zweibrücken, Germany, Feb. 28, 1828; came to the U. S. in 1835, and afterwards completed his education at the German universities; settled as a physician in St. Louis, and devoted much time to the microscopic study of zymotic fungi and the circuits of generation of the lower forms of life. His papers on these and kindred subjects—such as fresh-water algae,

the spawn of mosses, natural orders of the vegetable kingdom, phyllotaxy, and the genetic explanation of its numerical law, the numerical law of the vertebrate system, contributions to the physiology of sight, and other essays—are published in the *Transactions* of the St. Louis Academy of Science and in those of the American Association for the Advancement of Science. D. Mar. 5, 1875, of pneumonia, aged forty-seven.

**Hil'gard** (THEODORE ERASMUS), b. in Nassau, Germany, July 7, 1790; educated at Heidelberg and Paris; counselor at law at Trèves during the empire, and after the restoration of the Rhenish provinces to Germany judge of the court of appeals at Zweibrücken. While holding this position he published a series of reports on the working of the French system of jurisprudence and the Code Napoleon, which remained operative in those German provinces, contributing largely to the preservation and extension of that system. He was during five years member of the provincial assembly, maintaining the right of local self-government, but, dispirited by the reaction towards absolutism under the influence of Austria, he emigrated in 1835 to the U. S. with a family of nine children, whose education he personally directed at his new home in Illinois. He afterwards returned to Germany, and settled in Heidelberg, where he d. Feb. 14, 1873. Author of publications on important social questions, such as pauperism, the death-penalty, woman's rights, and the war-power. He also published metrical translations into the German language of Ovid, Homer, and Moore, an original poem entitled *The Hundred Days*, and many minor poems.

**Hill**, county of N. Central Texas. Area, 950 square miles. It is half prairie and half timber land. The soil is fertile. The chief products are cattle, maize, and cotton. The Brazos forms part of the western boundary. Cap. Hillsborough. Pop. 7,453.

**Hill**, post-tp. of Merrimack co., N. H., on the Northern R. R., 25 miles N. W. of Concord. It has manufactures of furniture, carriages, etc. Pop. 620.

**Hill**, tp. of Montgomery co., N. C. Pop. 477.

**Hill** (AMERSE POWELL), b. in Culpeper co., Va., 1825; graduated at the U. S. Military Academy July 1, 1847, and appointed in the army brevet second lieutenant of artillery, receiving his full commission the following month, and promoted to be first lieutenant Sept., 1851. Repairing at once to the seat of war in Mexico, he was in time to participate at Huamantla and Atlixco; subsequently serving in garrison and on frontier duty, and in the field in Florida against the hostile Seminoles, until 1855, when he was placed on duty in the Coast Survey office at Washington, where he remained until Oct., 1860, from which latter date he was on leave of absence to Mar., 1861, when he resigned his commission to follow the fortunes of his native State. On the secession of Virginia he was appointed colonel 13th Virginia Vols., and despatched to Harper's Ferry, rejoining the army at and engaged in the first battle of Bull Run. Promoted to be brigadier-general, he was distinguished at the battle of Williamsburg, and advanced to be major-general. In the succeeding operations on the Peninsula he bore a prominent part, and gained a brilliant reputation as a division commander. In Aug., 1862, his division was added to Jackson's force in Northern Virginia, arriving in time to render important aid in the defeat of Gen. Banks at Cedar Mountain (Aug., 1862), and in the succeeding battles of Bull Run and Chantilly. In the following month he received the surrender of Harper's Ferry, and hurrying forward arrived with his command at Antietam at the critical moment when he was most needed. At Fredericksburg his division formed the right of Jackson's command, which encountered the vigorous assault of Union troops under Meade, and which was finally repulsed; at Chancellorsville, still with Jackson, he participated in the famous flank movement which broke the Federal lines, and on the death of Jackson assumed command of the corps; himself being wounded soon thereafter. For gallantry on this occasion he was promoted to be lieutenant general and placed in command of one of the three corps composing the Army of Northern Virginia. In the campaign of 1864 he was indefatigable in his exertions, commanding with great ability at all the bloody conflicts from the Wilderness to the final assault of the Confederate lines before Petersburg, Apr. 2, 1865, where he displayed the greatest bravery, meeting his death by a rifle shot while engaged in reconnoitering at the moment it was decided that Richmond could no longer be held.

G. C. SIMMONS.

**Hill** (BENJAMIN HARVEY), b. in Jasper co., Ga., Sept. 14, 1823, of Irish descent on the father's side, and of English on the mother's side; graduated at the State University with high honor in 1844; studied law, and entered the profession at La Grange, Ga., in Aug., 1845, in which



he has since attained great eminence: in 1851 was elected a member of the legislature from Troup county as a Union man; in 1855 was defeated for Congress by the Hon. Hiram Warner (in this race he was supported by the American or "Know-Nothing" party, as it was then called, though he did not advocate the ritual or secrecy of the organization, and disavowed membership with it; in 1856 was elected at large on the Fillmore or American party ticket, and by his canvass of the State this year made much reputation as an orator and a popular speaker; in 1857 was run without success by the same party as their candidate for the office of governor; in 1859 was returned to the State senate as a Union man; was elected a trustee of the State University in 1855; in 1860 was run as an elector for the State at large on the Bell-Everett ticket; was a member of the secession convention of Jan., 1861; was an earnest advocate of the Union until the convention passed a resolution declaring that the State ought to secede; he then voted for the ordinance, and cast his fortunes with those of all other citizens of the State, earnestly resisting coercion as the only means of avoiding the calamity of subjugation. He was elected to the provisional Confederate Congress that met at Montgomery, Ala., on Feb. 4, 1861; at the fall session of the State legislature the same year he was elected to the Confederate Senate, in which body he served until the end of the war. He was arrested at his home, La Grange, Ga., in May, 1865, and confined in Fort La Fayette, New York, until July following, when he was released on parole. In 1867 he presided over the convention held at Macon, Ga., for the purpose of reorganizing the Democratic party; in this and the next year (1868) appeared his celebrated *Notes on the Situation*, embodying arguments of great power against the reconstruction policy of Congress; on July 4, 1868, was delivered in Atlanta his famous "Bush-Arbor" speech; in the fall of 1870 he issued an *Address to the People of Georgia*, which brought upon him severe censure from many quarters previously friendly to him; he, however, is understood to maintain that it was but a step in advance toward that position afterwards taken by other distinguished leaders of the Democratic party throughout the Union, known as the "New Departure," and the policy of which culminated in the nominations made and the platform adopted by the national convention of the Democratic party in 1872 at Baltimore. Mr. Hill therefore supported the "Greeley movement" with all the zeal and eloquence he could command. On this line of policy he competed in Jan., 1873, for a seat in the U. S. Senate which was to become vacant in the March following by the expiration of the term of Hon. Joshua Hill. There were two other candidates for the same office. One of these was Gen. John B. Gordon, who, though he had supported Mr. Greeley as the nominee of his party, disapproved of the principles set forth in the "New Departure" platform. The other was Alexander H. Stephens, who had been utterly opposed to the election of Mr. Greeley, as well as to any departure from the fundamental principles of Jeffersonian Democracy. In this triangular contest Gen. Gordon bore off the palm. Mr. Hill's speech pending the canvass on this occasion, in vindication of his course, and in urging the Democracy of Georgia to stand by the policy adopted at Baltimore in 1872, was one of the ablest of his life. He is still (Mar., 1875) in the full vigor of body and intellect, and his friends look forward with confident expectation to his acquiring much higher honors and distinction in the future than any yet attained in his past career.

A. H. STEPHENS.

**HILL (DANIEL HARVEY)**, b. in South Carolina in 1821; graduated from the U. S. Military Academy, and was appointed brevet second lieutenant of artillery July 1, 1842; transferred to the infantry in 1847, with rank of first lieutenant. Called to active duty in the field in the war with Mexico, he served with distinction from Monterey to the final capture of the city of Mexico, winning the brevet of captain for gallantry at Contreras and Churubusco, and that of major for Chapultepec; in addition to which he was presented by his native State with a sword of honor. In Feb., 1849, he resigned his commission, and accepted the chair of mathematics in Washington College, Va., which he filled until 1854; that of mathematics and engineering in Davidson College, N. C., 1854-59, when he assumed superintendency of the North Carolina Military Institute at Charlotte. On the outbreak of the civil war he at once offered his services in support of the cause of the Confederacy, and as colonel 1st North Carolina Vols. was engaged at the affair of Big Bethel, Va., June, 1861. Speedily promoted to be major-general, he commanded a division during the Seven Days' fight on the Virginia Peninsula, remaining in command of the James on the departure of the main army of Gen. Lee for Northern Virginia, but rejoining it in season to participate in the battles of South Mountain and Antietam, where he led his division, as subsequently

at Fredericksburg. Detached for a period during 1863 on duty in North Carolina, he was in September at the battle of Chickamauga, Ga., and in 1864 at Bermuda Hundred, Va. At the time of the capitulation of the armies his division was among the command of Gen. Johnston, who surrendered at Durham Station. At the close of the war he returned to Charlotte, N. C., and published *The Field and the Farm*. Among his works published prior to 1861 are *Elements of Algebra*, *Consideration of the Sermon on the Mount*, *The Crucifixion of Christ*.

G. C. SIMMONS.

**HILL (ISAAC)**, b. at Cambridge, Mass., Apr. 6, 1788; was apprenticed in youth to a printer at Amherst, N. H. In 1809 he became editor of the *New Hampshire Patriot*, which was long one of the ablest Jeffersonian or Democratic journals in the country. In 1824 he was second comptroller of the U. S. treasury; U. S. Senator 1830-36; governor of New Hampshire 1836-39, and afterwards was U. S. sub-treasurer at Boston. He again edited, with his sons, the *Patriot* (1840-47), and for fifteen years he published *The Farmer's Monthly Visitor*. D. Mar. 22, 1851.

**HILL (JOHN HENRY)**, D.D., LL.D., b. Sept. 11, 1791, in New York City; graduated at Columbia College; became a minister of the Protestant Episcopal Church; has now (1875) been a missionary at Athens, Greece, for forty-five years, and for thirty years chaplain to the British legation in Greece.

**HILL (JOSHUA)**, b. in Abbeville district, S. C., in 1812; removed to Georgia early in life; studied law, and was admitted to the bar; was a member of Congress from Georgia from 1857 to 1861, when he resigned his seat after the convention of his State passed the ordinance of secession in Jan. of that year, though he was strongly opposed to that measure. During the war he took no part on either side, except that he allowed his friends to run him for governor of the State in 1863. After the war he was a member of the constitutional convention called in pursuance of the proclamation of Pres. Johnson, and which met in Nov., 1865. He took a prominent and leading part in the proceedings of that body, and was a candidate for the office of U. S. Senator before the legislature of 1866. Upon his failure of election on that occasion, he left the State and took up his residence in Washington City. In 1868, after another constitution was formed and another legislature was elected under the reconstruction acts of Congress, he was chosen U. S. Senator for the term which expired upon Mar. 4, 1873.

A. H. STEPHENS.

**HILL (ROWLAND)**, an eccentric divine, b. at Hawkstone, England, Aug. 13, 1744; was educated at Eton and St. John's, Cambridge; became a Calvinistic Methodist; took orders in the Church of England, though six bishops refused his ordination on account of his Methodist opinions; became an itinerant, and in 1773 became rector of Kingston, Somerset; minister of the Surrey chapel, London, 1782-1833; and was remarkable for wit, eloquence, and success as a preacher. D. in London Apr. 11, 1833. He was a son of Sir Richard Hill, Bart.—His brother, Sir RICHARD (1733-1808), was also an active and successful Calvinistic Methodist preacher.

**HILL (ROWLAND)**, VISCOUNT, nephew of the great preacher, b. at Pres, Shropshire, Aug. 11, 1772; entered the army in 1790; served with the greatest distinction in most of the battles against Napoleon in which the British participated from Toulon to Waterloo; was raised to the peerage in 1814; took the chief command in 1828, and became a viscount in 1842. D. near Shrewsbury Dec. 10, 1842. Hill was called the "right arm of Wellington," and was the most popular general in the British army.

**HILL (SIR ROWLAND)**, K. C. B., D. C. L., F. R. S., b. at Kidderminster in Oct., 1795; entered the British civil service in 1835, and in 1837 brought forward in a pamphlet a plan for uniform penny postage, which was adopted in 1840; was chiefly employed in postal and railway affairs, and was the recipient of abundant honors and pensions, the result of his labors for postal reform. D. Aug. 27, 1879.

**HILL (THOMAS)**, D. D., LL.D., Unitarian minister and mathematician, b. at New Brunswick, N. J., Jan. 7, 1818. His parents were poor, but the boy's thirst for knowledge overcame all difficulties; he entered Harvard College in the class of 1843; gave two years to the study of theology; was settled in Waltham, Mass., 1845; was made president of Antioch College 1859; of Harvard College 1862; resigned in 1868 on account of ill-health; retired to Waltham; accompanied Agassiz on the expedition to South America; accepted on his return a call to Portland, Me., where he still preaches (1875). His mathematical genius showed itself early, and distinguished him in college. As a mathematician he might have reached eminence had he not preferred the office of a Christian minister to any scientific position. Mr. Hill is a man of remarkable intellectual



power, and of singular simplicity and devoutness of heart, and his ambition is to make science tributary to faith. He has published a volume of poems (Cambridge, 1843), an elementary treatise on arithmetic (1845), *Geometry and Faith* (1849 and 1874), a treatise on curves (1850), *First Lessons in Geometry* (1855), *Liberal Education* (1855), *The True Order of Studies, Jesus the Interpreter of Nature* (1859), *The Natural Sources of Theology* (1875), being five articles reprinted from the *Bibliotheca Sacra*. Mr. Hill's distinction is as a mathematician; his special distinction is as a discoverer in the laws of curves. O. B. FROTHINGHAM.

**Hil'la**, or **Hil'lah**, town of Asiatic Turkey, in the province of Bagdad, on the Euphrates, which here is 450 feet broad and crossed by a floating bridge. It has manufactories of silks, tanneries, dyeing establishments, and large bazaars. It is built on the ruins of Babylon. Pop. 6000.

**Hil'hard** (GEORGE STILLMAN), LL.D., b. at Machias, Me., Sept. 22, 1808, and graduated at Harvard in 1828. He taught for a time in the Round Hill School, Northampton, and was admitted to the bar in 1833 at Boston. In 1833 he became one of the editors of the *Christian Register* (Unitarian), and was afterwards connected editorially with the *Journal* and the *Boston Courier*. He took a high position at the bar, and published *Six Months in Italy* (1853), *Life of G. B. McClellan* (1861), *Political Duties of the Educated Classes*, and educational works, etc. D. Jan. 21, 1879.

**Hil'lear**, tp. of Knox co., O. Pop. 931.

**Hil'lel**, the GREAT of the ELDER (*Hazaken* or *Hassaken*), b. at Babylon about 75 B. C., or, as others say, 110 B. C.; became one of the most illustrious of Jewish rabbis, eminent alike for wisdom, holiness, and learning; went about 36 B. C. to Jerusalem, and worked with his hands for his living, at the same period attending the lectures of the principal officers of the Sanhedrim, of which, about 30 B. C., he became president, retaining that exalted position till his death, 10 A. D. He became the founder of the "school of Hillel," which numbered thousands of adherents, while Shammai, vice-president of the Sanhedrim, was at the head of the rival "school of Shammai." The two schools disputed mainly about questions of the law and discipline in sacred things; Hillel's, which was the more liberal party, finally becoming the dominant one.—HILLEL THE YOUNGER, a descendant of the foregoing, became president of the Sanhedrim and head of the school of Tiberias, as some say in 258 A. D., dying in 320; or, as others say, was chosen president 330 A. D., and d. before 400. Distinguished as the great reformer of the Jewish calendar.

**Hill'grove**, post-v. of Washington tp., Darke co., O. Pop. 117.

**Hill'house** (JAMES), LL.D., b. at Montville, Conn., Oct. 21, 1754; graduated at Yale in 1773. His father, William, who d. in 1816, was a member of the Continental Congress 1783-86, and forty years a judge in Connecticut. Dr. Hillhouse was a lawyer, served against Tryon in the Revolution, was a member of Congress 1791-94, U. S. Senator from Connecticut 1794-1810, and held many offices of trust and honor. D. at New Haven Dec. 29, 1832.

**Hillhouse** (JAMES ABRAHAM), a poet, son of James Hillhouse, b. at New Haven, Conn., Sept. 26, 1789, and graduated at Yale in 1808; became a merchant in New York, and in 1822 married and retired from business. His principal poems were *The Judgment* (1812), *Peep's Masque* (1820), and *Harold* (1825). His collected works in 2 vols. appeared in 1839. D. at New Haven Jan. 4, 1841.

**Hill'iard**, post-v. of Norwich tp., Franklin co., O., on the Columbus Chicago and Indianapolis Central R. R., 9 miles N. W. of Columbus. Pop. 282.

**Hilliard** (HENRY WASHINGTON), b. in Cumberland co., N. C., Aug. 8, 1808; graduated at the South Carolina College in Columbia in 1826; soon after he moved to Athens, Ga., where in 1829 he was admitted to the bar; in 1831 was elected to a professorship in the Alabama University at Tusculum, which position he filled with distinction for three years; then resigning, he resumed the practice of law at Montgomery in that State, which he pursued with arduous and distinguished success. He was a member of the Harrisburg Whig Convention in 1840, and zealously supported the nomination of Harrison, though Mr. Clay was the man of his choice for the Presidency at that time. He was a member of the State legislature in 1838, and was a Presidential elector on the Whig ticket in 1840. In 1842 he was appointed by Pres. Tyler minister to Belgium, and afterwards was a member of Congress from Alabama from 1845 to 1851, when he declined being again a candidate. He was a warm supporter of the Compromise measures of 1850. In 1856 he was a candidate on the Fillmore electoral ticket of Alabama, and also on the Bell-Everett ticket in 1860. He opposed secession in 1861 with all his might, but after the convention of Alabama passed their ordi-

nance of secession he espoused the cause of his State with firmness and decision. He accepted from Pres. Davis the appointment of commissioner to Tennessee, and met with signal success in the objects of his mission. He also accepted the commission of brigadier-general in the provisional army of the Confederate States. After the war he returned to Georgia, when he resumed the practice of law, first at Augusta, and then at Atlanta, where he now (Mar., 1875) resides. Mr. Hilliard has through life evinced quite as much fondness for letters as for legal or political distinction; has been a preacher of the Methodist Episcopal Church, South. A volume of his speeches was published in 1855, and since the war he has contributed to the literature of the country a work entitled *De Vane, a Story of Plebians and Patricians*. U. S. Minister to Brazil 1877.

A. H. STEPHENS.

**Hil'liardsville**, post-tp., Henry co., Ala. Pop. 1867.

**Hills** (ALFRED KIMBALL), M. D., b. Oct. 23, 1840, at Hudson, N. H.; studied in the Massachusetts Medical College and the Hahnemann College, Philadelphia; took his medical degree 1870; professor of materia medica in New York Medical College and Hospital for Women since 1871; surgeon to New York Ophthalmic Hospital. Author of professional papers.

**Hills** (Right Rev. GEORGE), D. D., Protestant Episcopal bishop of British Columbia, b. in England in 1817, a son of Rear-admiral Hills, was educated at Durham University; received several Church preferments, and in 1859 was consecrated lord bishop of British Columbia, having his see-house at New Westminster.

**Hills** (GEORGE MORGAN), D. D., b. in Auburn, N. Y., Oct. 10, 1825; at the age of fourteen removed with his parents to New York; graduated with honors at Trinity College, Hartford, Conn., 1847; was ordained deacon by Bishop De Lancey, and took charge of Grace church, Lyons, N. Y. The next year he was advanced to the priesthood by the same prelate, and in 1853 was called to Trinity church, Watertown, N. Y. This he resigned in 1857 to accept the rectorship of St. Paul's church, Syracuse. In 1862 he was elected a trustee of the General Theological Seminary in New York, and was placed by that corporation on the committee for the examination of students. In 1865 he was selected as one of four clergymen to represent the division of Western New York in the General Convention. In 1867, in addition to the care of his parish, he inaugurated a very successful mission among the Onondaga Indians. At the organization of the diocese of Central New York in Nov., 1868, he was chosen president of its standing committee. On Aug. 3, 1870, he was called to the rectorship of St. Mary's church, Burlington, N. J., and entered upon its duties Sept. 4. On the 28th of the same month he was appointed an examining chaplain of the diocese of New Jersey, and on the 24th of Nov. following lecturer on homiletics and pastoral theology in the divinity department of Burlington College. On July 13, 1871, he received the honorary degree of doctor of divinity from his *alma mater*. In 1873 he was chosen a fellow of Trinity College, and in 1874 was elected sub-dean of the house of convocation of that body. In Sept., 1874, he was appointed dean of the convocation of Burlington, having previously served as treasurer and secretary of the same. Among his publications those most known are *The Wise Master-Builder*, a sermon commemorative of Bishop De Lancey; *A Step between Us and Death*; *A Mother in Israel*; *The Record of the Past an Incentive for the Future*; an *Historical Sketch of St. Paul's Church, Syracuse*; and *Historical Records of the Church in Burlington, N. J.*

**Hills'boro'**, tp. of Lawrence co., Ala. Pop. 1863.

**Hillsboro'**, tp. of Shelby co., Ala. Pop. 522.

**Hillsboro'**, post-v. and tp., cap. of Montgomery co., Ill., 66 miles N. E. of St. Louis, on the Indianapolis and St. Louis R. R. It is the centre of a good agricultural district; has 8 churches, 2 banks, and 2 weekly newspapers. Pop. of tp. 3417.

E. J. C. ALEXANDER, Ed. "HILLSBORO' DEMOCRAT."

**Hillsboro'**, a v. of Henry co., Ind. Pop. 95.

**Hillsboro'**, post-v. of Louisa co., Va. Pop. 46.

**Hillsboro'**, post-v. of Fleming co., Ky., 9 miles S. S. E. of Flemingsburg. Pop. 1460.

**Hillsboro'**, post-v. and cap. of Orange co., N. C., 40 miles W. of Raleigh, on the North Carolina R. R. The country in the vicinity is hilly and broken, climate salubrious. It contains 6 churches, 2 academies, 1 newspaper, and 4 tobacco-factories. Pop. of v. 809; of tp. 3624.

J. D. CAMERON, Ed. "HILLSBORO' RECORDER."

**Hillsboro'**, post-v. and cap. of Highland co., O., 60 miles E. of Cincinnati, on the Marietta and Cincinnati R. R. It has 2 female institutes, 4 churches, 4 banks, 2 newspapers,



scale and agricultural works, planing-mills, flouring mills, 3 hotels. Pop. 2818. J. C. SPRINGER, ED. "GAZETTE."

**Hillsboro'**, tp. of Marion co., S. C. Pop. 1318.

**Hillsboro'**, post-v., cap. of Hill co., Tex., pleasantly situated in a picturesque and well-watered valley. It has a good academy, 1 flour and grist mill, and 1 weekly newspaper. Pop. 313.

L. J. STURGIS, ED. "HILL CO. EXPOSITOR."

**Hillsboro'**, post-v. of Loudoun co., Va. Pop. 246.

**Hillsboro'**, post-tp. of Vernon co., Wis. Pop. 985.

**Hillsborough**, port of entry of Albert co., N. B., on Petitcodiac River, has a good harbor, and exports large quantities of gypsum and gas-coal (calbertite) to the U. S. It has several handsome public buildings. Pop. about 900; of sub-district, 2995.

**Hillsborough**, county of Florida, bounded on the W. by the Gulf of Mexico. Land area, 1820 square miles. It includes Tampa Bay, a broad inlet, which furnishes a splendid harbor for vessels of nineteen feet draught. The county is generally level, partly sandy, partly rich marl hammock-land, and partly marsh. Cotton is the staple crop. Cap. Tampa. Pop. 3216.

**Hillsborough**, county of New Hampshire, bordering on Massachusetts. Area, 960 square miles. The surface is hilly. It principally lies on the W. side of the Merrimack River. The soil is mainly fertile. Cattle, wool, and grain are staple products. The cities of Manchester and Nashua, with many smaller towns, are extensively engaged in manufacturing. Lumber, cotton, woollen, wooden and metallic goods, furniture, cooperage, harness, and many other wares are manufactured. The county is traversed by several railroads. Caps. Amherst, Manchester, and Nashua. Pop. 61,238.

**Hillsborough**, post-v. of Scott co., Miss., 6 miles N. of Forest.

**Hillsborough**, post-v., cap. of Jefferson co., Mo., 40 miles S. of St. Louis. It has a good school, 2 churches, 3 hotels, 1 newspaper, and the usual mechanical shops. Principal occupations, farming, mining, and fruit-growing. Pop. about 400. R. W. McMULLIN, ED. "DEMOCRAT."

**Hillsborough**, post-v. and tp. of Hillsborough co., N. H., situated in the Contoocook Valley. It has a bank, a weekly newspaper, a hotel, 10 stores, 2 large woollen-mills, and bedstead and shovel-handle shops. Pop. of tp. 1595. W. M. SARGENT, PROP. "HILLSBORO' MESSENGER."

**Hillsborough**, tp. of Somerset co., N. J., embracing several villages. Pop. 3443.

**Hillsborough**, post-v., cap. of Washington co., Or., 17 miles W. of Portland, and on the Oregon Central R. R.

**Hillsborough River**, in Volusia co., Fla., is a salt-water lagoon continuous with Halifax River, and extending 30 miles S. of Mosquito Inlet. It abounds in fish and oysters, is separated from the sea by a strip of land from half a mile to 5 miles wide. It is shallow, though navigable for small boats, but its navigation is obstructed by mangroves, coral, sand, etc. Its W. bank is a range of oyster-shells. From its head to Indian River a short and shallow canal has been dug. This channel was once called Mosquito South Lagoon, and (with Halifax River) it is still known as Mosquito River. It averages a mile in width.—Another Hillsboro' River flows into Tampa Bay, and a third into the Atlantic, directly at Hillsborough Inlet.

**Hillsdale**, county in the S. W. of Colorado, formed in 1874. Area, 1400 square miles. It contains important gold-mines. Cap. San Juan.

**Hillsdale**, county of Michigan, bordering on Ohio and Indiana. Area, 570 square miles. It is undulating, fertile, and well timbered. It has quarries of good sandstone. Grain, cattle, and wool are staple products. Lumber, carriages, etc. are manufactured. It is traversed by the Michigan Southern and the Detroit Hillsdale and Indiana R. Rs. Cap. Hillsdale. Pop. 31,684.

**Hillsdale**, city and tp., cap. of Hillsdale co., Mich., on the Lake Shore and Michigan Southern and the Detroit Hillsdale and Indiana R. Rs., 66 miles W. of Toledo and 177 E. of Chicago. It is the seat of Hillsdale College, and has 6 churches, several schools, 3 weekly newspapers, 2 national banks, 3 hotels, a chair factory, 2 steam flour-mills, and 2 foundries and machine-shops. Pop. of city, 3518; of tp. 602. H. B. ROWLSON, ED. "STANDARD."

**Hillsdale**, tp. of Winona co., Minn. Pop. 417.

**Hillsdale**, tp. and post-v. of Columbia co., N. Y., on the New York and Harlem R. R., 110 miles N. of New York. Pop. 2083.

**Hillsdale College** was founded as Michigan Central College at Spring Arbor, Mich., in consequence of a vote (1844) of the Michigan yearly meeting of the Freewill

Baptist denomination. The college was chartered in 1845 by the legislature, rechartered and removed to Hillsdale, Mich., in 1855. It now has departments for the classical course, for theology, science, music, and art, besides two preparatory departments. A portion of the principal college building was burned in 1874, and a new building has been since erected. Both sexes are educated in this institution, in which there are 7 professors and 14 other instructors, the greater number of students thus far being in the preparatory departments. The college has a capital of more than \$200,000.

**Hill's Grove**, post-tp. of Sullivan co., Pa. Pop. 249.

**Hills'ville**, post-v. of Carroll co., Va., situated on the Blue Ridge, 13 miles E. of New River. It has 1 newspaper, 1 church, 2 hotels, and 4 stores. Pop. 268.

CHAS. C. HARRYMAN, ED. "NEWS."

**Hill Top**, tp. of Charles co., Md. It constitutes a peninsula in the river Potomac. Pop. 4040.

**Hill'town**, tp. of Bucks co., Pa. Pop. 2869.

**Hill'yer** (JUNIOR), b. in Wilkes co., Ga., Apr. 23, 1807; graduated at the State University in 1828; studied law while in the university, and was admitted to the bar immediately after his graduation. In 1834 was elected by the legislature solicitor-general of the western judicial circuit of his State; was elevated to the bench in 1841, where he served several years; and was a member of Congress from Georgia from 1851 to 1855; in 1857 was appointed solicitor of the U. S. treasury, which position he held until Georgia passed her ordinance of secession in 1861. He then resigned and returned home, and resumed the practice of law, to which (Mar., 1875) he is still devoted.

A. H. STEPHENS.

**Hill'yer** (WILLIAM SILLIMAN), b. at Henderson, Ky., Apr. 2, 1831; graduated in 1847 at Anderson College, Ind., with honors, and became a brilliant and successful lawyer and politician of New Albany, Ind. In 1855 he removed to St. Louis, where he was a warm friend of U. S. Grant, afterwards President of the U. S. In 1861 he served for a time as a private in a volunteer organization under F. P. Blair, Jr., and then removed to New York, where he commenced the practice of law. In 1863 he served on Gen. Grant's staff with the rank of brigadier-general, but after the Vicksburg campaign resigned on account of ill-health, and returned to New York. D. at Washington, D. C., July 12, 1874.

**Hi'lo**, an important seaport of Hawaii, and the second town in size in the Sandwich Islands. It has a spacious and commodious harbor. Pop. 4220.

**Hil'son's**, tp. of Henry co., Ala. Pop. 774.

**Hil'ton**, tp. of Iowa co., Ia. Pop. 563.

**Hilton Head**, post-v. and tp. of Beaufort co., S. C. It is on Hilton Head Island, and has on the N. the Port Royal entrance, which constitutes a noble harbor. It was fortified by the Confederates, and taken by the U. S. naval forces Nov. 7, 1861. Pop. 3073.

**Hil'versom**, town of the Netherlands, in North Holland, is beautifully situated, and has manufactures of carpets and horse-cloths. Pop. 6294.

**Himala'ya** ("the abode of snow"), the highest and most majestic system of mountains on our globe, forms the boundary between the high table-land of Thibet on the N. and the low, alluvial plain of Hindostan, around the Ganges and Brahmapootra, on the S., and stretches in a curved line, 1500 miles long, and at some points 350 miles broad, from Hindoo-Koosh to Assam, from lon. 73° to lon. 98° E. To the S., towards the plain of the Ganges, Himalaya stands almost perpendicular, from 4000 to 5000 feet high, like a wall, from which the mighty rivers formed by the melting of the snow burst forth with tremendous violence, splitting the granite masses and forming long, winding, but narrow chasms. To the N. the mountains slope more gently towards the plateau of Thibet. The Himalaya consists of several ranges, with a direction parallel to each other, and enclosing fertile and well-cultivated valleys, some of which are among the most beautiful places on earth; as, for instance, the valleys of Cashmere, Nepal, and Bootan. The central range is the highest, averaging from 16,000 to 20,000 feet, and forty-five peaks are known to rise above 23,000 feet. Mount Everest, the highest mountain on our globe, is, according to Col. Waugh, 29,002 feet high; Kanchinjinga, 28,156; Dhaulagiri, 25,826; Nanda Devi, 25,749; and Shumalari, 23,929. The line of perpetual snow descends to 16,200 feet on the southern side of the range, but only to 17,400 feet on the northern—a singularity which probably can be explained from the peculiarly dry atmosphere of the plateau of Thibet. Glaciers abound, and at some places they are known to descend from the regions of perpetual snow to about 12,000 feet. At an elevation of 2000 feet the heat



varies from  $100^{\circ}$  to  $37^{\circ}$ : at 7000 feet, from  $80^{\circ}$  to  $26^{\circ}$ ; at 12,000 feet, the thermometer falls during the nights of September below zero. But wheat can be grown at an elevation of 13,000 feet, and up to the height of 5000 feet the vegetation still retains a tropical character; the tea-plant has been introduced, and can be cultivated on the southern side up to a height of 5000 feet, but it succeeds best at an elevation of 2000 to 3000 feet. The passes of the Himalaya are few and extremely difficult. Ibi-Gamin, leading into Guhrwal, is the highest known pass, 20,457 feet; the highest pass used for traffic is Parany, 18,500 feet above the sea. With respect to their geological structure, the Himalaya Mountains consist of granite and gneiss, which form the loftiest peaks, and against which strata of the Silurian period rest. Mines of gold, copper, iron, and lead exist, but are not worked with energy, and seem not to be of importance. The flora of the Himalaya is peculiarly rich and interesting.

**Himera**, an ancient city of Sicily, situated on the northern coast, was founded in the seventh century before Christ by a colony from Zancle, and was destroyed in 408 a. c. by the Carthaginians under Hannibal. The first time the Carthaginians invaded Sicily (in 480) they were utterly defeated, and their commander, Hamilcar, fell in the battle at Himera. The second time they were victorious, and Hannibal, the grandson of Hamilcar, after taking Himera, put a part of the inhabitants to death and razed the city to the ground.

**Himerius**, a celebrated Greek sophist of the fourth century after Christ (probably from 315 to 386), b. at Prusa in Bithynia; studied at Athens; travelled; and settled finally at Athens as a teacher of rhetoric. For some time he lived in Antioch at the court of the emperor Julian, who fully appreciated him. Of his orations, twenty-four have come down to us complete, and have been edited by Wernsdorf (Göttingen, 1790). We have fragments of eleven others, and extracts by Photius of thirty-six. His style is, as that of his time, obscure, overlaid with figurative expressions, and affected, but he enjoyed a great reputation in his time. Among his disciples was Gregory Nazianzen. He was, like Libanius, a pagan, but he speaks with moderation, and sometimes even with kindness, of the Christians.

**Himilco**, or **Hamilcar**, is a name of common occurrence in the history of Carthage. Pliny mentions one Himilco, a Carthaginian, who made a voyage of discovery along the western coast of Europe at the same time that Hanno explored the western coast of Africa; but Himilco's voyage is stated to have been stopped by the absence of wind and by the sea being loaded with seaweed.—Both in the first and third Punic wars there were noted Carthaginian generals of this name, but the most famous was that Himilco, the son of Hanno, who in 406 b. c. commanded the Carthaginian expedition against Sicily, together with Hannibal, the son of Gisco. The expedition was very successful, and the whole western part of the island was conquered. In 397, however, Dionysius, tyrant of Syracuse, renewed the war. Himilco again commanded the Carthaginian force, and was very successful in the beginning, but while he besieged the city of Syracuse a pestilence broke out in his camp. In this emergency Dionysius attacked and defeated him, and Himilco now made an infamous capitulation, paying 300 talents in order to be permitted to depart unmolested with all his native Carthaginians, while he left his allies and the mercenary troops to the mercy of Dionysius. Having returned to Carthage, the popular odium which he incurred pressed so heavily on him that he committed suicide.

**Himyaritic Language**, a Semitic language formerly spoken in South-western Arabia by the Himyarites (or Homerites), a people of whose history comparatively little is known. A modern Himyaritic kingdom was destroyed 525 a. d. by the Ethiopians, who compelled the people to abandon Christianity. Himyaritic inscriptions of great but uncertain age have long been known to exist, but have not been deciphered until a quite recent date. The modern Ekhili Arabic is regarded as a representative of the old Himyaritic.

**Hinckley**, town of England, in the county of Leicester. It has a fine Gothic church and some manufactures of hosiery. Pop. 6902; with surroundings, 8982.

**Hinckley**, post-tp. of Pine co., Minn. Pop. 255.

**Hinckley**, post-tp. of Medina co., O. Pop. 972.

**Hincks** (EDWARD), D. D., b. at Cork, Ireland, Aug., 1792; studied under his father, Hebrew professor at Belfast; graduated with honors 1812 at Trinity College, Dublin, and received a fellowship; took Anglican orders, and became rector of Ardara, and in 1826 rector of Killyleagh, Ireland, where he d. Dec. 3, 1866. Though living in a remote country parish, and possessed of but small means, he became one of the first and ablest restorers of the lost

knowledge of the meaning of the Assyrian inscriptions. He discovered the key to the Assyrian numeral system, and his papers *On Assyrian Verbs* (1855-56) contain the first successful attempts at an Assyrian grammar. Among his writings are valued papers on Egyptian MSS., and some polemical and other works.

**Hincks** (Sir FRANCIS), K. C. M. G., C. B., b. at Cork, Ireland, in 1805, a son of the Rev. Dr. Hincks, a learned Presbyterian divine of Belfast, and brother of Rev. Edward Hincks (1792-1866), the Assyrian archaeologist. Sir Francis became a merchant, and in 1832 settled at Toronto, Canada, where he became a prominent editor and politician; finance minister of Upper Canada 1842-43 and 1848-54; prime minister in 1851; governor of the Windward Islands 1853-62, of British Guiana 1862-69; finance minister of Canada 1869-73. He was knighted in 1869.

**Hind**, the female of the red deer or STAG (which see) of Europe.

**Hind** (JOHN RUSSELL), b. at Nottingham, England, May 12, 1823, the son of a manufacturer of laces; became interested in astronomy in childhood; became an assistant to a civil engineer, and went in 1840 to London; found employment in Greenwich Observatory, and in 1843 was for three months employed in Ireland upon the task of exactly determining the longitude of Valentia; entered Mr. Bishop's observatory, Regent's Park, 1844. Here he discovered (1847-54) ten new asteroids, and made many other even more important observations; became foreign secretary of the Royal Astronomical Society 1847; corresponding member of the French Institute 1850; is superintendent of the *Nautical Almanac*, which under his direction has attained unsurpassed excellence both for astronomical and nautical purposes. Among his works are *The Solar System* (1846), *Illustrated London Astronomy* (1853), *Elements of Algebra* (1855), and treatises on comets.

**Hin'dersin, von** (GUSTAV EDUARD), b. July 18, 1804, at Wernigerode, Prussian Saxony; entered the artillery as a volunteer in 1820; distinguished himself by his quick apprehension, indefatigable application, and eminent business capacity, and was attached to the staff as first lieutenant in 1841. In 1846 he became major, and was appointed director of the topographical department. In the campaign of 1849 against the insurgents of Baden he had the misfortune to be taken prisoner while reconnoitring from a belfry, but was liberated after the capitulation of Rastadt. In 1854 he received the command of the 2d brigade of artillery, in 1858 that of the 3d, and in 1864 the position of inspector-general. Shortly before the assault on the Düppel intrenchments in Sleswick, during the war against Denmark, he was called to the head-quarters of Prince Frederick Charles and appointed leader of the artillery attack; after the victory he was ennobled and received the title of a general of infantry. In the war against France (1870-71) he followed the royal head-quarters as commander of the artillery, and took a very active part in the siege of Paris. D. at Berlin June 25, 1872, of heart disease. He did much for the improvement of the Prussian artillery, and introduced the breech-loading gun. But he was nevertheless not popular; he was vehement and haughty. A. NIEMANN.

**Hind'ley**, town of England, in the county of Lancaster, has extensive cotton manufactures and large coal-mines in its vicinity. Pop. with surroundings, 25,706.

**Hin'doo-Koosh', Hindu-Kush, or Indian Caucasus**, a mountain-range in Central Asia, extending from lon.  $68^{\circ}$  to lon.  $75^{\circ}$  E., and forming the boundary between Afghanistan and Toorkistan. At its eastern extremity it is connected with the Himalaya, which it resembles in many of its features, though it is lower and destitute of forests. Its highest point is Hindoo-Koh, 20,000 feet high.

**Hindustan**. See INDIA, by R. C. CALDWELL.

**Hinds**, county of W. Central Mississippi. Area, 930 square miles. Its surface is pleasantly diversified and well timbered, and its soil very fertile. Corn and cotton are staple crops. The county is crossed by the Vicksburg and Meridian and the New Orleans Jackson and Great Northern R. Rs. Cap. Jackson. Pop. 30,488.

**Hinds** (SAMUEL), D. D., born in Barbadoes 1793; graduated in 1815 at Queen's College, Oxford; became vice-president of Albion Hall, Oxford, and principal of Codrington College, Barbadoes; was vicar of Yardley, Hants, 1834-43; prebendary and rector of Castlenock, Dublin, 1843; chaplain to Archbishop Whately; chaplain to the lord lieutenant of Ireland 1846-48; dean of Carlisle 1848; bishop of Norwich 1849-57, when he resigned. D. Feb. 7, 1872. Author of a *History of Christianity* (1829) *supra*; a treatise on logic, *Sonnets and Sacred Poems*, *The Three Temples of the One True God Contrasted* (1840), *Inspiration and Authority of Scripture* (1851), *Scripture and the*



*Authorized Version* (1853), etc. His *History of Christianity*, originally published in the *Encyclopædia Metropolitana*, has gone through many editions.

**Hindu Philosophy.** The primitive religion of the Hindu branch of the Aryan race seems to have been monotheistic, but as it is exhibited in the hymns of the Vedas it is a pure nature-worship, its praises and its offerings being devoted to the various phenomena of nature and their deified personifications. Such a religion was suited only to a people in a primitive state. As the Hindu race advanced in knowledge, men began to "look through nature up to nature's God," and to seek "if haply they might feel after Him and find Him." This was an inquiry peculiarly suited to the subtle and analytical Hindu intellect, and it resulted in the formation of six distinct schools of philosophy. All the six systems are supposed to start from the Vedas, and are all recognized as orthodox. But the simple Vedic hymns afforded but scant material for metaphysical investigation, and were soon left far behind. The philosophical dogmas have only a very slight basis in the Vedas, and rest almost exclusively upon the deductions of pure reasoning. The nature of the Supreme Being, the origin of the universe, the mysteries of life, intelligence, and future existence, are the great subjects to which philosophy addresses its speculations. Though widely differing in their developments, all the schools recognize one fundamental maxim, *ex nihilo nihil fit*—"from nothing comes nothing." All also have one final object, the attainment of *mukti*, or deliverance, the emancipation of the soul from future birth and existence, and its absorption into the Supreme Soul of the universe.

The names of the six schools, or *darsanas*, are *Nyāya*, *Vaiśeṣika*, *Sāṅkhya*, *Yoga*, *Pāra*, *Mīmāṃsā*, and *Uttara Mīmāṃsā* or *Vedānta*. But certain points of resemblance bring the six into association in three pairs, called *Nyāya*, *Sāṅkhya*, and *Vedānta*.

I. (1) *Nyāya*, founded by the sage Gautama. The word *Nyāya* means "propriety or fitness," and was adopted because the author's primary object was to find the *proper method* of arriving at truth and of arranging the arguments. It is hence called the "logical school." The founder held the *sensations* to be the source of all knowledge, and set himself to inquire into their nature and functions. So his school is also known as the "sensational." (2) *Vaiśeṣika*.—This was founded by Kaṇḍa, and is called the "atomic school." Its method is generally the same as that of the *Nyāya*, though it is not so precise and comprehensive. It pushes the sensation theory farther into an investigation of the objects of sense, but its distinctive doctrine is the existence of a transient world composed of aggregations of eternal atoms. Both divisions recognize a Supreme Being. To the Western World the *Nyāya* is especially interesting, as the only logical system which is not distinctly traceable to the teachings of Aristotle.

II. (1) *Sāṅkhya*, with which is classed the *Yoga*, the former being atheistical, the latter theistic. The *Sāṅkhya* was founded by the sage Kapila, and received its name *Sāṅkhya* ("numeral") from its discriminative tendencies. The first principle it asserts is the necessity of true and perfect knowledge. It defines the nature of evidence, and the principles of which a knowledge is attainable. First among the latter is nature, "the universal material cause." Matter it declares to be eternal, and so far it may be considered materialistic, but it recognizes also an intellectual power with affections, sentiments, and faculties. It admits the existence of separate souls, and admits that "intellect is exercised in the evolution of matter, or, in other words, in the work of creation, but it denies the existence of any Supreme Being, either material or spiritual, by whose volition the universe was produced." The doctrines of this school are set forth in the *Sāṅkhya Kārika*, translated with a gloss and commentary by Colebrooke and H. H. Wilson. (2) *Yoga*, founded by Patañjali, and sometimes called after him *Pātanjala*. This pursues the same method and holds most of the doctrines of the *Sāṅkhya*, but it asserts not only the existence of separate individual souls, but of one all-pervading Spirit, unaffected by the influences to which other souls are subject, the Supreme Ruler, God. The followers of the *Sāṅkhya* devote themselves to contemplation and to abstruse reasonings upon the nature of mind and matter. The *Yoga* insists upon the necessity of devotion, and prescribes the exercises and discipline to be practised. The disciples of both these schools are called *Yogis* (or *Jogis*), but the *Sāṅkhya yogi* sits in calm meditation, while the *yogi* of the *Yoga* school practises all kinds of austerities and bodily torments as acts of devotion.

III. *Vedānta*. This includes the *Pāra-Mīmāṃsā*, founded by Jaimini, and the *Uttara-Mīmāṃsā*, attributed to Vyāsa. The *Pāra*, or prior *Mīmāṃsā*, started with the express object of aiding the interpretation of the Vedas, and its most distinctive dogma is the eternity of the Word, meaning the

Vedas. The *Uttara*, or later *Mīmāṃsā*, is the more important, and it is to this that the term *Vedānta* especially applies. This professes to be founded on the Vedas, and cites texts as authorities, but its conclusions are worked out by pure reason. It teaches that "God is the omniscient and omnipotent cause of the existence, continuance, and dissolution of the universe. Creation is an act of His will; He is both the efficient and the material cause of the world," and in the end all things are resolved into Him.

The time when these systems of philosophy sprang up is, as is usual in all matters of Hindu chronology, very uncertain. The *Uttara-Mīmāṃsā*, or *Vedānta*, is generally admitted to be the latest, and is supposed to have been especially directed against the teachings of the Buddhists. This would bring it within three or four centuries B.C. The other schools are to all appearance older, but reasons have been urged for placing them all after the rise of Buddhism. If this be the correct view, the date of the *Vedānta* must be brought down later. This is a question of some interest, for the later the rise of these schools the greater is the possibility of their having been evoked by the teachings of the Greek philosophers. Mr. Colebrooke, the highest authority on the subject, expresses his decided opinion that "the Hindus were the teachers, not the learners."

The principal authorities are COLEBROOKE'S essays in the *Transactions of the Royal Asiatic Society*, subsequently published separately in 2 vols.; *Dialogues on Hindu Philosophy*, by the Rev. K. M. BANERJEE (Calcutta, 1860); *Refutation of Hindu Philosophy*, by PUNDIT NEHEMIAH NILKANTH SASTRI, translated by Dr. HALL (Calcutta, 1862); BALLANTYNE'S *Essays* (various). JOHN DOWSON.

**Hindu Religion.** The origin of the Hindu religion is veiled in the mists of a remote antiquity. When the old Aryans crossed the Indus in their emigration from Irān or Central Asia, they carried with them certain hymns which were probably even then committed to writing. These hymns were afterwards increased in number, for there are allusions in some hymns to the new land in which their authors had settled. The language in which the hymns are composed is the oldest known form of Sanscrit, and centuries probably passed before these scattered compositions were collected and arranged in the books called *Vedas*. The date of these compositions is a matter of very great uncertainty, and the best opinions are based upon deductive reasoning from uncertain premises. The date which has received perhaps the greatest approval is 1400 B.C. The hymns have a strong mythic character about them. They are addressed to the elements and powers of nature personified—to fire, to the wind, to the firmament, the moon, and other objects. Those addressed to the dawn are peculiarly interesting from their mythical significance. No one of the divinities has any recognized superiority over the others, but the differences in the numbers of the hymns addressed to the individual deities show that they were held in various degrees of dread and reverence. There are glimpses in some of the hymns of a high and spiritual conception of the Deity, or direct mystical allusions to one superior Being, from whom all the rest emanate; and texts are found which speak more or less explicitly of "One Supreme Spirit, the Lord of the universe, whose work is the universe." But the general character of the hymns does not rise above earthly objects. Protection from the elements, from sickness, and from enemies, aspirations for the favors of nature, for increase of children and of cattle, are their main topics. Various rites and ceremonies are provided for and enforced, and very frequent reference is made to the fermented juice of the soma plant (*Asclepias acida*), a beverage in high favor among mortals, and therefore presented as an acceptable offering to the superior powers. In course of time the scattered hymns were collected and arranged in books by a sage who is known as Vyāsa "the compiler." The Vedas as they are now known, and have been known for ages, are four in number, named *Rig*, *Yajur*, *Sāma*, and *Atharva*. The *Rig* is the most important and original. The second and third Vedas consist principally of hymns from the *Rig* adapted to special purposes. Those of the *Yajur* are intended for sacrificial, those of the *Sāma* for choral uses. The *Atharva*, or fourth Veda, is of later date, and its contents are more original and diverse than those of the second and third. The hymns of the Vedas recognize a priestly class and a regal class, which are evidently the beginnings of the *Brāhman* and *Kshatriya* castes of later days. The great body of the people was called *vis*, a word which was afterwards expanded into *Vaiśya*, and used as the name of the third or mercantile and agricultural caste. The fourth or servile caste, called *Sūdra*, seems to have had no recognized existence in those days. In the later portion of the *Rig*, and in the more modern *Atharva veda*, there are references to a future state, and an abode of bliss is promised after death to the victorious.



The difference between the religion of the Vedas and modern Hinduism is very wide—so wide indeed that the two religions have little or nothing in common beyond the Vedic texts and formulas which still remain in use. "The great feature of difference," says H. H. Wilson, "is the total absence of the divinities, both *nomina* and *numina*, who have for ages engaged, and, to a great degree, engrossed, the adoration of the Hindus. We have no indications of a Triad, the creative, preserving, and destroying power; Brahmā does not appear as a deity, and Vishnu, although named, has nothing in common with the Vishnu of the Purānas; no allusion occurs to his *avatars* or incarnations. As a divinity Siva is not named; nor is his type, the *Lingam*, ever adverted to. Durgā and her triumphs, and Kālī, 'whom the blood of man delights a thousand years,' have no place whatever in the hymns of the Vedas." The doctrine of transmigration seems to be entirely unnoticed in the Vedic hymns; and the rite of *sati*, the burning of widows with the corpses of their husbands, although known to Greek writers 300 years before Christ, and said to be a Vedic institution, proves upon examination to have no better authority than a misquoted verse. Some portion of the ceremonial of the Vedas still survives in the domestic observances of the Brāhmanas and in their obsequial offerings. It is incumbent on every householder to make offerings of cakes and other viands to his own ancestors, and to the collective *Pitris* or Patres of the human race. Every *brāhman* also, on approaching maturity and being invested with the sacred thread, is taught the celebrated verse called the *Gāyatri*: "Let us meditate on the adorable light of the Sun (or Divine Ruler): may it guide our intellects!" This may be the only verse of the Veda he may ever learn, but this he must repeat in all his devotions.

The hymns collectively, the whole metrical part of the Veda, is called *Mantra*, and is thus distinguished from another part written in prose and called Brāhmana. There are several works bearing this title. They are of later date, but they are held to be part and parcel of the *Veda*, and of equal authority with the *Mantra*. The *Brāhmanas* have been compared to the Talmud, and though "gleams of beautiful thought occasionally break out" in them, their contents are in general worrisome. They enter into long details about ceremonies, and of the origin and meaning of various rites, and they illustrate them with curious legends, both human and divine. The four castes are distinctly named in the *Brāhmanas*, and one of them indicates, rather than lays down, the doctrine of transmigration.

Next in order come the writings called *Aranyakas* and *Upanishads*. These are works of a far higher character, and give clear evidence of a vigorous intellectual life interesting itself in questions about life and eternity. They are the beginnings of Hindu philosophy, and cast aside matters of rites and ceremony to deal with abstract questions and make "guesses at truth."

Second only to the Veda in importance is the Code of Menu, which is also a pre-Christian production. This shows a considerable advance in the development of the Hindu system. A future state of reward and punishment is clearly recognized, and the doctrine of transmigration is distinctly enunciated. No one of the three great gods of modern times was known to the *Veda*, but Menu recognizes Brahmā, the Creator. But Brahmā is not the One Supreme Being, the Soul of the universe, but merely the creative energy; and after the world which he has produced has endured for long ages, the Divine energy is withdrawn and Brahmā himself returns to the Supreme essence from which he emanated. It is remarkable that no mention is made by Menu of the burning of widows; and as he prescribes the kind of life that widows were to lead, the inference to be drawn is, that the practice was unknown to him. Yet, as we have seen above, the custom was well known to Greek authors 300 years *b. c.* But the most remarkable feature in Menu is the full development of the caste system. Not only are the four great castes recognized, but the "mixed castes" also have come into being through the intercourse of couples belonging to different castes. Most stringent rules are laid down for the separation and guidance of all the castes, the chief and leading object throughout being the elevation of the *Brāhman* and the degradation of the others. The *brāhman*, according to Menu, is the chief of all created beings; kings are inferior to him, and must show him respect; his person and property are guarded by the severest laws in this world, and by denunciations of tremendous punishments in the next. But the *brāhman's* life was not to be one of luxury and ease: all his days were to be spent in study, devotion, and austerity, in acquiring and imparting a knowledge of the holy books, in performing the duties and ceremonies they enjoin, and in so mortifying the flesh that it might cease to care for the things of this world, and rise nearer and nearer to assimilation and unity with the Great Soul of the universe. The *brāh-*

*man's* life was divided into four portions or stages. The first portion he was to spend as a *Brāhmachāri*, or student, in strict service and obedience to his religious superior until his investiture with the sacred cord about the age of sixteen. Next he was to marry and become (2) a *Grhastha*, or householder and head of a family. During this stage he was to be diligent in studying and teaching the Veda, to officiate at sacrifices, to receive alms and bestow alms. But the grand object of marriage was to obtain male offspring, and so provide for the obsequial offerings to himself after death, and to his ancestors and the general progenitors of mankind. These duties accomplished, he was to proceed to the next stage, (3) the *Vānaprastha*, or dweller in the woods, whose duty it was to divest himself of all fleshly luxuries and comforts, to despise all trials of heat and cold, wet and dry, to live upon the coarsest fare, and to mortify the body in every way as a clog and burden to the soul. Lastly, he was to become (4) the *Sannyāsī*, or mendicant, when, freed from all earthly attachments and religious observances, his only duty was to abstract his mind from material objects, and to strive after that perfect equanimity, that complete indifference to everything mundane, which is the nearest approach in this world to the all-pervading Spirit which rules it. Such was the high ideal of the life of a *brāhman*—an ideal which few sought to realize, even in the days when the ordinance was young, and of which the mere name and shadow only now remain.

In the days of the *Upanishads* the duty of studying and teaching the Veda had been shared by the second caste, but now it was restricted exclusively to the *brāhman*s; the law was either derived directly or deduced from the same writings, so the *brāhman* was the judge and the exponent of the law. Government and administration were to be in accordance with the law, so the *brāhman* was the king's counsellor and guide, the chief director and administrator in all political transactions. Fighting was the more special duty of the *Kshatriya*, but, as will be presently seen, the *brāhman* took a prominent part even in this. The Code declares that "the world and all that are in it are his;" the world was made for the *brāhman*; it was for him to rule and guide it. Others might act as instruments, but he was the director and controller.

The *Kshatriya*, or military class, were charged with the duties of government and war. They were entitled to honor and obedience, but were far inferior to the *brāhman*. The sacerdotal class required the protection of the ruler and warrior; the soldier needed the advice and guidance of the sage and lawyer. The two classes were mutually dependent on each other, but the one contributed mental and spiritual influence, the other physical power, and the former asserted and maintained its ascendancy.

The business of the *Vaiśya*, or third class, was to carry on trade and agriculture, to perform sacrifices through the *brāhman*s, and to bestow alms.

The *Sūdra* was the fourth or servile caste, and its whole duty was service of the others, especially the *brāhman*. Ingenuity almost exhausted itself in the effort to describe the utter vileness of the *sūdra*, a being so base that a *brāhman* could not receive a gift from him, and even in the extremity of hunger could accept nothing more than a little dry grain. But the degradation of the *sūdra* was only religious. Though he was to serve, he was not a slave; he could choose his own master, and was entitled to payment. He could accumulate wealth and acquire property, and he often became rich and sometimes rose to power.

The "mixed castes" are fully recognized by Menu: their social status is declared, as well as the course of life to which their degraded birth had called them.

In the present day it is asserted by the *brāhman*s—and with much apparent reason—that they alone of the four castes remain unchanged and unmixed. The *rājās* claim to be the representatives of the *kshatriyas*, and there are other castes who assert themselves to be the descendants of the *vaiśyas* and *sūdras*, but it is difficult for them to prove the purity of their descent. The *brāhman*s themselves have broken up into divisions and subdivisions without end, and the higher classes hold the lower divisions in the utmost scorn. The mixed castes have naturally greatly increased, and the general tendency is to still further multiply them by all kinds of artificial and arbitrary distinctions.

The two great poems *Rāmāyana* and *Mahābhārata* are supposed to have been written a little before the Christian era. They depict the heroic age, and those deified heroes come upon the scene who occupy so prominent a position in modern Hinduism. The *Rāmāyana* celebrates the exploits of the hero Rāma in clearing the conquest of the S. of India and Ceylon. He was a *brāhman*, and in the poem appears as a mere mortal hero, but he has since been raised to the dignity of an incarnation of Vishnu. The *Mahābhārata* records the wars between two rival families for the sovereignty of a state whose capital stood near the site of



modern Delhi. In this war, Krishna, the most celebrated of the incarnations of Vishnu, took a leading part. Like Rāma, he was brāhman, but even in the poem he has many of the attributes of divinity, and is more of a god than a mortal. He it is who is represented as reciting the *Bhagavad-gītā*, the "Divine Song," a philosophical poem of great elevation of thought and beauty of language.

From the epic poems to the *Purānas* is a wide interval, full of important changes. There are many works bearing this name, but the recognized *purānas* are eighteen in number, and are supposed to have been written between the eighth and fourteenth centuries of our era. In these works the Hindu religion receives its full development. Brahman the Creator, Vishnu the Preserver, and Siva the Destroyer (or rather Regenerator) are acknowledged as the three great divinities constituting the Triad. The first of the *Purānas* is the *Brahmā-purāna*; the others are devoted, some to the exaltation of Vishnu in one or other of his many forms, and some to the honor of Siva and his emblem, the *lingam*. It is doubtful if Brahman was ever an object of worship, for even the *Brahmā-purāna* does no more than indicate a local worship of him at one place near Ajmir. Vishnu the Preserver was then, as now, the most popular deity, under one or other of his *avatārs* or incarnations. The *avatārs* were ten: (1) *Matsya*, the Fish, the object of which was to recover the Vedas, which had been lost in a general deluge. (2) *Kārama*, the Tortoise. This is connected with one of the wildest legends of Hindu mythology. The deluge had destroyed thirteen precious things, among which was the *amrita* or water of immortality; Vishnu converted himself into a tortoise, and sustained the mountain Mandara on his back while the gods churned the ocean with it till they recovered the lost treasures. (3) *Vārāha*, the Boar. (4) *Narasimha*, the Man-lion. (5) *Vāmana*, the dwarf named Bali. (6, 7, 8) The three Rāmas—Parasu-rāma, Rāma or Rāma-chandra, and Bala-rāma. (9) Buddha. (10) Kalki, the White Horse, which will appear hereafter to destroy the world and restore purity. For Bala-rāma some substitute Krishna, but Krishna has attained to such honor that he is held to be Vishnu himself, not simply an incarnation. A foreshadowing of one of these incarnations appears in the Veda. The sun is represented mythically as taking three steps—his rising, culmination, and setting. Bali the dwarf is represented as having begged three steps of land from a tyrant, and then to have strode over the whole world. Vishnu in his abstract form receives little or no adoration. Rāma and Krishna, the deified heroes, are the great objects of worship. Both were mortals, and are represented as dying, one by suicide, the other by accident. Rāma, the hero of the *Rāmāyana*, is the special deity of the mendicant sects. His name is used as a salutation and benediction by all classes, and the constant repetition of it is a religious exercise of great merit. Krishna, the hero of the *Mahābhārata*, enjoys unbounded popularity, particularly as Gopāla, the youthful cowherd. He was of royal race, but was hidden among the cowherds from a tyrant who sought his life. His gambols with the milkmaids and the frolics of his childhood and youth are related in the *Bhāgavata-purāna* and in the modern *Prem-sāgar*. They are the delight of all classes, especially of females and the young. In later life he performed many wonderful exploits, and after taking a leading part in the war of the *Mahābhārata* he retired to Dwāraka, his capital, in Guzerat, where he was killed by an arrow shot at him by mistake. The name Krishna signifies "black," and the god is represented as a youth of very dark complexion. The ceremonies and rejoicings at the great spring festival, the *Holi*, are principally in honor of Krishna.

Vishnu is "the thousand-named," and the repeating of these names is a very meritorious work. Prominent among these forms—for each name carries with it some special significance—is that of *Jagan-nāth*, "the lord of the world," in which form he is worshipped at the great car-festival in Cuttack.

Siva, the Destroyer and Regenerator, has also a vast number of votaries, but fewer than Vishnu. His appearance and attributes are of a very gloomy character. He is represented as sitting absorbed in thought—naked, smeared with funeral ashes, with matted hair, and a necklace of human skulls and bones. He has three eyes, and the fire from them consumes those who interrupt his devotions. But the especial form under which he is worshipped is the *lingam*, or phallus, the male organ of reproduction, which symbolizes his office of regenerator. There is nothing offensive in the way this is represented, nor anything obscene in the ideas attached to it. A plain column of stone, a cone of clay, or even a natural oblong stone, is its representative. This, in the eyes of the worshipper, is simply Siva, its symbolical purport being altogether unknown or unheeded. At the time of the Mohammedan

conquest of India in the eleventh century there were twelve celebrated *lingams* at different places, and it was one of these that Mahmūd destroyed at Somnāth. One of the names of Siva is *Soma-nāth*, "lord of the moon," and he is represented as bearing the crescent on his forehead. It is in honor of Siva, but especially of his consort, Devī, that bloody sacrifices are offered and tortures inflicted.

Saraswati, the wife of Brahman, is the goddess of learning and the arts, and the inventress of the Sanskrit language. She receives more honor than her lord. Lakshmi, the wife of Vishnu, is the goddess of prosperity and fortune. Both of these deities receive adoration on particular occasions, and the latter is very frequently invoked, but they are not the objects of any regular worship. It is far different with the consort of Siva, who is known under a great variety of names—Devī, Durgā, Kālī, Pārvatī, Bhavānī, etc.—and is the recipient of a fierce fanatical adoration. This goddess is represented in a variety of ways, all more or less terrible and disgusting. In the mildest form she is a handsome woman riding on a tiger in a fierce and menacing attitude. In another and more common one she is Kālī, "the black," with a black skin, a hideous and terrible countenance, dripping with blood, wreathed with snakes, and adorned with human skulls. The worship of this deity is very widely spread, especially in Bengal, and it is from her that Calcutta obtained its name. The worship of Devī owes its diffusion, perhaps its rise, to a class of writings called *Tantras*. These are works of a comparatively late date, but their origin is very obscure and their authors are unknown. They are ascribed to Siva, and are generally in the form of dialogues between him and his consort. "They are very numerous, and some are of considerable volume. They have been but little examined by European scholars, but sufficient has been ascertained to warrant the accusation that they are authorities for all that is most abominable in the present state of the Hindu religion. The great feature of the religion taught by the *Tantras* is the worship of Sakti—divine power personified as a female, and individualized, not only in the goddesses of mythology, but in every woman; to whom, therefore, in her own person, religious worship may be, and is occasionally, addressed. The chief objects of adoration are, however, the manifold forms of the bride of Siva. Even in its least exceptional division the Sakti worship comprehends the performance of magical ceremonies, and rites intended to obtain superhuman powers and a command over the spirits of heaven, earth, and hell. The popular division is, however, called by the Hindus the *left-hand* faith. It is to this that the bloody sacrifices offered to Kālī must be imputed, and that all the barbarities and indecencies perpetrated at the annual worship of Durgā and the swinging festival are to be ascribed. There are other atrocities which do not meet the public eye." (H. H. Wilson.)

The religion of the Hindus is thus principally directed to the worship of three leading divinities, Vishnu, Siva, and Devī—each of whom has many names and forms. Each form or manifestation has some peculiar attribute, some special kind of worship, but the general features are maintained throughout. The worship of Vishnu is cheerful and sensuous; of Siva, sombre and severe; of Devī, terrible and disgusting. But besides these great divinities there are many others of less dignity and power, who have their special attributes and spheres of action. They are not the objects of any regular worship, but they are invoked and adoration is offered to them when it is desired to propitiate them and secure a favorable exercise of their powers. There is Indra, the god of the firmament and heaven; Sūrya, the sun; Soma, the moon; Varuna, the waters; Pavana, the wind; Agni, fire; Kuvera, wealth; Kārtikeya, war; Kāma, love; Yama, the god of the infernal regions and judge of the dead; Ganesa or Ganapati, the god of wisdom and the remover of obstacles. He is represented as a short fat man with an elephant's head. His image is frequently found at the entrance of temples, and he is invoked at the beginning of important works and ceremonies. The total number of gods is said to be 330,000,000.

Two very remarkable features in the Hindu religion are the great powers and virtues ascribed to sacrifice and faith. Sacrifice and austere penance, perseveringly and rigidly performed, make even the gods subservient to the wishes of the devotee, and that quite irrespective of the object in view. The merit is in the performance, not in the spirit of the observance, and the most impious and worthless are represented as gaining their ends by sacrifice and severe bodily torture. The virtue of faith was a leading principle in the *Bhagavad-gītā* ascribed to Krishna. Trust in the chosen deity, constant repetition of his name, the bearing of his sectarian marks—in short, the outward show of religion upheld by a fanatical faith—is of more avail than sacrifice and piety. Morality and innocence may be inculcated, but the saving principle is belief.



The worshippers of Vishnu and Siva are broken up into an infinite variety of sects and divisions, and they have also a great number of monastic and mendicant orders intent upon the maintenance of their respective phases of belief. Many instances are recorded of rival devotees coming in conflict at some of the great places of pilgrimage, and of hundreds and thousands being killed. There are among the Hindus men of superior intelligence who philosophically see through all these varieties of divinity the One Supreme Being, to whom alone worship is due. There have been others who, influenced by that feeling of mysticism so prevalent in the East, have treated all the forms of religion as mere symbols. Such were the founders of some of what may be called the dissenting sects, who deny the merit of religious ceremonies, and strive to seek above and beyond them the One Great Being. Such was the sect established by the weaver Kabir at the beginning of the fifteenth century; such also was that of the Sikhs, founded by Nānak at the end of that same century. Many a pure thought and lofty idea is to be found in the verses of these and other such independent thinkers—for it is to be noted that all of them express their thoughts in verse—but there is a strong disposition in all such sects, as time wears on, to unduly exalt their *guru* or founder, and to adore him as a saint.

JOHN DOWSON.

**Hindus.** See INDIA, by R. C. CALDWELL.

**Hinesburg,** post-tp. of Chittenden co., Vt., 12 miles S. E. of Burlington, has an academy, 4 churches, and manufactures of castings, woollen goods, cooperage, carriages, leather, boxes, yarn, etc. Pop. 1573.

**Hinesville,** post-v., cap. of Liberty co., Ga., 35 miles W. of Savannah. It contains the usual county-seat buildings, a high school, a flouring-mill, 1 weekly newspaper, and a sulphur spring of marked medicinal properties. Principal occupation, farming and stock-raising.

S. D. BRADWELL, ED. "GAZETTE."

**Hinge,** the pivot on which a door or shutter, or sometimes a window, turns in opening or shutting. Hinges are also used in fastening on one side of the covers of trunks, boxes, and the like. In ancient Egypt, Syria, etc. hinges were usually pivots, one below resting in a socket in the doorsill, and another above in the lintel. Such are still seen in the East. A simple strip of leather is another early and rude form. From this the transition to metallic hinges was an easy one. In mediæval times, and again at the present day, the custom has prevailed of employing elaborately designed and highly ornamented hinges. A strap-hinge is one which is screwed to one side of a door. The more common sort, called *butt* by the builders, screws into the edge of the door.

**Hingham,** post-v. of Plymouth co., Mass., 14 miles S. E. of Boston, on the Old Colony R. R. It has both rail and steamboat communication with Boston. It contains an academy, 9 churches, 2 banks, a fire insurance company, 2 hotels, 1 newspaper, a public library, an agricultural society, and manufactures of wooden ware, cordage, bagging, furniture, iron castings, worsted upholstery, fancy knit goods, etc. Pop. 4122.

GEORGE LINCOLN.

**Hinkley,** tp. of Washington co., Me., on Grand Lake. Pop. 19.

**Hin'man** (CLARK TITUS), D. D., b. at Kortwright, N. Y., Aug. 3, 1819, graduated at the Wesleyan University in 1839; was connected with the Methodist Seminary, Newbury, Vt., 1839-46; principal of Albion Seminary, Mich., 1846-53; founder of North-western University, Evanston, Ill., and its first president 1853-54. D. at Troy, N. Y., Oct. 21, 1854. He was an able orator and scholar, and a laborious and successful instructor.

**Hinman** (JOHN), LL.D., b. in Fairfield co., Conn., in 1802; was admitted to the bar at New Haven, and afterwards practised law at Waterbury, Conn.; was appointed a justice of the superior court 1842; of the State supreme court 1850; its chief-justice 1861. D. at Cheshire, Conn., Feb. 21, 1870.

**Hinmansville,** post-v. of Schroepel tp., Oswego co., N. Y., on Oswego River. Pop. 151.

**Hin'ny, or Jen'net** [Gr. *inos*, *yavros*, a "mule"], a hybrid between the horse and the she-ass, a very different animal from the mule, which is bred between the ass and the mare. The hinny neighs like a horse, the mule brays like the ass. The mule's ears, tail, and general aspect are asinine. The hinny more nearly resembles the horse; is of slighter build, and of strength inferior to that of the mule. It is bred to some extent in Spain and Barbary. It was once called *junart*, and was absurdly believed to be the fruit of a cross between the bull and the mare.

**Hinojo'sa del Du'que,** town of Spain, in the province of Cordova. It has some manufactures of linens and woollens. Pop. 8637.

**Hins'dale,** post-tp. of Berkshire co., Mass., 8 miles E. S. E. of Pittsfield. It is a mountainous town, and has some manufactures. Pop. 1695.

**Hinsdale,** post-v. of Cheshire co., N. H., on the Ashuelot R. R. It has a fine water-power, and contains large woollen-mills, 3 churches, 2 newspapers, manufactories of mowing-machines, lumber, etc. Pop. 1342.

HENRY E. HUNTER, ED. "STAR-SPANGLED BANNER."

**Hinsdale,** tp. and post-v. of Cattaraugus co., N. Y., on the Erie and the Buffalo New York and Philadelphia R. Rs., 60 miles S. E. of Buffalo. It has some manufactures. Pop. of v. 321; of tp. 1491.

**Hinsdale** (BURKE AARON), A. M., b. at Wadsworth, Medina co., O., Mar. 31, 1837; was educated at the Elective Institute, now Hiram College; received in 1871 the degree of A. M. from Bethany College, W. Va., and from Williams College, Mass.; entered the ministry of the Christian Church (called also Disciples, Campbellites, etc.) in 1861; was pastor in Solon, O., 1864-66; in Cleveland 1866-68; assistant editor of the *Christian Standard* 1866-69; professor of history and English literature in Hiram College 1869-70; became its president 1870, and performs the duties of professor of philosophy, history, and biblical literature; is also assistant editor of the *Christian Quarterly*, Cincinnati. Author of *Genuineness and Authenticity of the Gospels* (1873). *The Evolution of the Theological and Doctrinal Systems of the Ancient Church* (in preparation), and has contributed much to periodical literature.

**Hin'ton,** tp. of Mecosta co., Mich. Pop. 390.

**Hinton,** post-v., cap. of Summers co., W. Va., on the Chesapeake and Ohio R. R., at the confluence of the Greenbrier and New rivers. It has a large sash and door factory, 1 newspaper, the round-house and machine-shops of the C. and O. R. R., 4 hotels, and the usual stores. Pop. about 500. C. L. THOMPSON, ED. "MOUNTAIN HERALD."

**Hinton** (JOHN HOWARD), M. A., b. at Oxford, England, Mar. 24, 1791; was educated at Edinburgh University; became a Baptist minister, and held various pastorates, principally in London; attained distinction as a preacher. Author of a *History of the U. S.*, *Memoirs of W. Knibb*, *Theology*, *Elements of Natural History*, etc. D. at Bristol Dec. 17, 1873.

**Hio'go, or Fiogo,** seaport of Japan, on the island of Nipon, 20 miles W. of Osaka, to which a railway extends. It has a very large trade in tea, and its harbor is the best in the empire. Pop. 20,000.

**Hip,** the fruit of the rosebush. Hips are used in pharmacy as a material for making "confection of hips" (*confectio rose caribæ*), the *Rosa canina*, or dog rose, and *R. pomifera* of Europe, furnishing the most of the fruit. The seeds are taken out, and the hips beaten in a mortar with white sugar—2 pounds of sugar to 1 of hips. This makes a pleasant sourish confection. The more fleshy and juicy sorts of hips are in some places preserved or dried, and in winter are boiled in portage, after taking out the seeds and bristly substance within them.

**Hip-joint, Diseases of.** See CONALGIA.

**Hipparchus**, generally considered the founder of the science of astronomy, lived in the middle of the second century B. C.; b. at Nicaea, in Bithynia. Of his life nothing is known, and of his writings only the least important, *A Commentary on Aratus*, has been left to us. But from the *Syntaxis* of Ptolemy we know that by his great discoveries, and more especially by his method, he actually laid the foundation of the science of astronomy. (More detailed information will be found in the article on PROLEMY.)

**Hippa'ron.** See HORSE, FOSSIL, by PROF. O. C. MAESCH.

**Hippeau** (CELESTIN), b. at Niort, Deux Sèvres, May 11, 1803; made his first studies in his native city, and filled different positions as a teacher and professor at Poitiers, Napoléon-Vendée, Strasburg, Paris, and Caen. The most prominent of his writings are *Histoire de l'Abbaye de Saint-Etienne de Caen, 1066-1290* (1833), *Les Écrivains normands au dix-septième siècle* (1857), *Histoire du développement de la Normandie* (9 vol., 1863-73), *Dictionnaire de la langue Française au Douzième et Treizième siècles* (1873).

**Hip'pias**, a contemporary of Protagoras and Socrates, b. at Elis, and lived mostly at Athens. Of his life nothing is known, and of his writings none have come down to us, but his character has been very vividly drawn by Plato in the two dialogues which bear his name. He seems to have been a man of great gifts and comprehensive knowledge, but arrogant, vain, and superficial.

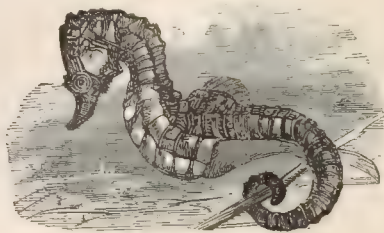
**Hippocamp'pide** [from *ἵππος*, *hippos*, a proper name], a family of fishes of the order Lophobranchii, distinguished by the prehensility of the tail and the want of a median fin, combined with a tubular snout, narrow gill-openings, a



single soft dorsal, belonging partly to the abdominal and partly to the caudal portion, and the absence of ventral fins. To this group belong five genera—*Gasterosteus*, *Solenophtus*, *Phyllopteryx*, *Acutocentrus*, and *Hippocampus*. The most characteristic and familiar form is the little sea-horse, *Hippocampus*, remarkable for the resemblance of its head and neck to those of a horse, and the winding downward and inward of its caudal portion, or tail.

THEODORE GILL.

**Hippocampus** [in Greek mythology, a sea-monster half horse and half fish], a singular genus of Lophobranchiate marine fishes of the family Hippocampidae. They



The Sea-Horse.

have ganoid scales, and swim generally in a vertical posture. The males carry the spawn in pouches upon the tail until the fry are hatched. The tail is prehensile, the caudal and ventral fin absent. All the species are small. *H. Hudsonius* is found along our Atlantic coast. From the peculiar shape of the head it is called the sea-horse. The cut shows the *H. breviceps*, a common European species.

**Hippocrates** [*Ἱπποκράτης*], the father of medicine and the most distinguished of Greek physicians, was b. in Cos in 460 B. C. (according to Soranus), and was the son of Heraclides, one of the Asclepiads, and Phænarete, a woman who belonged to the Heracleidae. Hippocrates studied medicine with his father and with Herodicus of Selymbria; learned rhetoric of Gorgias the Leontine; practised his profession chiefly at Cos, and rendered its medical school, already very famous, by far more illustrious than it had ever before been. He travelled much among the Grecian towns, and d. at Larissa B. C. 357. (Clinton.) Little more than the above facts is known regarding his life, but ancient writers relate of him many fabulous tales. His sons, Thessalus and Draco, and Polybus, his son-in-law, perpetuated his fame, and probably wrote some of the works which bear his name. Those now extant are more than sixty in number (some of them very short), but by far the larger part are either spurious or incorrectly ascribed to Hippocrates. Part or all of the *Aphorisms*, parts of the *Epidemics*, parts of the *Prognostics*, the *Regimen in Acute Diseases*, the treatise on *Wounds of the Head*, and that *On Air, Water, and Places*, are considered genuine works of Hippocrates; and (according to Littre) the treatises *On Ancient Medicine*, on *Joints*, on *Fractures*, on *The Use of the Lever* (in reducing luxations), on *Laws*, on *Ulcers*, on *Hæmorrhoids*, on *the Sacred Disease*, on *Fistula*, and the *De Medici Officina*, are possibly genuine. As a practitioner, it would be unfair to judge of Hippocrates' merits by any modern standard. His pathological notions were founded mainly on natural analogies and *a priori* reasoning; they consequently have no scientific value, but are memorable as the direct source of the humoral pathology so long dominant in the schools. He also taught the doctrines of *crases*, *coctions*, and *crises*, treated disease chiefly by attention to regimen, and earnestly advocated the expectant treatment in many acute diseases. He was a careful observer and excellent describer of symptoms, and (as his genuine writings show) was a man of the noblest mental and moral qualities. Among the most valued works upon the Hippocratic writings are the commentaries of Galen. The best editions of the entire works are by C. G. Kühn (3 vols., Leipsic, 1825-27), and by Littre, with French translation (Paris, 1839-61, 10 vols.).

**Hippocratic Oath**, a solemn engagement entered into in ancient times by young men about commencing the practice of medicine, and especially by the Asclepiads. The formula itself has been ascribed to Hippocrates, and is certainly very ancient. It was as follows: "I swear by Apollo the physician, by Æsculapius, by Hygieia, Panacea, and all the gods and goddesses, that, according to my ability and judgment, I will keep this oath and stipulation; to reckon him who teaches me this art equally dear to me with my parents; to share my substance with him, and relieve his necessities if required; to look upon his offspring upon the same footing as my own brothers, and to teach them this art, if they shall wish to learn it, without fee or stipulation; and that by precept, lecture, and

every other mode of instruction I will impart a knowledge of this art to my own sons, to those of my teachers, and to disciples bound by a stipulation and oath according to the law of medicine, but to no others. I will follow that system of regimen which, according to my best judgment, I consider best for my patients, and abstain from whatever is injurious. I will give no deadly medicine to any one if asked, nor suggest any such counsel. Furthermore, I will not give to a woman an instrument to procure abortion. With purity and holiness will I pass my life and practice my art. I will not cut a person who is suffering with stone, but will leave this to be done by those who are practitioners of such work. Into whatever houses I enter I will go for the advantage of the sick, and will abstain from every voluntary act of mischief and corruption, and, further, from the seduction of females or males, bond or free. Whatever in connection with my professional practice, or not in connection with it, I may see or hear, I will not divulge, holding that all such things should be kept secret. While I continue to keep this oath inviolate, may it be granted me to enjoy life and the practice of my art, respected always by all men; but should I break through and violate this oath, may the reverse be my lot." This oath is not now administered to practitioners, though something equivalent to it was used in the Middle Ages, and especially in the school of Salerno; but every honorable and right-minded physician governs his private and professional life by its noble principles. It is the oldest and one of the best of the codes of medical ethics, there being but one simpler and better code, the Golden Rule of doing as one would be done by.

**Hippocrene** [Gr. *ἵππος, κρήνη*, "horse-spring"], a famous fountain upon the side of Mt. Helicon, in Boeotia, was believed by the ancients to be a favorite haunt of the Muses and a source of poetic inspiration. It was fabled to have been produced by a stroke of the foot of Pegasus. It is still a fine spring.

**Hippodrome** [Gr. *ἵπποδρομος*, a "horse-race"], the name anciently given in Greece and Constantinople to the ground where chariot and other horse-races took place. Of these races, those in chariots were the most popular. In these races many competitors for the prize entered the race, which was consequently attended with much danger to the drivers—a danger much increased by the limited size of the hippodrome and the consequent necessity of frequent turning of goals. The hippodrome at Olympia was long the most famous, but in later times that at Constantinople acquired great renown, and the whole Byzantine populace was divided in their social and political relations by factions which took their origin in the hippodrome.

**Hippolytus**, according to the Grecian mythology, was a son of Theseus. His stepmother, Phædra, fell in love with him, and accused him to his father in order to revenge herself for his coldness. Theseus then cursed his son, and asked Ægeus to destroy him, but after the death of Hippolytus the king learned the innocence of his son and fell into great grief; Phædra killed herself. According to the Roman mythology, Hippolytus was restored to life by Æsculapius, and placed in a grove at Aricia by Diana, where he received divine worship under the name of Virbius.

**Hippolytus**, SAINT, bishop and martyr. There is still some uncertainty about the dates and the events of his life, but he was probably b. after the middle of the second century, and in Italy, though he travelled in the East, and was also a disciple of Irenæus of Gaul. Le Moine (1685) makes him bishop of Portus Romani, the modern *Aden* in Arabia. But his diocese was certainly in the neighborhood of Rome, and probably at Portus Romanus, 15 miles from the city, at the northern mouth of the Tiber. In 235, under the emperor Maximinus, he was banished, along with the Roman bishop Pontianus, to Sardinia, and is supposed to have suffered martyrdom the year following, but whether in Sardinia or after returning to Italy cannot be determined. His statue in a sitting posture, with a list of his writings inscribed upon the back of the chair, was dug up in 1551 near the basilica of San Lorenzo in Rome. By much the most important of his writings is the *Philosophumena*, a *Refutation of All Heresies*, in 10 books. Until recently only the first book was known to be extant, and this was ascribed to Origen. The second, the third, and the commencement of the fourth book are still wanting. The rest were discovered at Mount Athos in 1842 by Minoides Mynas, a learned Greek sent by M. Villemain, minister of public instruction under Louis Philippe, to make researches in the Greek monasteries. *Philosophumena* was first published at Oxford by Miller in 1852, as a work of Origen. But the best edition is that of Duncker and Schneidewin (1859). This treatise is one of great value historically, philosophically, theologically, and critically. The works of Hippolytus have been edited by Fabricius (1716-18),



Galland (1766), and Lagarde (1858). (See also monographs by Bunsen (1862; 2d ed. 1864); Cruice (1866), who also edited the *Philosophumena* in 1859; Döllinger (1853); Wordsworth (1855), and Volkmar (1855).)

R. D. HITCHCOCK.

**Hippo'nax**, a Greek satirical poet of the sixth century B. C., of whom about 100 lines are still extant. He was banished from his native city, Ephesus, on account of his satires, and lived afterwards at Clazomenæ, always fighting against everybody. He is the inventor of the choliambic verse, in which a spondee or trochee is placed in the last foot, instead of an iambus, thus giving to the rhythm a peculiar jarring movement which is well adapted for satire. The fragments collected and edited by F. G. Welcker (Göttingen, 1817, 4to).

**Hippoph'agy** [Gr. ἵππος, "horse," and φάγειν, "to eat"], the eating of horseflesh. From the earliest times the Northern races of Europe ate the flesh of the horse, and, in consequence of religious associations, sacrificed it to their gods. Owing to this, early Christian missionaries made the abstinence from horseflesh a test of religion. In the eighth century the popes anathematized it, and Gregory III. declared *immundum est et execrabile*—"it is foul and vile." In the *Njall* saga a converted Icelander, taunting an enemy, tells him that he has but lately eaten horseflesh. In time it was popularly believed that horseflesh was unhealthy. The French were the first to doubt this, and in the retreat from Moscow, Larrey killed his horses to make broth for the sick. According to experiments and reports made by Baron Guerrier de Dumost, horseflesh contains one-seventh more nutriment than its equivalent weight of beef, and, taking the average horse with the average ox, the former yields 110 to the 104 of the latter. In 1842, Dr. Perner of Munich began to combat the prejudice against horseflesh, and in 1845 the sale of it was legalized in Bavaria. At the same time hippophagic societies were formed in Paris and Berlin. Messrs. Leblanc of the Academy of Medicine and M. de Quatrefages were zealous in dissipating the prejudice against this food. Since 1855 horse-butcheries have been established throughout Germany. In Paris the first were opened in 1865 in the quarters of St. Marceaux and Popincourt. But it was not until the privations of the siege of 1870-71 had taught all Paris by experience the real excellence of horseflesh that it became popular. In 1867 the total consumption of horses, asses, and mules during the first quarter of the year was 535 head; in the corresponding period in 1872 it rose to 1144. During the present year (1874) the quarterly returns from the *abattoirs-chevalines* show that 1555 horses, mules, and donkeys were slaughtered in August, September, and October, yielding 630,000 pounds of meat. A like increase was reported from the provinces. A fat horse, injured but not diseased, sells for \$50 or \$60 at the abattoir, whereas he would not have brought a tenth part of that sum in the old days. The average price is from \$25 to \$30. Horseflesh has a pleasant taste, and expert cooks in Paris excel in dressing it so as to make it resemble venison. The meat is dark in color, but, taking it of relative ages and feeding, it is better than beef under the same conditions. It is stated that during the Stone Age the hare was not eaten, as its bones are not found among the remains of food of those days, and even in the time of Charlemagne the Franks rejected it, as do the Russians at present. The Jews and other Orientals avoid pork, the Hindoos consider it impious to touch beef, and in England the gypsies are the only people who will eat the hedgehog, an animal which the writer has found by experience equals any meat in quality and any game in flavor. It is to be regretted that the prejudice against horseflesh has existed with these kindred superstitions to the loss of humanity. C. G. LLELAND.

**Hippopotam'ide** [from ἵππος, a "horse," and ποταμός, "river"], a family of artiodactyl ungulates belonging to the group Omnivora, and distinguished by the massive body, phalangigra feet, and well-developed external toes, round snout and nostrils open upward and sidewise, overhanging upper lips, and inguinal mammae. The molars have nearly straight or irregular sinuous longitudinal and transverse valleys dividing four tubercles, of which the external two are convex extrorsely, and the inner two convex introrsely; the canines are very large and furrowed along their posterior surfaces. This family includes two recent genera, which are so different as to have been differentiated as distinct sub-families—*Hippopotamus*, including a large species, and *Cheropsis*, established for a smaller species found in Liberia. *Hippopotamus* has the skull depressed between the orbits, the frontal sinus obsolete, and the orbits prominent above the level of the forehead and closed behind; *Cheropsis* has the skull convex between the orbits, the frontal sinus well developed, and the orbits depressed below the level of the forehead and incomplete behind. Only two

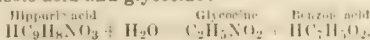
living species are known, both of which are confined to Africa; one (*Hippopotamus amphibius*) is the animal well known to menagerie visitors, and is found in most of the African rivers; the other (*Cheropsis Liberiensis*) is a very small species confined to Liberia. In previous geological epochs the family was, however, widely extended, and remains have been found in England and other parts of Europe, as well as in India. The nearest relations of these animals are the hogs (Suidæ); they have no affinity to the rhinocerotids or to the tapirs. THEODORE GILL.

**Hippopot'amus** [Gr. ἵπποπόταμος, "river-horse"], a genus of artiodactyl and omnivorous ungulate mammals (pachyderms), of which only one living species is known. The *Hippopotamus amphibius* inhabits most of the rivers and lakes of Africa from the Nile to the Cape of Good Hope, and occasionally is known to visit the salt water. The largest males sometimes are fourteen or fifteen feet long. It is usually inoffensive and quiet, but has been reported as occasionally attacking beasts, and even men, with unaccountable fury. It is an unwieldy beast, living chiefly upon soft water-plants, but quite often visiting cultivated fields, which it devastates. It is hunted for its flesh, which somewhat resembles pork, and for its skin, which is tanned and makes leather sometimes an inch thick, now used as a material for buffing-wheels and heavy belts, and for other mechanical purposes. Its teeth also furnish a very considerable amount of the best ivory, used in making philosophical instruments, etc.

**Hippo Re'gius**, the royal city of the Numidian kings, was a Tyrian colony on the W. side of the Gulf of Bona. It became under the Romans a splendid city, and was famed as the see of St. Augustine, who d. there Aug. 28, 430. It was captured by the Vandals, after a siege of fourteen months, in Aug., 431. About the middle of the seventh century it was destroyed by the Arabs, and its materials were used in building Bona, the present Algerine city, 2 miles N. of the ancient site.—*Hippo Zar'atus*, or *DIAR'RHYTUS*, now *Bizerta*, was a Tyrian, and afterwards a Roman colony, near the extreme N. point of Africa, on the sea, at the entrance to a lagoon called *Hipponitis Palus*.

**Hippotherium** [Gr. ἵππος, a "horse," and θηρίον, a "beast"]. See HORSE, FOSSIL, by PROF. O. C. MARSH.

**Hippur'ic Acid** (HC<sub>9</sub>H<sub>5</sub>NO<sub>3</sub>). This acid exists in the urine of herbivorous animals, and in small quantity in that of man. Hippuric acid is readily converted into benzoic acid, the change often taking place in the animal organism. When horses are kept in the stable or lightly worked the urine contains hippuric acid; when they are put to hard work it contains benzoic acid. Cows' urine contains about 1.3 per cent. of hippuric acid; that of oxen sometimes as much as 2.1 to 2.7 per cent.; of horses, 0.38; the quantity varies with the food and other conditions. Benzoic acid taken into the alimentary canal appears as hippuric acid in the urine; the same is true of quinic acid. Hippuric acid is readily separated from cows' urine in an impure form by the addition of an excess of hydrochloric acid. When purified and recrystallized, it forms colorless, transparent crystals. Its taste is bitter; it reddens blue litmus, dissolves in 600 parts of water at 32° F., is readily soluble in boiling water and in alcohol. Like uric acid, it dissolves readily in water containing ordinary phosphate of sodium, in such quantity as to change the reaction from alkaline to acid. Liebig attributes to this fact the acid reaction of fresh urine. Hippuric acid is converted by a ferment in the presence of an alkali, and by boiling with strong acids, into benzoic acid and glycocine:



(See *Watts's Diet. and Supplement.*) C. F. CHANDLER.

**Hippur'ites** [once considered a fossil *Hippuris*, the plant called mare's tail], an interesting genus of extinct conchiferous mollusks, of which the shells of some sixteen species are found fossil in the *hippurite limestone* and other European Lower Cretaceous strata. There have been many theories and much dispute as to the origin of these shells, but they are now generally referred to an extinct order (Rudista) of conchifera.

**Hiram**, post-tp. of Oxford co., Me., on the Portland and Ogdensburg R. R., 3 miles W. by N. of Portland. It has manufactures of furniture, lumber, cooperage, etc. Pop. 1393.

**Hiram**, tp. and post-v. of Portage co., O., 4 miles N. W. of Garrettsville, a station on the Atlantic and Great Western R. R. It is the seat of Hiram College. Pop. 1234.

**Hiram** [called also Hiram and Hiram; Heb. חִירָם, "high-born," the Hiram of Alexander], a king of Tyre, contemporaneous with David and Solomon, and the ally of both. He sent a supply of cedar timber, with skilled craftsmen, to assist David in constructing his palace, and in



Solomon's reign supplied timber, treasure, and men for the building of the temple at Jerusalem (960 B. C.). He was likewise a great builder at Tyre, and is said to have reigned thirty-four years; was son and successor of Abibal.

**Hire**, tp. of McDonough co., Ill. Pop. 1186.

**Hiring.** This term has a variety of applications in law as well as in common usage, and may refer to the engagement of servants or to the leasing of real property, as well as to the hire of things or professional services. But in its more specific legal signification it denotes a species of bailment by which the use of a chattel is contracted for, or labor or services affecting it are stipulated to be given for a compensation, express or implied. In this sense alone will the subject of hiring be here considered. Reference may be made for its other applications to the titles MASTER AND SERVANT, LEASE, AGENT, while the hire of vessels will be considered under SHIPPING and CHARTER-PARTY. Hiring as a form of bailment is of three varieties, whose names are expressed in Latin phrases: (1) *Locatio rei*, the hiring of a thing for temporary use; (2) *Locatio operis faciendi*, the hiring of work and services or care and attention to be bestowed upon articles delivered by the hirer to the person whose labor is engaged; (3) *Locatio operis mercium vehendarum*, the hire of the transportation of goods from one place to another. (The third species is examined under the title CARRIER, COMMON, and need not therefore be reconsidered. The other two will be discussed separately.)

(1) *Locatio rei*.—The hire of things constitutes a contract for the mutual benefit of both parties, since the owner receives a compensation, while the hirer becomes entitled to the use of the property; and the latter is accordingly bound to ordinary care and diligence, and is liable only for ordinary neglect. He must conduct himself with such prudence, forethought, and discretion as a man of ordinary sagacity and reasonable soundness of judgment would exhibit in similar circumstances. The degree of care requisite will vary with the nature of the property with which he is entrusted. If it be delicate and fragile, or of great value, or subject to deterioration unless attended to and preserved with unusual watchfulness, greater care will be necessary than if it be of such a character that injury or loss is not to be presumed probable unless there be excessive imprudence. If a watch or a valuable horse were hired, greater precaution would need to be taken for its security than would be required if the article were of insignificant value. But if injury is occasioned by some accident which a reasonable foresight could not have anticipated, or by theft or violence against which proper measures of protection had been taken, the hirer is not responsible, but the owner must bear the loss. The hirer becomes invested with a special property in the goods for the period during which his right of temporary use is to continue, and for any interference with his possession or injury to the property by third persons he has a right of action to recover damages for the loss sustained. If the hiring be for a definite time, as is usually the case, any attempt even by the owner to retake the property or to prevent its intended use will give the hirer a claim for redress. This rule is, however, subject to the qualification that if the hirer makes any unwarrantable misuse of the property the owner has a right to retake it, if he can do so peaceably, or to bring an action for its immediate recovery. The articles hired must only be used for the purposes contemplated by the contract, and the hirer's exclusive interest is defined and limited precisely by the stipulations agreed upon. They must be used also in the manner ordinarily appropriate, and must be surrendered when the time of the hiring has expired. The obligations of the owner of the property, other than those already stated, have not yet been definitely settled at common law. There have been some decisions holding that he impliedly warrants the property to be fit for the purposes for which it is hired, without reference to his knowledge of its unfitness. It is quite clear that he would be liable if he knew of its unfitness, and did not disclose the defect, and injury was sustained by the hirer in consequence; so that, for instance, if he let a horse which he knew to be dangerous, without informing the hirer, and injury occurred through the animal's viciousness, he would be responsible. The contract of hiring may be terminated by the expiration of the time for which the contract was made, or the completion of the intended purpose, when the property reverts to the owner, who has a claim for whatever compensation was agreed upon, or, if no definite arrangement had been made, to whatever sum might be deemed reasonable under the circumstances.

(2) *Locatio operis faciendi*.—The same principles in reference to the degree of care to be required of the bailee apply to contracts for labor and services to be bestowed

upon the thing bailed as in the hiring of chattels. Ordinary care is required, and the measure of obligation is estimated by the value and nature of the articles delivered. But the obligations of the workman depend also, in large measure, upon the nature of his occupation. He is held responsible for the exercise of such a degree of skill and careful workmanship in fulfilling the task imposed upon him as is requisite in the ordinary labors of his trade or profession. In accepting an engagement to perform a particular kind of work he implicitly represents himself as competent for such an undertaking, and may be made to respond in damages for injuries sustained through any exhibition of unskillfulness or incapacity. If, however, his incompetence were known to the person engaging his services, the hirer must suffer the consequence without remedy. If any instructions be given to the workman as to the manner in which his labor is to be performed, they must be adhered to strictly. If there be a material deviation from them, he can recover nothing for his services, unless the deviation be attributable to some unavoidable cause or be acquiesced in by his employer. The employer's assent need not be indicated by any express agreement, but may be presumed from his conduct, if he has knowledge of the deviation from the terms of the contract before its execution is completed, and makes no objection. If the bailee only completes a portion of the desired work, he can claim a proportionate compensation if the benefit of what was actually performed was received in its incomplete state by the assent of the employer; but if the employer insist on full performance or decline to make compensation on account of some substantial imperfection in the workmanship or some injury which the goods have sustained, the workman is not only entitled to no reward, but may even be held liable for the original value of the goods. The acceptance of the goods by the employer is not of itself sufficient to constitute an assent to a deviation from the contract, since an owner has a right to the possession of his goods. If the property is destroyed by some unexpected casualty, without any fault on the part of the workman, or is carried away by robbers notwithstanding the use of reasonable precautionary measures for security, since the absolute ownership remains continually in the employer, he must sustain the loss. If any labor has been expended upon it before the disaster occurs, the workman is, according to the general rule of the common law, entitled to a proper recompense for services actually rendered, unless the entire fulfillment of his engagement had been made a condition precedent to payment. Under the French law and the Code of Louisiana the employer in such a case loses the value of his materials and the employé the value of his labor. But that the loss of the property in such instances may fall upon the employer, it is necessary that the contract be strictly in the nature of bailment; and interesting questions sometimes arise as to whether a delivery of articles to a workman and an engagement of his services constitutes this relation. If cloth be given to a tailor or gold to a jeweler, and the identical piece of cloth is to be returned in the form of a suit, or the same gold to be made into an article of ornament, it is a case of bailment, even though additions be made to the original article delivered in the course of its alteration. But if the workman has liberty to expend his labor upon other materials of the same kind as those delivered, being under no further obligation than to return articles similar to those which would be made if the employer's goods were used, this is not generally considered as constituting a bailment, but only a species of barter or sale. The employer makes use of his goods to purchase others of the same nature in an altered form. The workman, therefore, owns the goods until his labor is complete and the finished product accepted; and if they are destroyed before that time the loss is his alone, and the employer has still a claim for the delivery of the article ordered. A similar question arises when grain is deposited in a warehouse or elevator with the understanding that a similar amount of the same quality may be returned instead of the very same grain delivered. The courts have generally adjudged an agreement of this kind to be a sale, and not a bailment, so as to make the bailee responsible in case of accidental loss. In all cases where a person is to furnish materials himself, and expend labor upon them, the contract is evidently not one of bailment, but rather one of sale, so that the employé is subject to all the obligations of a vendor.

The law concerning warehousemen, wharfingers, and innkeepers is also included under the head of *Locatio operis faciendi*, since such persons devote care and attention to the objects entrusted to them, but their liabilities will be considered under these several names respectively.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Hirpini**, an ancient people of Italy of Samnite race, inhabiting the central group of the Apennines between Lu-



cania, Apulia, and Campania, and deriving their name from *lupus*, the Samnite name of a wolf. They were subjugated by the Romans—probably together with the other Samnite tribes—before 268 B. C., at which time the Roman colony of Beneventum, which formed the strategical key to their country, was established. Immediately after the battle of Cannæ (216 B. C.) they declared in favor of Hannibal, but when he (in 209 B. C.) was driven towards the southern part of Italy, they bought peace on good terms from the Romans by betraying the Carthaginian garrisons in their cities. In the Social war (90 B. C.) they were among the first who took up arms against Rome, but they were soon reduced by Sulla, and after the end of the war their name as an independent nation is not mentioned.

**Hirschberg**, handsome town of Prussia, in the province of Silesia, on the Bober. It has considerable linen manufactures, and one Lutheran and three Catholic churches. Pop. 11,773.

**Hirst** (HENRY B.), b. in Philadelphia Aug. 23, 1813, was admitted to the bar in 1843, having previously to some extent been occupied in mercantile pursuits. He published several volumes of poems which had a wide popularity—*The Counting of the Monmouth*, etc. (1845), *Endymion* (1848), and *The Penance of Roland* (1849). D. Mar. 30, 1874.

**Hirtius** (AULUS) belonged to a plebeian family, but played a conspicuous part in Roman politics on account of his personal friendship and intimate political connection with Cæsar. He served him in Gaul as legate, and was often employed as negotiator. He lived mostly in Rome, on his Tusculan estates, in the neighborhood of the villa of Cicero, with whom he was on friendly terms and held frequent social intercourse. He was chosen consul for the year 43 B. C., and entered on his official duties Jan. 1. Of the horrible convulsions into which the assassination of Cæsar threw the Roman republic, Hirtius was by no means the master, but his moderation and freedom from personal ambition exercised a beneficial influence; and when he fell at the head of the army which was sent against Antony, then besieging Mutina, the people mourned him. He was a man of refined tastes and literary accomplishments, and the eighth book of Cæsar's *Commentaries* is generally supposed to have been written either by him or by Oppius.

**Hispania**, the Latin name of SPAIN (which see).

**Hispaniola**. See HAITI, by MELVILLE BLOSCOURT.

**Histiæa**, one of the oldest and most important towns of Eubœa, became subject to Athens during the Persian wars, but revolted in 445 B. C. As a punishment the Athenians removed all the inhabitants, replaced them with Attic colonists, and changed the name of the place to *Oreus*.

**Histiæus**, tyrant of Miletus, won the attachment and gratitude of Darius by guarding faithfully the bridge of boats over which the Persian army crossed the Danube on its expedition into Scythia in 513 B. C.—a service by which he saved the army and the life of the Persian king. His adventurous and ambitious character, however, could not help exciting suspicion, and he was detained at the Persian court for thirteen years. At last he succeeded in raising his Greek countrymen in Ionia in rebellion against Persia, but Darius had still so much confidence in him as to send him down to quench it. The rebellion itself failed utterly, and the treachery of Histæus was discovered by Artaphernes, the Persian satrap of Sardis. He now fled from place to place, stirring the different Greek colonies in Asia Minor into premature insurrections; but at last he was captured and put to death by Artaphernes, who sent his head to the Persian king. Darius, however, mourned deeply, buried the head with honors, and blamed Artaphernes for having acted hastily.

**Histology** [*Gr.* *hîstos*, "web," and *logos*, "discourse"] is the branch of anatomy which treats of the minute structure of the tissues of which living beings are composed. It is subdivided into *Human histology*, which treats of the tissues of man; *Comparative histology*, which treats of the tissues of the lower animals; and *Vegetable histology*, which treats of the tissues of plants. Each of these subdivisions may be again divided into *Normal* and *Pathological histology*—the first referring to the healthy tissues, the second investigating the changes they undergo in disease.

Histology may be said to date back only to the appearance of the *Anatomie Générale* of Bichat in 1801, for although many interesting observations had previously been made by Malpighi (1628-94), Leeuwenhoek (1632-1723), Swammerdam (1637-80), Rayssach (1688-1743), Lieberkühn (1711-58), Hewson (1733-71), and others, yet Bichat was the first who treated the subject in a comprehensive way, classifying according to their structure, so far as it was then understood, all the tissues of the human body, and giving a general view of their relations, both in health and disease. His work gave a great impulse to the study of

the tissues, but the imperfect condition of the compound microscope at that time was a serious obstacle to progress, and it was not until the opticians succeeded in devising efficient methods of correcting the spherical and chromatic aberrations of that instrument that histology made any important advance beyond the position in which Bichat left it.

The next epoch in the development of histology is marked by the appearance of the works of Schwann (1838-39), who endeavored to show that the observations of Schleiden in vegetable histology were substantially true for animals also; that all tissues are formed by the transformation of nucleated cells; and that these arise *de novo* under favorable circumstances in a formless nutritive fluid or blastema. This theory was extended to pathological anatomy by Johannes Müller, and continued to be almost universally accepted until the appearance of the cellular pathology of Virchow (1858), which was speedily followed by the very general acceptance of his doctrine, that cells can only arise out of pre-existing cells, and that in both normal and pathological growth the cells of the growing part multiply by division, and thus give birth to all the elements ultimately produced. This doctrine seemed to be permanently established on a sure foundation, when the discovery of the wandering cells in living connective tissue by Von Recklinghausen (1863), and the demonstration by Cohnheim (1867) that these movable elements are in fact white blood-corpuscles which have migrated from the blood-vessels, compelled a modification of opinion, and showed that the actual details of the growth and nutrition of the tissues are much more complex than had been previously supposed. Since the time of Schwann the number of histological investigators of reputation has multiplied so greatly that it would occupy more space than can here be given even to enumerate them. The names of a few of the more prominent will appear in the list of works appended. In the present article a sketch of some of the more important and best-established elementary facts with regard to human histology is all that can be attempted, and greater prominence will be given to the normal than to the pathological branch of the subject. The reader who desires more detailed information is referred to the special treatises and essays.

**Elementary Cells.**—The tissues are composed of elementary cells and their derivatives. According to the long-received views of Schwann, elementary cells are hollow vesicles composed of an external membrane or cell-wall, which encloses, besides fluid or solid contents of various characters, a smaller vesicle, the nucleus, in which again is contained a still smaller body, the nucleolus. It has, however, been shown that many kinds of cells have no distinct walls, and in many others the existence of a wall is in the highest degree problematical; Max Schultze accordingly defines the cell simply as a little mass of protoplasm containing a nucleus, and Brücke and Stricker, going a step farther, are disposed to regard the nucleus itself as unessential.

Protoplasm, thus brought into prominence in our conceptions of the ultimate structure of living organisms, is an albuminoid body, which under the microscope either appears to be quite homogeneous or presents a more or less granular aspect. It may be fluid, semi-solid, or solid, and probably varies considerably in its composition in different situations and under different circumstances. All its forms, however, possess certain special properties in common, of which the most important are the capability of manifesting spontaneous movements; of taking up nutritive materials from the surrounding media and transforming them into its own substance, or of growing; and of reproducing its kind by detaching portions which are capable of independent existence and growth. The elementary cells of the human tissues usually contain a nucleus. This is an oval or rounded body generally between .0002" and .0006" in long diameter, composed of a material that certainly differs from the protoplasm of the body of the cell in offering greater resistance to the action of acids and alkalis, and in behaving somewhat differently with various reagents, but the precise composition of which has not been determined. The nucleoli are even less constant and more imperfectly known than the nuclei. The spontaneous movements in the protoplasm of the elementary cells are most constant and noteworthy while the cells are young. These movements, during which the nucleus remains quite passive, occur in part as changes in the form of the cells, in part in consequence of these changes in their form; the cells change place, or wander, among the surrounding elements in a manner which,

\* In this article dimensions will be given in decimal fractions of an inch, indicating the inch by the letter "I." It must be understood that the figures given are only offered as approximations to the average size of the several elements, and that the individual elements vary greatly in dimensions.

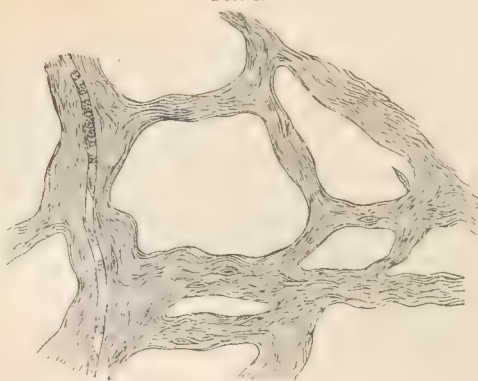


on account of its similarity to the movements of the amœba, has been called amœboid. When, at a later period in the history of certain cells, they acquire a cell-wall or outer membrane, they become fixed, and are no longer capable of amœboid movements.

The various transformations which cells undergo in building up the several tissues will be indicated in connection with each. Here, however, a word must be said as to the mode in which the reproduction of cells takes place. Cells usually multiply by division. In so doing, the nucleus first elongates, then becomes constricted in the middle, and finally separates into two parts, which recede from each other; fission of the protoplasm of the body of the cell subsequently occurs. Besides this mode, endogenous cell-multiplication, and multiplication by gemmation or budding, are admitted by many histologists. The first is, in most instances, if not always, merely the result of the continued multiplication by division of a protoplasmic mass contained within a membrane or capsule; the second has been observed chiefly in the case of certain low vegetable forms; as, for example, the yeast-fungus. As already mentioned, it was taught by Schwann that cells might also arise spontaneously in a formless fluid of suitable composition. This supposition was brought into disrepute by Virchow, who held that cells could only arise from pre-existing cells—*omnis cellula e cellula*. Of late, however, numerous investigations have been published which appear to favor the doctrine of the spontaneous generation of the lower organisms under suitable conditions; and if this view should be established, it may turn out that the theory of Schwann has been too hastily condemned.

**Connective Tissue.**—The designation connective tissue (*Bind-gewebe* of the German histologists) is bestowed upon the widely diffused tissue which unites together the organs and their several parts, and includes not merely the capsules, sheaths, fascia, tendons, and ligaments, but also the more delicate tissue which forms the supporting framework of the special elements of the complex organs. Connective tissue consists of special fixed cells, the connective-tissue corpuscles, united together by an intercellular substance or

FIG. 1.



Connective tissue.

matrix. In the latter a series of minute passages are channelled, and through these granular cells, identical in structure and appearance with the white corpuscles of the blood, wander freely. The fixed cells are usually either spindle-formed or stellate, and are provided with an elliptical transparent nucleus, immediately around which the protoplasm of the cell is usually more granular than elsewhere. They vary greatly in dimensions in different situations, the nucleus averaging about .0004" in long diameter, and the cells being from twice to five or six times as large. From the extremities of the spindle-formed cells and all parts of the stellate ones proceed branching processes, which vary considerably in number and length. In the living tissue slow changes in the form of these processes may be observed, but so far as can be ascertained these do not lead to any change in the position of the cells. The wandering cells are much less numerous under normal conditions than the fixed, but in inflammation increase in number often to an enormous extent. They are derived from the blood, and escape into the channels of the connective tissue through stomata in the walls of the small blood-vessels. A part of them, both in health and in inflammation, find their way from the channels of the matrix into the lymphatic capillaries. That others remain in the tissue and become fixed corpuscles is a plausible suggestion not yet positively established.

The matrix varies greatly in characters and arrangement in different situations, and by these variations determines the external characteristics of the several varieties of con-

nective tissue. The diversity consists not merely in the conformation, but also in the chemical composition of the matrix, as is shown by the fact that certain forms of connective tissue yield gelatine on boiling, while others do not. To the former belongs the so-called fibrillar connective tissue, which is the dominant form in man and the vertebrates, at least in the adult state. The latter includes the delicate connective tissue in the interior of the kidneys, the liver, and the lymphatic glands, that in the brain and spinal cord (the neuroglia of Virchow), and the succulent translucent tissue of the umbilical cord, which has been called mucous tissue because acetic acid produces in it a precipitate of mucin in threads and flocculi, which dissolve in an excess of the acid.

In the form of fibrillar connective tissue, which occurs in the ligaments and tendons, the matrix appears, when examined in indifferent fluids (aqueous humor, amniotic fluid, or blood-serum), to be composed of indistinctly fibrillated bundles .0005" to .001" or more in diameter, lying parallel to each other, and anastomosing at comparatively long intervals. Long narrow anastomosing channels are thus left between them, in which, on the margins of the bundles, lie the spindle-formed fixed cells. When examined in water or neutral saline solution the fibrillar appearance is much more distinct, and after maceration in lime-water or baryta-water the bundles are easily split into their component fibrils, .00004" or less in diameter, which cannot be satisfactorily done in the fresh state, so that indeed some have gone so far as to pronounce the fibrilla an altogether artificial product. On treatment with dilute acids the bundles swell up and hour-glass contractions appear at intervals. These have been ascribed by some to spiral elastic fibres wound around the bundles. Others have supposed each bundle to be enveloped in a delicate sheath, which is partially ruptured by the swelling produced by acids, the remaining portions producing the constrictions. The latter view has received considerable support from the recent investigations of Boll, who has arrived at the conclusion that the cells of connective tissue are in fact thin scale-like plates which form an endothelial lining to the channels between the bundles, and ascribes the appearance of the cells, as usually seen, to imperfect methods of investigation. In the fascia, the skin, the subcutaneous, submucous, and subserous membranes, the periosteum, and the perichondrium, the fibrillar bundles do not run parallel, but cross each other in diverse directions and inosculate at various angles, so as to leave irregular spaces of various sizes, which freely communicate with each other. Except in this more areolar arrangement the matrix in these situations differs little from that of the tendons and ligaments.

When fibrillar connective tissue is boiled or treated with dilute acids, the fibrillæ disappear, and certain sharply defined, more or less spiral, fibres come into view, which are known as *elastic fibres*. These vary from .00005" or less to .0004", or even more, in thickness; they branch frequently, and in some situations form intricate networks. Characteristic coarse networks of this sort exist in the skin, more delicate ones in the serous and mucous membranes. In the elastic coats of the arteries, the yellow ligaments of the vertebral column, and the ligamentum nuchæ, they are very coarse, and form the most conspicuous tissue-element. The varieties of connective tissue which occur in the kidneys, the lymphatic glands, etc. will be described in connection with the organs in which they exist; a word must, however, be said here with regard to the mucous tissue of the umbilical cord. This, in early fetal life, consists of a transparent, apparently structureless matrix, in which are embedded delicate stellate cells with branching, freely inosculating processes. Interspersed throughout the matrix a certain number of wandering corpuscles are found. At a later period fibrillar bundles begin to appear on the matrix. The interest which attaches to this tissue is due in part to the fact that it resembles the embryonic condition of the fibrillar connective tissue, in part to its resemblance to certain pathological new formations. Connective tissue serves as the substratum for the ramification of the blood-vessels, lymphatics, and nerves of all parts of the body. It stands indeed in special relations to the lymphatics, the channels and spaces of its matrix being the ultimate lymphatic passages.

**Development of Connective Tissue.**—At an early period of the history of the embryo connective tissue consists of round formative cells in close juxtaposition. Between these the matrix gradually makes its appearance, pushing the cells farther and farther apart. Simultaneously the cells change their shape, becoming gradually spindle-formed or stellate. In the tendons and ligaments the matrix is more or less distinctly fibrillar from its first appearance. In most other situations it is at first homogeneous, resembling that of the mucous tissue described above, and only subsequently acquires a fibrillar character. Considerable diver-



sity of opinion still exists as to the interpretation of these phenomena. Some hold still to the view of Schwann, that the formative cells themselves elongate and split up into the bundles of fibrils; some, like Beale, suppose the peripheral portions of the protoplasm of the cells (germinal matter) to be gradually transformed into matrix (formed material), so that this is created by the continual growth of the cells, the peripheral portions of which undergo continual transformation. This view is substantially that adopted by Rollet as the most probable. Finally, it is held by others that the matrix is independently formed between the cells by the transformation of the nutritive blood-plasma. That the elastic fibres originate by the transformation of a portion of the formative cells was long held as certain. Doubts as to the accuracy of this view have, however, been expressed, and Rollet advocates the opinion that they originate by a direct deposit from the plasma in the form of fibres. The evidence on which this opinion rests is, however, far from conclusive.

**Adipose Tissue.**—In many parts of the body the areolar connective tissue encloses in its meshes groups of cells containing fat. These cells are round or oval, sometimes polygonal, as from mutual pressure, and .001" to .005" in diameter. The presence of the fat conceals their nuclei, but after its extraction by absolute alcohol, and the staining of the tissue by carmine, a nucleus can generally be observed in each, attached to the interior of the cell-wall, which here appears as an undoubted membrane. The groups of fat-cells contained in individual areolæ of the connective tissue are designated fat-lobules. Each is supplied with blood by one or more arterial twigs, whence proceed numerous capillaries so arranged that each of the larger cells at least is surrounded by its own capillary loops. In their embryological condition the fat-cells are at first nucleated masses of protoplasm, like other formative cells. The fat makes its appearance in the substance of the protoplasm in small drops, and there finally coalesces into a single large one, occupying the central portion of the cell. As the fat-drops grow still larger, the protoplasm becomes more scanty, until only a thin membrane remains, with the nucleus embedded in it. In certain forms of dropsy and some other diseases the adipose cells lose their fat, which is replaced by serum. A similar disappearance of the fat has been observed in animals deprived of food, the fat promptly reappearing when food is again supplied.

**Cartilage.**—Cartilage, like connective tissue, consists of cells imbedded in an intercellular substance or matrix; the latter may be homogeneous or fibrous, and accordingly two varieties of cartilage are recognized—hyaline cartilage and fibro-cartilage. Hyaline cartilage forms the cartilages of the ribs, the ensiform cartilage, the articular cartilages of the bones, the cartilages covering the opposed surfaces of the symphyses, the nasal cartilages, all the cartilages of the larynx except the epiglottis and the cartilages of Wrisburg, and the cartilaginous rings of the trachea and bronchial tubes. In this variety of cartilage the cells (cartilage corpuscles), when single, are usually oval, on an average from .0005" to .001" in long diameter, and consist of a delicate granular protoplasm containing one or two large oval nuclei. They lie in cavities (cartilage cavities) hollowed

addition of water, or even of indifferent fluids, as aqueous humor or blood-serum, the cells shrivel and separate from the parietes of the cartilage cavities, so that they appear to be surrounded by a clear transparent space; or they may shrivel irregularly, remaining attached at points to the parietes of the cavity, so as to present a stellate appearance. At the same time the matrix becomes more or less distinctly granular. These changes occur also shortly after death without the addition of reagents. The matrix when fresh is homogeneous and quite transparent, no traces of the existence of layers or cell-territories being observable even with the highest powers. After the action of certain reagents, however, such as dilute chromic acid, or after digesting for some time in acidulated water at a temperature of about 100° F., the matrix may be split up into concentric layers surrounding the cell-groups and individual cells. If cartilage be boiled in water for some time, the matrix is entirely dissolved, the solution containing the substance known as chondrin.

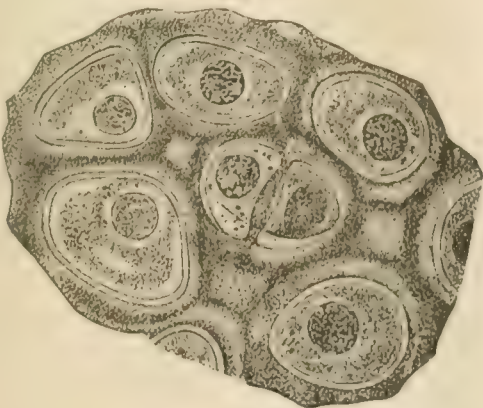
Where cartilage is continuous with connective tissue there is no abrupt boundary between the two, but the one passes by a gradual transition into the other. As we proceed from the cartilage to the connective tissue, the matrix becomes first indistinctly, then distinctly fibrillated, and is continuous with the connective-tissue matrix, while the cells are more and more elongated until they present the character of connective-tissue corpuscles. In the inter-articular cartilages little masses of hyaline cartilage are imbedded in fibrillated connective tissue. This has sometimes been considered a variety of fibro-cartilage, but is simply a mixture of cartilage with connective tissue.

**Fibro-cartilage (Reticular Cartilage, Yellow Cartilage).**—The cells of fibro-cartilage are quite like those of hyaline cartilage, but the matrix consists chiefly of a plexus of anastomosing fibres resembling elastic fibres. Between these, however, a homogeneous substance similar to the matrix of reticular cartilage no doubt exists, since these cartilages yield a small proportion of chondrin on boiling. This homogeneous substance, in certain situations, is most abundant immediately around the cells, where it is visible under the microscope as a clear or slightly granular area in which no fibres are discerned. When fibro-cartilage is anatomically continuous with connective tissue, the fibres of the matrix are continuous with the yellow elastic fibres. Fibro-cartilage, as above described, forms the cartilages of the ear and of the Eustachian tube, the epiglottis, the cartilages of Wrisburg, and a part of the intervertebral cartilages. Neither hyaline nor fibro-cartilage contains either blood-vessels, lymphatics, or nerves.

**Development of Cartilage.**—In early embryonic life cartilage is composed of simple formative cells in immediate juxtaposition. These enlarge, and are transformed into cartilage-cells, and meanwhile the matrix gradually makes its appearance between them, at first as a thin layer surrounding each cell. In this condition the cells can readily be isolated with the capsule of matrix about them; after a time, however, the capsules surrounding adjacent cells become fused together, and can no longer be isolated except by the aid of reagents. As in the case of connective tissue, several interpretations of these facts have been offered. The view of Beale, that the matrix is formed by the transformation of the peripheral portions of the protoplasm of the growing cells, is substantially accepted by many excellent histologists—among others, by Max Schultze; while on the other hand, the view that it is produced independently by the direct transformation of the nutritive plasma is not without supporters. During the process of growth the cartilage cells multiply by division. Cells containing two nuclei are frequently observed, as well as groups of two or more cells lying together in a single capsule, as if just divided. Direct observation of the process of division is, however, no easy matter. The division of the cells is immediately followed by the formation of a thin layer of matrix between the two resulting cells, and this will generally be found to exist when two or more cells appear to lie together in the same capsule, if the cell be caused to shrink as described above. This thin partition-wall of matrix gradually increases in thickness, pushing the newly-formed cells farther and farther apart. The fibres of the matrix of reticular cartilage are developed in the same way as the elastic fibres. With advancement a deposit of lime-salts takes place in the matrix of certain cartilages, as in those of the larynx and of the ribs. A similar change takes place in ossifying cartilage, and in certain morbid conditions. It is known as the calcification of cartilage.

**Bone,** like cartilage, consists of cells imbedded in a matrix. In thin sections of dried bone the position of the cells is marked by the presence of small stellate cavities about .0008" in average length, and rather less than half as broad, the bone lacunæ, from which radiate delicate canals, .00003" in diameter, the canaliculi. The canaliculi

FIG. 2.



Cartilage.

out in the solid matrix. Sometimes the cavities are of larger size, and contain two or more cells, and then the adjacent sides of these are flattened. Sometimes groups of two, four, or more cells, with their adjacent sides flattened, lie quite near together, but are separated by a narrow layer of matrix. In living or perfectly fresh cartilage the cells exactly fill the cavities in which they lie, but on the



of adjacent lacunæ anastomose freely. Examined by transmitted light, the lacunæ and canaliculi appear dark, the matrix transparent; by reflected light the former appear white and opaque, the latter translucent. These appearances depend upon the fact that in dried bone the lacunæ and canaliculi are hollow and contain air, as may be demonstrated by first flowing turpentine upon a thin section while under microscopical observation, and then permitting it to dry. In recent bone, and especially in growing bone, the lacunæ are filled with a mass of protoplasm containing a nucleus, which sends processes into the canaliculi. These

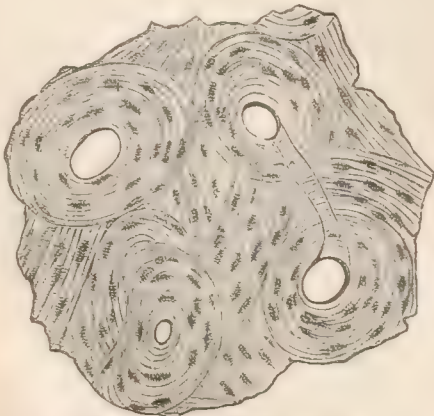
FIG. 3.



Bone longitudinal.

masses of protoplasm are the proper bone-cells. Osseous tissue is very vascular, and the capillaries lie in the compact substance of the long bones in a series of longitudinal anastomosing channels—the canals of Havers—which are continuous with the larger canals containing the nutritive arteries, with the areolar spaces of the spongy extremities of the bones, and with the marrow cavities. In transverse sections of the compact shafts of the long bones, therefore, the canals of Havers appear as rounded or oval openings, disposed at tolerably regular intervals, with the lacunæ arranged regularly around them in concentric rows. In lon-

FIG. 4.



Bone transverse, treated with acid.

gitudinal sections the canals appear as a network with elongated interspaces, in which the lacunæ lie in rows parallel to the canals. In the extremities of the long bones and in the spongy bones thin sections display an areolar structure, and the bone-lacunæ are always arranged more or less evidently in rows parallel to the margins of the areolar spaces.

If bone be treated with dilute acids the earthy matter of the matrix is dissolved, and a material resembling cartilage is left behind, which, however, does not yield chondrin on boiling, but gelatine. When transverse sections are made through the shaft of a long bone, after the removal of the earthy matter by acids the matrix no longer appears homogeneous, but is disposed in a number of thin concentric layers (*Haversian lamellæ*) around each Haversian canal. The spaces between the systems of lamellæ thus formed are occupied by *intermediate lamellæ*, which run parallel to each other without any definite relation to the course of the adjoining Haversian lamellæ; and, lastly, just beneath the periosteum is a series of *peripheral lamellæ*, the course of which is parallel to the surface of the bone.

The medullary cavities of the long bones are filled with a delicate, very vascular connective tissue, rich in fat-cells—the marrow. The areolæ of the spongy extremities of the long bones and of the spongy bones also contain a delicate vascular connective tissue, in which, however, there are few fat-cells; instead, it abounds in round granular cells and masses of protoplasm containing many nuclei, the myeloplaxes of Robin. Wandering cells are abundant in this tissue, less numerous in the marrow, in which, however, they accumulate in certain pathological conditions.

*Development of Bone.*—In early fetal life the skeleton is entirely cartilaginous, and bone first makes its appearance by a transformation of the cartilaginous skeleton, commencing at certain definite centres or points of ossification. There are usually several such centres to each bone, which are separated by cartilage until the growth of the bone is complete. The cartilaginous septa thus left, of which those between the epiphyses and shafts of the long bones may be taken as types, maintain their dimensions by a continual growth, while their margins are constantly being transformed into bone. Besides this development of bone in cartilage, it is also developed in connective tissue. This is the case with the thin cranial bones, in which a primordial cartilaginous stage does not exist. A similar formation of bone out of connective tissue takes place beneath the periosteum of all growing bones. It is by this process, for example, that the long bones increase in thickness, while their increase in length takes place by the growth and ossification of the cartilages between the shaft and epiphyses. The earlier histologists supposed that the formation of bone out of cartilage occurred by a deposit of earthy salts in the matrix of the cartilage, transforming it into bone-matrix, while the cartilage-cells were metamorphosed into bone-cells. Subsequent observations have shown, however, that the process is by no means so simple. The first formation of bone in the fetal cartilaginous skeleton is preceded by an ingrowth of blood-vessels, surrounded by a delicate layer of cells—fetal marrow, into the substance of the cartilage, which is absorbed to permit the entrance of the new tissue. Shortly after a deposit of earthy salts takes place in the matrix of the cartilage at the point of ossification. Detailed observations as to the earliest development of true bony tissue are yet wanting, but it seems probable that from the first, as certainly always occurs afterwards, the bone is formed by the transformation of the peripheral portions of the fetal marrow. When, after the process is fairly under way, thin sections are cut, including the developing bone on one side and the fetal cartilage on the other, the following conditions are observed: In the portion of the cartilage immediately adjoining the already formed bone the cells are disposed in closely packed rows perpendicular to the surface of advancing ossification. In these rows the cells which are more distant from the bone are flattened and have flattened nuclei; those nearer to it progressively more oval or rounded, with rounded nuclei. A deposit of lime-salts in the matrix between these rows extends in the form of fine trabeculæ some little distance beyond the already formed bone. The cartilage-cells nearest to the ossifying territory are always unusually large and clear, and immediately next to them groups of small granular cells, surrounding one or more capillary loops, lie in the most external areolæ of the already formed bone. These groups of granular cells are the terminal buds of the fetal marrow. No transition forms between them and the adjacent row of large clear cartilage-cells have been observed, and it therefore seems improbable that these become converted into the granular cells by any process of division. It has been suggested by Henke that the granular cells are formed from migrated white corpuscles, but it is more generally believed that from the first the fetal marrow intrudes into the cartilage along with the blood-vessels by continued cell-multiplication. Both views lack the support of actual observation. It is more positively established that the peripheral granular cells become bone-cells. These peripheral cells are known as osteoblasts, and form a distinct layer (the osteoblastic



layer) on the surface of the terminal buds of fetal marrow. The details of the transformation have not been fully made out; some holding that all the osteoblasts become stellate

FIG. 5.



Ossifying cartilage.

bone-cells, between which the bone-matrix accumulates as the transformation proceeds, while others suppose that a large proportion of them are transformed into bone-matrix, and that this transformation, being limited in a certain number to their peripheral portions only, leaves the stellate bone-cells. It will be understood from the above that the cartilage of the fetal skeleton is to be regarded as merely a temporary formation, and that the multiplication of its cells in rows, and the deposit of lime-salts in the matrix between them, are preliminary steps to its complete disappearance before the growing bone-tissue. The formation of bone beneath the periosteum takes place in a manner essentially similar to what has just been sketched. A layer of osteoblasts is developed between the connective tissue of the periosteum and the part of the bone which has already been formed, and these are transformed into bone in the same way as the osteoblasts of the fetal marrow.

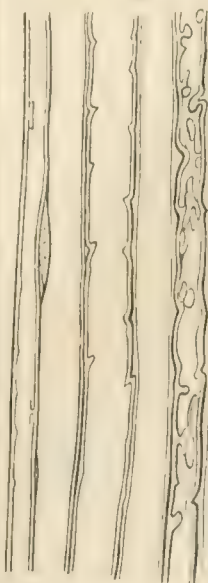
**Muscular Tissue.** There are two varieties of muscular tissue, the non-striated and the striated. The *non-striated* muscles are composed of spindle-forme contractile fibre-cells with elongated or rod-like nuclei. These occur in the muscular coats of the intestinal canal, the middle coat of the arteries and veins, the posterior part of the walls of the trachea and bronchial tubes, the ciliary muscle and the iris, the skin (where they constitute especially the *erectores pili* muscles), the lymphatic glands and spleen, the walls of the gall-bladder and biliary ducts, the ureters and urinary bladder, the uterus and Fallopian tubes, etc. etc. The fibre-cells are composed of a contractile substance, which is either homogeneous or faintly striated longitudinally; in this, besides the nucleus, a number of strongly refractive granules are imbedded, a pyramidal group of them generally appearing at each extremity of the nucleus. Sometimes the extremities of the fibre-cells are divided into two or more branches. In length these cells for the most part range between .0015" and .008"; their average breadth is about .0004", and their nuclei range from .0003" to .001" in long diameter. They are united into larger or smaller fasciculi by a delicate connective tissue consisting of a homogeneous matrix, with scattered stellate, anastomosing cells. On a transverse section through these fasciculi the divided fibre-cells present irregular polygonal outlines. The fasciculi are united by septa of ordinary fibrillar connective tissue. The arteries and veins supplying the muscular tissue lie in these septa; the capillaries enter the muscular fasciculi and are distributed between the fibre-cells. The relation of the muscular fibre-cells to the nerves will be described in connection with the nerves. The *striated muscles* consist of cylindrical or somewhat fusiform fibres, .0004" to .0025" in diameter, which in short muscles

extend from one insertion of the muscle to the other; in long ones, seldom exceed an inch and a half in length. These are marked transversely by close parallel lines, the well known transverse striat. Each fibre is invested by a delicate structureless sheath, the sarcolemma, beneath which, and on the exterior of the muscular substance proper, oval nuclei, the so-called muscle-corpuscles, are scattered at irregular intervals.

With proper management the muscular fibres may be split longitudinally into a bundle of minute fibrils, or transversely into a series of narrow disks. Hence, as was first taught by Bowman, each fibre is composed of a great number of quadrangular particles, the sarcous elements. Cohnheim, by the investigation of thin sections of frozen muscles especially, has shown that these sarcous elements are separated from each other by a transparent intervening substance. Brücke has pointed out that the sarcous elements polarize light, while the intervening substance does not. He found their doubly refractive power to be uniaxial and positive, and by a study of their behavior when examined with polarized light during contraction, arrived at the conclusion that each consists of a group of smaller doubly refractive bodies (disdiaclasts) capable of changing position with reference to each other during contraction, and thus modifying the form of the sarcous elements. To this view Stricker appears to incline, though he expresses himself with a certain reserve. Various other views of the structure of muscular fibres have been offered, with regard to which the reader must consult the special treatises. The muscular fibres are bound together into fasciculi by a delicate connective tissue resembling that which unites the fibre-cells of organic muscles. The fasciculi are united by septa of ordinary fibrillar connective tissue, in which the nutritive blood-vessels lie. The latter give off a system of capillaries which form a network between the individual muscular fibres. The termination of the nerves in striated muscular fibres will be described hereafter. All the voluntary muscles of the body, and certain of the involuntary ones also, among which the most notable is the heart, consist of striated muscular fibres. In the heart the muscular fibres offer several marked peculiarities. They branch and anastomose with each other, forming thus a continuous network, and they are divided by highly refractive transverse lines into segments .002" to .003" in length, each of which has a single nucleus in its centre, so that they have been described as chains of muscle-cells. Besides this, they frequently contain numerous fat-molecules, even when apparently quite healthy. In their transverse striation, and most of the details of their minute structure, however, they resemble the other striated muscles.

**Nerves and Nerve-centres.**—The nervous system consists of a series of branching cords, the nerves, which originate in the brain, spinal marrow, and ganglia, and are distributed to the tissues, where, for the most part, they end in

FIG. 6.



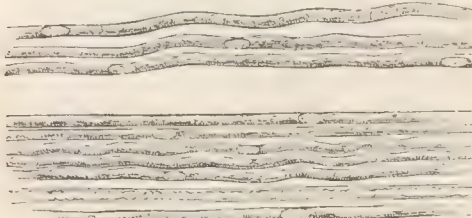
Medullated nerve-fibres.

certain special terminal organs. The *nerves* consist either of single nerve-fibres or of fasciculi of fibres united together by vascular connective tissue. In most of the cerebro-spinal nerves, with the exception of their central and peripheral terminations, the nerve-fibres consist of a central portion, the axis-cylinder, surrounded by a medullary sheath, the white matter of Schwann, and this again covered by a delicate investing membrane, the sheath of Schwann. Such fibres are designated *medullated nerve-fibres*. The sheath of Schwann is a transparent structureless membrane, like the sarcolemma of the muscular fibres. The medullary sheath is a peculiar, highly refractive, oily substance containing proteogen, which, when the fibres are torn across, exudes from their extremities as the so-called myelin drops. The axis-cylinder consists of a bundle of extremely minute fibrils united by a delicate granular material. Medullated nerve fibres range for the most part from .0002"



to .0008" in diameter; when perfectly fresh they appear smooth and round, with here and there an oval nucleus, but in a short time the medullary sheath undergoes a kind of coagulation, changing it into a granular semi-transparent mass, which shrinks away from the peripheral sheath in some places, and encroaches upon the axis-cylinder in others, so as to present very irregular contours. Medullated nerve-fibres branch frequently, especially towards their peripheral terminations, the axis-cylinder dividing into two or more portions, each of which is invested with a medullary layer, and a sheath of Schwann continuous with those of the primitive fibre. The secondary nerve-fibres thus produced are individually smaller than the one from which they spring, but in the aggregate the thickness of the branches is usually greater than that of the original fibre. Still farther towards the periphery both the sheath of Schwann and the medullary sheath disappear, the latter sometimes before the former, and the axis-cylinder which alone remains then divides and subdivides until it is broken up into its primitive fibrils, which are extremely minute, .00002" or less in diameter, and often present a delicate beaded appearance. Another variety of nerve-fibres is found in the branches of the great sympathetic nerve, which, on account of the absence of the medullary sheath, have been called non-medullated fibres (also Remak's fibres). These correspond in size for the most part to the medium and smaller medullated fibres, and when fresh are smooth or somewhat granular, often marked by faint longitudinal

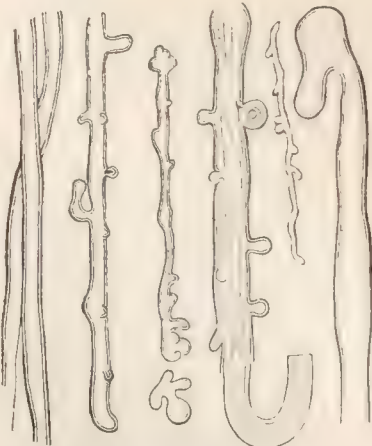
FIG. 7.



Remak's nerve-fibres.

striations. They consist of a peripheral sheath, identical with that of the medullated nerve-fibres, enveloping a bundle of primitive nerve-fibres united by a finely granular interfibrillar substance. Such non-medullated fibres exist also in the olfactory nerves, and in the white matter of the brain and spinal cord fibres are encountered which are quite similar, except that they do not possess the peripheral sheath of Schwann. The medullated nerve-fibres of the brain and spinal cord are also destitute of the sheath of Schwann, to

FIG. 8.



Myelin coagulated nerve-fibres.

the absence of which from both kinds of fibres, together with the delicacy of the connective tissue in which they are imbedded, the softness of the white matter of the nerve-centres is due.

From the foregoing it will be understood that the primitive nerve-fibrils are the characteristic elements of all nerve-fibres, and that the various appearances of nerve-fibres in diverse situations depend upon whether the fibrils occur singly or in fasciculi, and are or are not invested with medullary and peripheral sheaths. Max Schultze has proposed, on the basis of these circumstances, the following classification of nerve-fibres: I. Non-medullated fibres: 1,

primitive fibrils: 2, fasciculi of primitive fibrils: 3, these last, with a sheath of Schwann. II. Medullated fibres: 1, primitive fibrils with medullary sheath; 2, fasciculi of primitive fibrils with medullary sheath; 3, these last, with a sheath of Schwann.

*The Nerve-centres.*—The brain and spinal marrow consist, as is well known, of two varieties of nerve-tissue, the white and the gray. The characteristic elements of the former are medullated and non-medullated nerve-fibres, neither of which possess the sheath of Schwann; in the latter, besides similar fibres, nerve-cells are encountered, which are also the characteristic element of the several ganglia. The nerve-cells are rounded, oval, or stellate bodies .0002" to .003" in diameter, consisting of a granular protoplasm, with a round or oval nucleus which usually contains a nucleolus. Each cell gives off one or more protoplasmic processes twice to six times as long as the diameter of the cell or layer. According to the number of these the cells are called unipolar, bipolar, or multipolar. The large multipolar nerve-cells in the anterior horns of the gray matter of the spinal cord are particularly available

FIG. 9.



Nerve-cell.

for study. In each of these cells all the processes but one branch frequently, until finally the ramifications escape observation. The exceptional process, as first demonstrated by Deiters, pursues its course without branching, and becomes ultimately the axis-cylinder of the medullated nerve-fibre. Like the axis-cylinder, this process consists of delicate fibrils united by a granular interfibrillar material. The fibrils can be traced into the substance of the nerve-cell. Indeed, recent investigations have shown that all the protoplasmic processes of the nerve-cells contain similar fibrils which interlace in the substance of the cell, and many of which can be traced through it from one process to another. Cells essentially similar to these, though smaller, are found in the gray substance of the cerebrum and cerebellum. Besides these, there are, in the gray substance of the brain especially, an immense number of small cells in which no peripheral process has been demonstrated, all their processes branching until they become fine fibrils, or having a fine fibrillar character from the very first. The destination of these fibrils is still a matter of uncertainty.

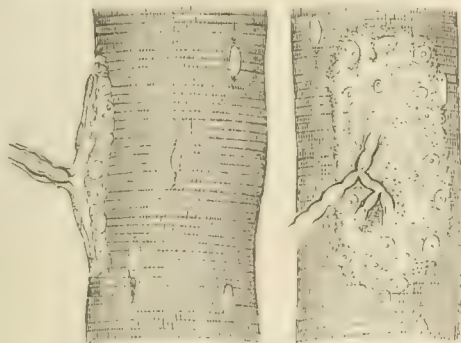
The nerve-cells and nerve-fibres of the brain and spinal cord are imbedded in a delicate connective tissue, the neu-



roglia of Virchow. This consists of branching and anastomosing connective-tissue cells and delicate elastic fibres imbedded in a finely granular matrix. The sympathetic ganglia are traversed by medullated and non medullated fibres, and contain numerous nerve-cells, which, like those of the spinal cord, give origin to fibres, all being united together by ordinary fibrillated connective tissue. Some of the nerve-cells are multipolar, like those of the spinal cord, but it is impossible to follow their processes for any distance on account of the density of the connective tissue in which they lie. Others are unipolar, and in this case the single process, like the peripheral process of the cells of the spinal cord, is continuous with the axis cylinder of a nerve-fibre. Beale has described a form of cell in the sympathetic ganglia of the frog which gives off two processes, one of which winds spirally around the other.

*The Peripheral Terminations of the Nerve.*—The periph-

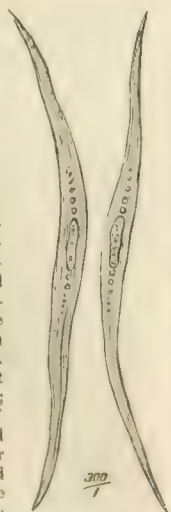
FIG. 10.



Termination of nerve in voluntary muscle.

eral terminations of the nerves in the organs of special sense, in the cornea, skin, and other situations, will be described in connection with these several parts. Here, therefore, we shall sketch only the termination of the nerves in muscle and in the Pacinian bodies.

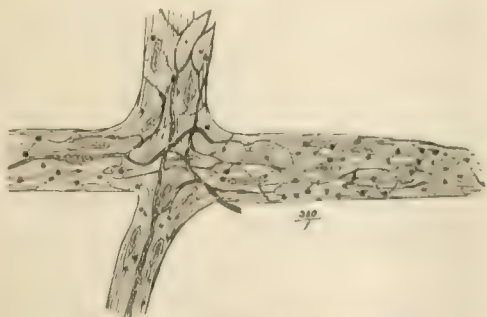
FIG. 11.



Organic muscle.

In the case of the voluntary muscles, medullated nerve-fibres terminate in peculiar organs situated immediately beneath the sarcolemma. At the point where the nerve-fibre joins the muscular fibre the sheath of Schwann becomes continuous with the sarcolemma, while the medullary sheath ends abruptly, and the axis-cylinder, penetrating beneath the sarcolemma, expands into a delicate, transparent, more or less branched terminal plate, which is separated from the striated substance of the muscular fibre by a little elliptical granular mass in which several nuclei are imbedded. Every striated muscular fibre has at least one of these nerve-terminations; the longer fibres receive several of them. In the case of the non-striated muscles the nerve-fibres first lose their medullary sheaths, then branch, and finally split up into their ultimate fibrils, which form a plexus between the fibre-cells of the muscle. From this plexus a series of short delicate branches is given off, one or more of which enter the substance of the

FIG. 12.

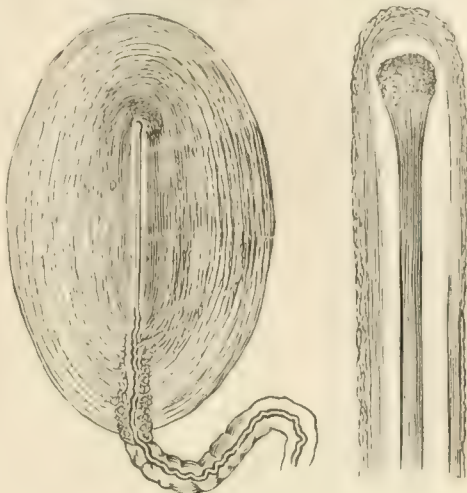


Nerve-termination in organic muscle.

nucleus of each fibre-cell, and apparently terminate there in a minute knob or granule. According to J. Arnold,

however, these knobs give off filaments which pass through the substance of the nucleus and fibre-cells to join the intermuscular plexus again. The Pacinian bodies are peculiar terminations of the sensory nerves, which in man are found in the subcutaneous connective tissue of the sides of the fingers and toes, in the intermuscular spaces, and in the vicinity of joints. They are elliptical bodies .01" to .1" in long diameter, which consist of numerous

FIG. 13.

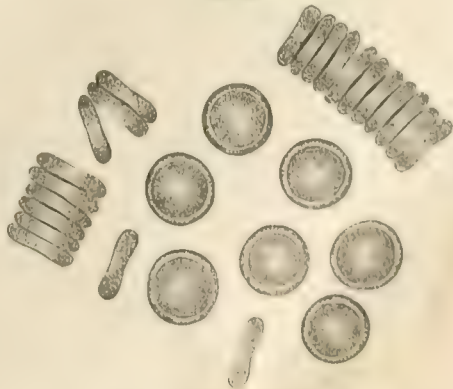


Pacinian body.

concentric layers of delicate connective tissue, forming a laminated capsule with a narrow elongated central cavity. A single medullated nerve-fibre enters one extremity of the capsule. Its external and medullary sheaths disappear shortly after its entrance, while the axis-cylinder penetrates the central cavity, and having extended nearly its whole length, forms a terminal knob, or breaks up into a knob-like brush of terminal fibrils.

The Blood consists of a colorless liquid, the liquor sanguinis or blood-plasma, in which float two kinds of cellular elements, the red and white corpuscles. When the blood coagulates, fibrin in a more or less distinctly fibrillated condition separates from the plasma, entangling the corpuscles in its meshes. The remaining fluid portion, or serum, consists of albumen and certain salts dissolved in water. The red blood-corpuscles in man are flattened biconcave disks the average diameter of which is usually stated at  $\frac{1}{250}$  of an inch. Weleker makes them rather larger, .00774 of a millimetre, or .0003" very nearly, the usual variations being between .0064 and .0086 of a millimetre. Their number has been estimated by Vierordt at 5,000,000 to a cubic millimetre. They consist of a homogeneous elastic substance, are destitute of a nucleus, and, according to most modern histologists, are not invested with a special membrane or cell-wall. In the majority of mammals the blood-corpuscles are similar in form to those of man, but differ somewhat in size. On this diversity in size alone the attempts to identify human blood by the microscope for legal purposes are based. It should be remembered, however, that the corpuscles of certain animals, particularly the monkey and the

FIG. 14.



Human red blood-corpuscles.

dog, so closely approximate the dimensions of those of human blood that it is quite impossible to discriminate

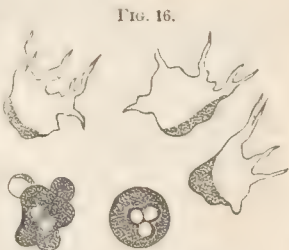


them by the microscope even in fresh blood: and as after soaking out a blood-stain the original size of the blood-corpuscle is not always exactly reproduced, it becomes difficult to distinguish human blood under such conditions from the blood of a considerable number of animals the corpuscles of which approximate those of man in size. It is also to be noted that the dimensions assigned to the corpuscles of man and mammals by various authors differ considerably. In the camel and llama the corpuscles are elliptical, but possess no nuclei. In birds, reptiles, and fishes the corpuscles are elliptical flat disks possessed of an oval nucleus, which, when the edge of the corpuscle is turned towards the eye, is seen to project on each side above the surface of the disk. The following are the mean dimensions of the corpuscles of a few animals, as given by Welcker, in decimals of a millimetre:

Circular Corpuscles.	Elliptical Corpuscles, long diameters.
Man..... .0077	Llama..... .0080
Dog..... .0073	Pigeon..... .0147
Cat..... .0065	Frog..... .0223
Rabbit..... .0069	Triton..... .0293
Sheep..... .0050	Proteus..... .0582
Moschus Javanicus..... .0025	Sturgeon..... .0134

The *white blood-corpuscles*, as seen circulating in the living blood-vessels, are spherical granular bodies, most of which in man have rather greater diameter than the red (on the average nearly .0004"). Each is a little mass of protoplasm which contains one or more nuclei. When a drop of human blood is watched

with the microscope while the temperature is kept at about 100° F. and evaporation is prevented (by means of the hot stage and moist chamber), it will be observed that the majority of the white corpuscles assume the most diverse forms, and creep across the field of view with a motion resembling that of the amoeba. Similar amoeboid motions are



Amoeboid movement of white blood-corpuscles.

observed in transparent living tissues in white blood-corpuscles which have migrated from the vessels. Two varieties of these amoeboid corpuscles may be distinguished—one coarsely, the other finely granular; there is besides a third variety of white corpuscles, which are very delicately granular, smaller than the red corpuscles, and exhibit no amoeboid motions. Lastly, the blood contains considerable numbers of still more minute protoplasmic particles destitute of nuclei. The white corpuscles in all vertebrate animals are essentially similar to those of man, but the amoeboid motions in those of the cold-blooded animals take place at a lower temperature. Their differences in dimensions in the various classes of animals are much less than in the case of the red corpuscles. The white corpuscles are much less numerous than the red. Welcker estimates the proportion at 1 to 335, but it varies with age and sex, and indeed in different individuals and in the same individuals at different times. The blood of the splenic and hepatic veins contains a much larger proportion of white corpuscles than that of the splenic artery and portal vein.

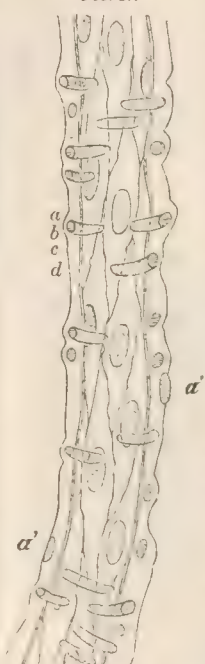
**Development of the Blood.**—The earliest red corpuscles are derived immediately from the primitive cells of the embryo, and even in man and the mammals are nucleated. The non-nucleated red corpuscles make their appearance later, and entirely replace the nucleated ones before birth. They appear to originate by the transformation of white corpuscles, and the subsequent supply is kept up in the same manner as has been shown in the case of the frog by Von Recklinghausen and Golubew. The white corpuscles themselves originate in the lymphatic glands and the spleen in a mode which as yet is undetermined, probably by the multiplication by division of the cells of the parenchyma. Lastly, attention has been directed to the marrow of the bones as a situation in which the transformation of white corpuscles into red is particularly active.

**The Blood-vessels.**—The heart and blood-vessels, including the capillaries, are lined throughout by an endothelium consisting of a single layer of flattened nucleated cells, the

boundaries of which are best displayed by the imbibition or injection of dilute solutions of nitrate of silver and subsequent exposure to light. The nuclei may afterwards be demonstrated by carmine staining. These cells range usually from .001" to .004" in length; the nuclei on an average are about .0005" long. The walls of the true capillaries appear to consist merely of this single layer of cells, which are irregular in outline, and vary considerably in form in the capillaries of different organs. As the capillaries pass into the small arteries the endothelial cells become fusiform; in the small veins they are irregularly polygonal. In the line of junction between these cells small irregular openings, the so-called stomata, are mapped out by the action of silver, especially in the smaller veins. As they proceed from the capillaries towards the heart both veins and arteries acquire an investment of connective tissue, in which a layer of circular muscular fibre-cells soon makes its appearance. After this three distinct coats can be distinguished in both arteries and veins, consisting of the epithelial lining, reposing upon a thin layer of connective tissue, rich in elastic fibres, many of which run longitudinally; a middle or muscular coat, consisting of muscular fibre-cells disposed circularly and united together by connective tissue abounding in elastic fibre; and an external coat, or adventitia, composed of fibrillated connective tissue. The coats of the veins are considerably thinner than those of arteries of the same size, and contain less elastic tissue. On the other hand, the thick middle coat of the larger arteries is distinguished by the great quantity of elastic tissue which it contains. Longitudinal muscular fibre-cells occur in the adventitia of some of the larger arteries and veins. The coats of the veins within the cranium, in the bones, and in the maternal portion of the placenta contain no muscular fibres. The larger arteries and veins are nourished by a system of vessels, the vasa vasorum, which ramify in the external coat and send capillary branches to the muscular layers beneath. Nerves enter the middle coat of both larger and smaller vessels (with the exception of the true capillaries), and terminate in the muscular fibre-cells in the manner already described.

The lymphatics, like the blood-vessels, are lined by a single layer of flattened endothelial cells, the boundaries of which are best displayed by the action of silver, while their nuclei

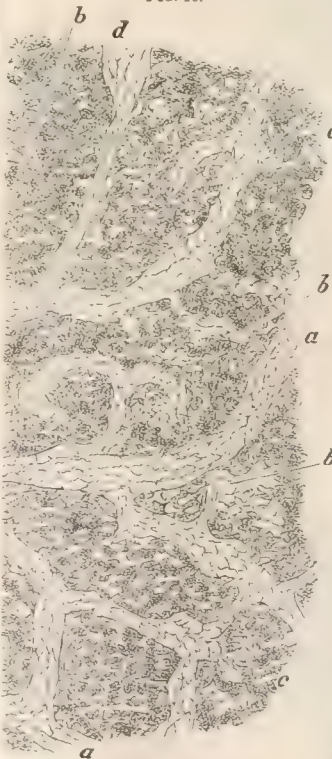
FIG. 17.



Small artery: a, tunica adventitia; a', nucleus of tunica adventitia; b, muscle nucleus; c, elastic internal tunic; d, cell-membrane of fusiform cells.

the other hand, the thick middle coat of the larger arteries

FIG. 18.



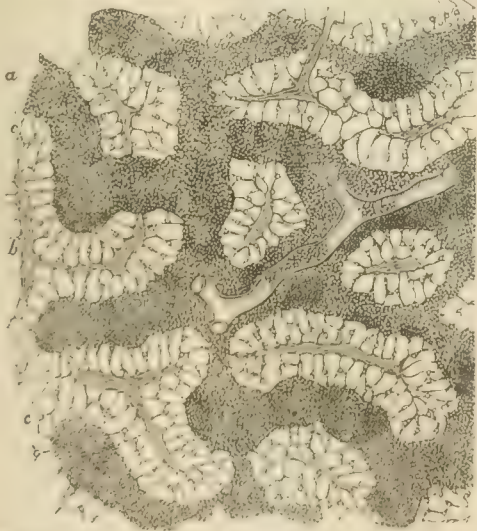
Lymphatics: central tendon diaphragm of rabbit: a, lymph capillaries; a', connective tissue with serous canals; d, flask-shaped dilatations.



can be demonstrated by the use of carmine. In the smaller lymphatics and in the lymphatic capillaries these cells are distinguished by the sinuous character of their margins and by the large size and great number of the stomata between them. The larger lymphatics possess a middle muscular and an external connective tissue coat, resembling the corresponding tunics of the veins. The stomata of the lymphatic network communicate with the system of spaces already described as everywhere existing in the connective tissue. These form a system of canals (plasmatic canals, serous canals), which vary in size and form in various parts of the body, and which, as Von Recklinghausen has shown, are best demonstrated by the action of silver, which blackens the intervening matrix, leaving the plasmatic canals uncolored. The plasmatic canals communicate also with the blood-vessels by the stomata of the latter, and thus form the passages through which the white corpuscles move when they migrate from the vessels.

The *lymphatic glands* are interposed in the course of the lymphatics. When these, on their way from the peripheral portions of the body, arrive at a gland (vasa efferentia), they ramify on its surface and enter its substance from the periphery. The branches leading from the gland towards the larger lymphatic trunks (vasa efferentia) escape from the hilus. The lymphatic glands are invested by a capsule of connective tissue, and consist essentially of a delicate reticulum of branching connective-tissue cells, the meshes of which are filled with small granular cells resembling the white corpuscles of the blood. When thin sections of glands, hardened in alcohol, are pencilled with a brush, a portion of these elements are detached, and the more firmly attached cells which remain in situ appear as cord-like masses (follicular cords), which form a plexus in the central medullary portion of the gland, while in the cortical portion they expand into rounded or club-shaped dilatations.

FIG. 19.



Lymphatic gland: *a*, follicular ends; *b*, trabeculae; *c*, lymph-path.

If the pencilling be continued, the lymphoid cells are detached from these follicular cords also, and it is then seen that the meshes of the reticulum are smaller in them than in the intervening portions of the gland. The connective-tissue capsule gives off to the interior of the gland a series of trabeculae which form an areolar network, interlacing with the plexus formed by the follicular cords in such a way that in sections the trabeculae appear to occupy the centres of the spaces between the cords, with which they are connected by the coarse reticulum above described. This coarse reticulum between the trabeculae and the follicular cords constitutes the lymph-path, the easily detached lymphoid elements of which are constantly carried away by the current of the lymphatic circulation, and as constantly renewed; it communicates directly with the vasa efferentia at the periphery of the organ, and with the vasa efferentia at the hilus. Connected with the lymphatic plexuses of the mucous membrane of the alimentary canal especially are certain glandular bodies, the *lymphatic follicles*, the parenchyma of which is very similar in its structure to that of the follicular cords just described, and which, for this reason, and on account of their relations to the lymphatic vessels, are to be regarded as minute lymphatic glands. The solitary glands and glands of Peyer

in the intestines, the closed follicles of the tonsils, pharynx and back of the tongue, are of this nature.

The *lymph* is the colorless, slightly opalescent fluid contained in the lymphatics. Its morphological elements, the lymph-corpuscles, are in all respects identical with the white corpuscles of the blood, which in fact are continually recruited by the lymph-corpuscles entering the subclavian veins through the thoracic duct and the lymphatic duct of the right side, while on the other hand, white blood-corpuscles which have migrated from the blood-vessels into the serous canals of the connective tissue continually enter the lymphatic capillaries and become lymph-corpuscles. The lymph which leaves the lymphatic glands by the vasa efferentia is so much richer in corpuscles than that which enters them as to leave no doubt that these glands are one important seat of the formation of the lymph-corpuscles. They probably originate by the multiplication by division of the cells of the parenchyma, but the details of the process have hitherto escaped observation. A similar formation of white corpuscles takes place in the spleen, and probably also in the lymph-follicles and the marrow of the bones.

The *serous membranes* consist of a thin layer of connective tissue coated on the side next the serous cavity by a single layer of endothelial cells. These are flattened polyhedral, nucleated elements, generally with sinuous margins, which are best displayed by the action of silver. It is then seen, also, that numerous sharply defined, rounded, or irregular spaces, the so-called stomata, exist between the margins of the cells. The membrane on which this endothelium reposes consists of a network of interlacing bundles of fibrillar connective tissue with stellate fixed corpuscles and elastic elements. It contains, besides blood-vessels and nerves, a rich plexus of lymphatic capillaries, which appear to communicate freely with the serous cavities by means of the stomata. In consequence of this arrangement, milk or colored fluids, such as carmine solution, introduced during life into serous cavities—as, for example, the peritoneum or the pleural sacs—are speedily taken up by the lymphatics, a natural injection of which may thus be effected. The lymphatic capillaries may also be demonstrated by soaking the membrane in nitrate of silver and exposing it to the light. The connective-tissue matrix is thus blackened, while the blood-vessels and lymphatics appear as light-colored channels lined by their characteristic endothelium. From the abundance of these lymphatics, and the readiness with which they take up fluids introduced into the serous cavities, the latter have been of late regarded by some as belonging to the lymphatic system.

The *Spleen*. The spleen is invested externally by the peritoneum, immediately beneath which is a firm connective-tissue capsule. From the inner surface of the capsule numerous processes (trabeculae) proceed into the substance of the organ, uniting with each other to form a network, the areolar interspaces, which are filled with the splenic pulp. Both the capsule and the trabeculae contain a considerable number of muscular fibre-cells and elastic elements. Where they adjoin the veins the trabeculae become continuous with the adventitia of these vessels, which thus acquire unusual firmness and are prevented from collapsing. The splenic pulp consists of lymphoid elements resembling those of the lymphatic glands, like which, when examined fresh, they exhibit amoeboid movements. These elements are united by a faintly granular, tenacious intercellular substance. In the mass thus formed, according to Frey, an anastomosing system of passages, lined by an endothelium consisting of a single layer of spindle formed cells, is hollowed out. These passages communicate with both the arteries and veins, and serve for the transmission of blood. In consequence of their existence the splenic pulp may be considered as itself disposed in a network, in the meshes of which lie the trabeculae, the blood-vessels, and the passages just described. The splenic artery, after entering the organ, breaks up into smaller and smaller branches, which soon become characterized by the large numbers of lymphoid elements in their adventitia, and also by the presence of peculiar oval structures—the Malpighian bodies. These are from .01" to .04" in diameter, and are readily recognized by the naked eye on account of their whitish color. They consist of cells resembling those of the splenic pulp, held together, like them, by an intercellular material, which, towards their peripheries, acquires a resemblance to ordinary connective tissue, without, however, forming a complete capsule; the parenchyma of the Malpighian bodies being thus continuous with the splenic pulp. The arteries and veins of the spleen are united by a rich plexus of capillaries, which ramify in the substance of the splenic pulp, and form a well-developed network on the peripheries of the Malpighian bodies, into the interior of which they also penetrate, though with wider meshes. Besides, according to Frey, as already mentioned, both



arteries and veins open into the parenchymatous passages described above. This view is, however, not universally accepted, some histologists holding that the splenic arteries communicate with the veins by capillaries in the ordinary way only. Further investigations are needed to reconcile these conflicting views. The nerves of the spleen are derived from the sympathetic system, and primarily accompany the arteries. They terminate in the muscular fibre-cells of the middle coats of the blood-vessels, and in peculiar ellipsoid organs described by W. Müller, which are well developed in carnivorous animals, but only rudimentary in man. The lymphatics of the spleen form a close plexus in the capsule of the organ, whence numerous branches are given off into its interior; there a second plexus is formed, the larger branches of which for the most part accompany the arteries.

*The Skin and its Appendages.*—The skin consists of a superficial epithelial layer, the epidermis, and a deeper layer, the corium or true skin. The corium is from .02" to .1" thick, and is composed of dense connective tissue, many of the fixed corpuscles of which are stellate, especially in its more superficial portions, where also they are smaller and more numerous. The fibrillated matrix of this connective tissue is so disposed as to form a dense network with small intercommunicating meshes, which are largest in the deeper parts of the corium, and there contain groups of fat-cells. Still deeper, the network becomes continuous with the loose connective tissue of the subcutaneous fat. Interlacing with this connective-tissue network is a second network of coarse and fine elastic elements. On its exterior surface the corium presents great numbers of little elevations, the papillæ. These are merely rounded projections over the greater portion of the body, but in some situations, especially in the palmar surface of the hands and fingers, become conical elongated processes .004" in length or longer. They are divided into vascular and nervous, the first containing capillary loops, the second the terminations of nerves. The blood-vessels of the corium form in its deeper portion a close plexus, whence numerous branches are given off towards the surface. These form, in the most superficial portion of the corium, a second still closer plexus, from which the capillary loops of the papillæ are derived. There are also two plexuses of lymphatics, a superficial and a deep—the first situated just beneath the superficial plexus of blood-vessels, the second just beneath the deep vascular plexus. The lymphatic capillaries of these plexuses communicate with the communicating areolar interspaces of the connective tissue of the skin, which here, as elsewhere, are to be regarded as lymphatic passages.

The nerves of the skin are composed of medullated nerve-fibres, part of which terminate in the peculiar corpuscles of Meissner and Pacini, while others lose their medullated sheath, and, after breaking up into bundles of fibrils, form a plexus in the superficial portion of the corium. Innumerable single fibrils, given off from this plexus, penetrate the epidermis, and terminate with bulbous extremities in its deeper layers. The corpuscles of Meissner (tac-

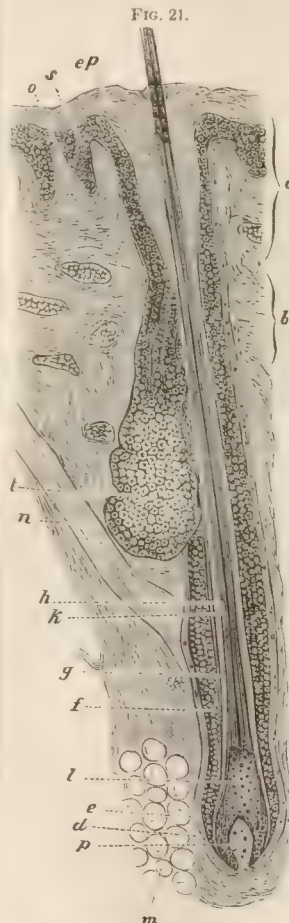
in which they are contained, but rather narrower, composed of a modified connective tissue with transversely disposed nuclei, and marked superficially with transverse lines. Each is penetrated at its inferior extremity by one or more medullated nerve-fibres which run towards the opposite extremity, either straight or in a spiral manner, and terminate there in a mode which is not yet fully made out.

The *epidermis* varies in thickness from .002" to .15", and is composed of numerous strata of epithelial cells, the deeper ones being soft and rounded, while the more superficial are flattened and horny; it is hence divided into a mucous and a horny layer. The cells of the mucous layer are nucleated masses of granular protoplasm. Those of them which are immediately in contact with the corium are elongated or columnar, and about .0004" in average length. Next above these the cells have about the same diameter, but are rounded or polygonal from mutual pressure, and succeeding strata increase in size towards the surface of the mucous layer, becoming more and more flattened, till the uppermost cells have a transverse diameter of .001" or more, with less than half the thickness. The nuclei of the cells of the mucous layer vary with the size of the cells from .0001" to .0004". The horny layer consists of strata of cells flattened into mere polygonal scales .001" to .0015" or more in diameter, and extremely thin. In most of them no nucleus can be made out. The most superficial cells of this layer are constantly being thrown off, while the superficial cells of the mucous layer continually undergo the horny transformation, and thus replace the loss. To maintain this process a constant development of new elements goes on in the deeper parts of

the mucous layer. This is generally believed to take place by the multiplication of the epithelial elements of the deepest strata. Recently, however, it has been shown that wandering corpuscles migrate from the corium into the mucous layer, where they can always be found in thin sections between the epithelial cells. It has hence been suggested that the new elements arise, in part at least, by the fixation and transformation of these migrated cells.

The dark color of the skin in certain races is due to the deposit of pigment-granules in the cells of the lower part of the mucous layer.

The *hairs* vary considerably in thickness in different situations. The long soft hairs of the head, beard, etc. usually range between .0015" and .004" in thickness; the short stiff hairs of the eyelashes, eyebrows, nostrils, and auditory meatus, from .0025" to .006"; and the downy hairs of the general surface of the body from .0005" to .001". The proper substance of all these varieties of hairs can be broken up, by the action of sulphuric acid, into flat elongated fibre cells .002" in average length. Each hair is coated externally by a cuticle composed of a single layer of flattened scales, which overlap each other like the shingles on a roof; internally, in the coarser hairs at least, is a



Hair from beard: *a*, orifice of hair-follicle; *b*, neck of follicle; *c*, dilatation of follicle; *d*, outer follicular sheath; *e*, inner follicular sheath; *f*, outer root-sheath; *g*, inner root-sheath; *h*, cortical substance of hair; *k*, medullary substance of hair; *l*, root of hair; *m*, adipose cells; *n*, erector pili; *t*, sebaceous gland; *p*, papillæ of skin; *s*, mucous layer; *ep*, horny layer projecting into hair-sac.



Tactile corpuscles: *a*, vascular papilla; *b*, nerve-papilla; *c*, blood-vessel; *d*, medullated nerve-fibre; *e*, tactile corpuscle; *f*, transverse section of medullated nerve-fibre.

tile corpuscles) are contained in the nervous papillæ, and are most numerous in the palmar surface of the hand and fingers. They are oval bodies about as long as the papillæ

central medulla composed of granular polygonal cells .0006" to .0008" in diameter. The color of the hair is due to pig-



ment-granules deposited both in the medulla and the proper hair substance. Each hair grows from a vascular papilla, which projects into the bottom of the hair follicle. Immediately upon the surface of this papilla is a single layer of columnar cells similar to those of the deepest layer of the epidermis. To these succeed several strata of polygonal ones, and these, according to their position, pass by transition into the elements of the hair cuticle, hair substance, and medulla. The growth of the hair is effected by the multiplication of the cells in the immediate vicinity of the papilla. The hair follicles are from .08" to .25" long, and extend deep into the corium—in the case of the larger hairs, quite through it. The connective tissue of the corium immediately adjoining them is so condensed as to form an external sheath, the fibres of which run parallel to the hair. The portion of this sheath nearest to the follicle is more homogeneous, and contains muscular fibre-cells disposed longitudinally; it is known as the internal sheath of the follicles: its very innermost part, being quite transparent, is called the vitreous membrane. Both the mucous and horny layers of the epidermis are continued into the sheath, which they line as far as the papilla; the first lies next to the vitreous membrane, and is called the external root-sheath; the second is thinner, and is designated the internal root-sheath. From near the orifice of the follicle to the papilla the internal root-sheath is adherent to the outermost layer of cells on the surface of the root of the hair, which is termed the sheath of Huxley. The hair-papillæ are vascular processes of connective tissue which project into the bottoms of the follicles; they are conical in shape, with constricted necks. Two small arteries enter each papilla; these usually unite to form a single trunk, which breaks up into a capillary network from which two emergent veins proceed. A small artery and vein also ramify in the substance of the external sheath of the follicle. Nerves have been traced as far as the neck of the papilla, but their mode of termination remains unknown.

The *erector muscles of the hair* are narrow bands of muscular fibre-cells .0018" to .009" in thickness, which arise in the upper part of the corium and run obliquely inward to be inserted into the internal sheath of the hair-follicles just below the sebaceous glands. Each hair-follicle enters the skin obliquely, forming an acute angle with the surface, and as the muscle lies in the corresponding obtuse angle, its contraction erects the hairs.

One or more *sebaceous glands* open into each hair-follicle just below the level of the general surface of the corium. Each of these glands consists of from two to twenty somewhat oval sacculi .005" to .011" in long diameter, composed of a transparent nucleated membrane, filled with nucleated gland-cells, resembling the cells of the mucous layer of the epidermis. The cells nearest the walls of the sacculi often contain no oil; in the more central cells oil is usually present in drops of various sizes imbedded in the cell substance. The size of the sebaceous glands is quite independent of the size of the hairs with which they are connected, and sometimes, though rarely, they open directly upon the surface of the skin without being connected with any hair.

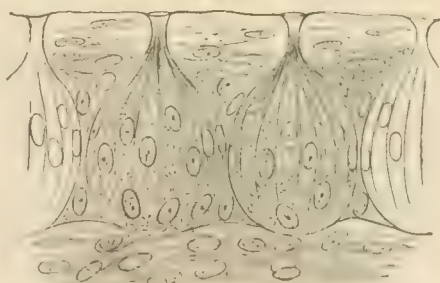
The *sweat-glands* are simple tubular glands, each consisting of a delicate nucleated sheath, lined by a single layer of columnar nucleated cells, which leave in the centre a narrow cylindrical passage. The diameter of the tube averages about .0025"; its deepest extremity forms a coil or glomerulus .008" to .016" in diameter, which is surrounded by a plexus of blood vessels, and lies in the lower part of the corium or in the subjacent adipose tissue. From this coil the tube pursues a nearly straight path to the surface of the corium, where both the sheath and the columnar cells terminate, and the central passage becomes continuous with a spiral canal hollowed out between the cells of the epidermis, which opens on the external surface of the horny layer. The hairs, sebaceous glands, and sweat-glands are developed from the mucous layer of the epidermis, papillary outgrowths of which invade the corium and undergo the requisite transformations. Simultaneously, the adjacent layers of the corium are metamorphosed into the external sheaths of the hair-follicles and glands.

The *nails* are to be regarded as special modifications of the epidermis, and consist, like it, of a mucous and a horny layer, the latter being the true nail. In the fold of skin from which the root of the nail grows the corium is elevated into papillæ projecting forward, which in the true bed of the nail are replaced by a series of parallel longitudinal ridges or laminae .002" to .008" high. These papillæ and ridges are abundantly supplied with blood vessels, and numerous medullated nerve fibres exist in the subjacent connective tissue, which lose their medullary sheath on entering the corium, and break up into fine branches, the ultimate termination of which is not fully known. An ac-

tive development of cells takes place in the mucous layer at the root of the nails; and as a similar development occurs, though less actively, in the mucous layer of the nail-bed, the nails are at once pushed forward and increased in thickness towards their free margins. The horny layer, or nail-substance, is composed of irregular polygonal cells intimately united together, but which can be isolated by reagents, as, for example, by maceration in solution of potash.

*The Digestive Organs.* The *mouth* is lined by a mucous membrane which is directly continuous with the skin, and like it consists of a vascular layer of connective tissue beset with papillæ and a many-layered epithelium, the superficial cells of which are flattened scales, the deeper ones polygonal, and those next the connective-tissue layer columnar. The connective-tissue layer, however, is much thinner than the corium; in the epithelium a horny layer cannot be discriminated as in the epidermis, and the large superficial epithelial scales, .0016" to .002" in long diameter, contain oval nuclei .0002" to .0004" long. The papillæ of the mucous membrane vary in size and shape in different parts of the oral cavity; they are particularly conspicuous on the upper surface of the tongue, where three varieties are discriminated—viz. the filiform, fungiform, and circumvallate. The filiform papillæ are pretty uniformly distributed over all portions of this surface. They are conical elevations of the mucous membrane, the apices of which terminate in a number of secondary papillæ, the whole being covered with a thick layer of epithelium, which, at the apices, breaks up into a number of slender processes, each composed of epithelial cells adhering together. The fungiform papillæ are situated at the anterior part of the tongue, chiefly on its tip and edges. They are club-shaped projections of the mucous membrane with narrow necks, beset upon the surface with small secondary papillæ, and smoothly covered over with epithelium. The circumvallate papillæ are arranged in the form of a V at the root of the tongue. They are flattened elevations, somewhat constricted at their bases, beset, like the fungiform, with small secondary papillæ, and surrounded by a circular elevation of the mucous membrane, from which they are separated by a narrow depression. All these varieties of papillæ are provided with both blood-vessels and nerves. Connected with the nerves are special organs of taste, the so-called gustatory bulbs, which are situated chiefly on the sides of the circumvallate papillæ, but also exist, though less plentifully, on the fungiform papillæ. They have the form of round bellied flasks

FIG. 22.



Taste-bulb.

about .003" long, and rather more than half as broad, which occupy cavities in the epithelium, resting below on the connective-tissue layer of the mucous membrane. They are composed of flattened, spindle-shaped nucleated cells, which enclose a number of more delicate thread-like ones, and are connected inferiorly with a plexus of non-medullated nerve fibrils. This plexus originates by the splitting up of the axis-cylinders of the terminal medullated fibres of the gustatory nerve in the substance of the papillæ. The central cells of these bulbs are believed to be the true gustatory cells, while the others are regarded as epithelial in their nature, and are so arranged as to leave at the apex of the bulb a circular opening about .00014" in diameter, through which gustatory pore, through which rapid solutions gain access to the gustatory cells. The oral cavity is provided with a considerable number of small mucous glands .03" to .16" in diameter, similar in structure to the salivary glands, and designated, according to their situation, labial, buccal, palatine, and lingual glands.

The *salivary glands* are racemose glands, the ducts of which are lined with a cylindrical epithelium and branch in a tree-like manner, terminating finally in sacculi or alveoli .0013" to .005" in diameter, all lined with polygonal secreting cells .0004" to .0007" in diameter. The whole is united into a mass by a delicate connective tissue in which numerous blood-vessels and nerves ramify. On the surface of the alveoli and smaller ducts the connective tissue is



condensed into a delicate *membrana propria*, while in the larger ducts it forms a comparatively thick wall. The secreting cells are granular nucleated masses of protoplasm, which line the alveoli, and so nearly fill them as to leave a comparatively small central cavity. The nerves of the salivary glands consist of both medullated and pale fibres. According to Pflüger, a portion of the former penetrate the alveoli, and are continuous with the protoplasm of the secreting cells, while others terminate in small multipolar cells, some of the processes of which are also continuous with the secreting cells. A number of small ganglia, each consisting of a group of round or oval nerve-cells, occur in the course of the nerves. The oral fluid consists of the secretion of the salivary glands mixed with that of the small racemose glands above described. It always contains large numbers of flattened epithelial cells, derived from the surface of the oral mucous membrane, together with small round granular cells resembling the white corpuscles of the blood after they have been somewhat swollen by immersion in a fluid of the density of the saliva. The latter are known as the salivary corpuscles, and have been regarded as undeveloped secreting cells cast off by the salivary glands; they are, however, more probably migrated white corpuscles which escape into the cavity of the mouth either directly through the oral mucous membrane, or indirectly by way of the salivary glands.

The *tonsils* are two glandular masses, each consisting of from ten to twenty sacculated depressions of the mucous membrane, in the walls of which are numerous oval lymphatic follicles .008" to .02" in diameter. The parenchyma of these follicles consist of a fine reticulum of connective tissue, the meshes of which are stuffed with lymphoid elements. The sacculi with their follicles are united together by a connective tissue rich in blood-vessels and lymphatics. At the root of the tongue there are a number of small follicular glands similar in structure to the tonsils, but simpler, each consisting of a single sacular depression of the mucous membrane, in the walls of which are a number of closed follicles resembling those of the tonsils. Böttcher has recently denied that these glands are of constant occurrence, and regards them as pathological formations. The oral mucous membrane is well supplied with lymphatics, which are especially abundant on the surface of the tongue and about the tonsils.

**The Teeth.**—The dentine which constitutes the principal portion of the substance of the teeth consists of a calcareous matrix containing great numbers of delicate dentinal canals .0005" to .00015"

in diameter, which branch and anastomose as they radiate from the pulp-cavity towards the periphery of the dentine. The crown of the teeth is covered with a harder material, the enamel, made up of hexagonal prismatic enamel-fibres .00012" to .00018" in diameter, arranged perpendicularly to the surface, or nearly so. The roots of the teeth are covered with a thin layer of true bone, the *crusta petrosus* or *cementum*. The tooth-pulp occupies the central cavity of each tooth, and is a delicate mass of connective tissue containing both blood-vessels and nerves. Its external layer consists of large nucleated cells, the odontoblasts, provided with long branching processes which line the dentinal canals. The investigations of Boll render it probable that the delicate terminal fibrils of the nerves of the pulp accompany these processes into the dentinal canals. In the development of the teeth a longitudinal furrow in the mucous membrane of the gum is first formed, into which papillary outgrowths from the mucous

membrane sprout, and ultimately become the pulps of the several teeth. The enamel originates by the transformation of portions of the epithelium of the primary dental groove, while the peripheral cells of the pulp send out branches and are transformed into odontoblasts, between the processes of which the calcareous matrix of the dentine is deposited.

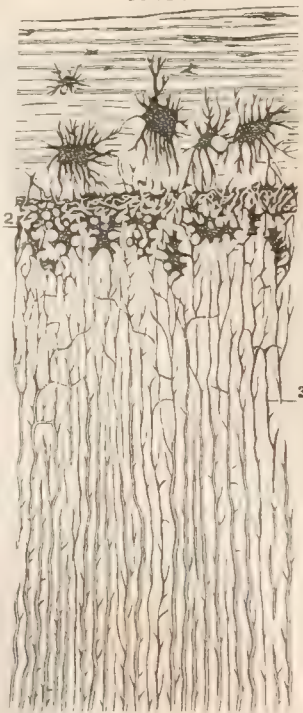
The *pharynx* is lined by a mucous membrane resembling that of the mouth, except in the portions adjoining the posterior nares and the orifices of the Eustachian tubes, where the pavement epithelium is replaced by one composed of ciliated columnar cells like those of the nasal mucous membrane. The mucous membrane is well supplied with vessels, nerves, and lymphatics, and contains a considerable number of racemose glands resembling those of the oral cavity, as also numerous closed follicles, arranged around sacculi like those at the root of the tongue or in the tonsils.

A laminated pavement epithelium, like that of the pharynx, also lines the *œsophagus* as far as the cardiac orifice of the stomach, where it terminates with a dentated border, and is replaced by the columnar epithelium of the stomach. This epithelium reposes upon a vascular layer of delicate connective tissue, the proper mucous membrane, which is separated from the more loosely meshed submucous connective tissue by a thin stratum of muscular fibre-cells, the muscle of the mucous membrane, which commences with a few scattered fibre-cells in the upper part of the *œsophagus*, and becomes a continuous layer farther down. A few small racemose glands lie in the submucosa and open by minute ducts on the mucous surface. The external muscular coat of the *œsophagus* consists of an internal circular and external longitudinal layer; in its upper fourth these are composed chiefly of striated muscular fibres, but contain also numerous bundles of muscular fibre-cells; in the next fourth the latter elements predominate; and in the lower half the muscular coat is wholly composed of them. Externally the muscular coat is invested by a sheath of fibrillated connective tissue.

The walls of the *stomach* consist of a mucous membrane, a layer of submucous connective tissue, a muscular coat, and the peritoneum. The epithelium of the mucous membrane consists of a single layer of nucleated columnar cells .0008" in average length, among which occur certain peculiar cup-shaped elements, the so-called goblet-cells. Beneath the epithelium the mucous membrane is composed of a tissue designated adenoid by His, consisting of a delicate reticulum of branching cells, the meshes of which are filled with lymphoid elements, as in the lymphatic glands and follicles. In this adenoid tissue innumerable tubular glands, .015" to .06" long and .002" to .003" broad, are arranged perpendicularly to the mucous surface, and placed so closely side by side as to occupy more space than the intervening adenoid tissue. In the vicinity of the cardiac and pyloric orifices of the stomach these glands are lined throughout by a columnar epithelium similar to that of the surface of the mucous membrane. In the rest of the stomach this epithelium only lines the upper portion of the glands, the rest being filled with spheroidal granular elements, the so-called pepsin-cells. At the two extremities of the stomach some of the glands are divided at their fundus into two or more branches. The mucous membrane is separated from the submucosa by a stratum of muscular fibre-cells, on an average about .002" thick, the muscle of the mucous membrane, or muscle of Brücke, consisting of an internal circular and external muscular layer. The submucosa is a layer of rather loose connective tissue, which unites the muscle of the mucous membrane to the external muscular coat. The latter is .02" to .08" thick, and consists most internally of a series of oblique fasciculi, next of a circular layer, and still more externally of a longitudinal layer, all composed of muscular fibre-cells. Lastly, the peritoneum, which has the structure of serous membranes generally, is united to the external muscular coat by a thin layer of subperitoneal connective tissue. The blood-vessels of the stomach ramify in the submucosa, and there form a network whence numerous small branches proceed to the mucous membrane, where they form a close capillary plexus around the tubular glands. The external muscular coat and the peritoneum are partly supplied by branches given off by the vessels as they pass through them, partly by branches derived from the submucous plexus. The nerves of the stomach form in the submucosa a plexus in which numerous small ganglia are found. A second plexus, also with numerous ganglia, exists between the circular and longitudinal layers of the external muscular coat. The ultimate relations of the nerves to the mucous membrane are yet uncertain. The lymphatics form three networks—one in the mucous membrane between the tubular glands, the second in the submucosa, the third to the peritoneum.

The description of the coats of the stomach just given

FIG. 23.



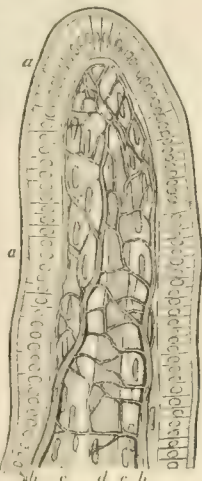
Canine tooth: Transverse section of root; 1, cement; 2, interglobular substance; 3, dentinal tubules.

Canine tooth: Transverse section of root; 1, cement; 2, interglobular substance; 3, dentinal tubules.



applies, with certain modifications, to both small and large intestine. The lining epithelium is similar throughout, as is the structure of the mucous membrane, except that the tubular glands, which in the intestines are called the glands or crypts of Lieberkühn, are shorter, .01" to .02" long, do not branch, and are lined throughout by columnar epithelium. What has been said of the muscle of the mucous membrane, the submucosa, the external muscular coat, the peritoneum, and the general distribution of blood-vessels, lymphatics, and nerves of the stomach, will apply with but little alteration to the intestinal canal. The more important points of difference are as follows: In the *small intestine* the mucous membrane, besides being thrown, on its upper portion especially, into numerous transverse folds, the valvulae conniventes, presents a great number of conical elevations, .008" to .01" long, the so-called villi. These consist of the adenoid tissue of the mucous membrane, and are coated externally by its cylindrical

FIG. 24.



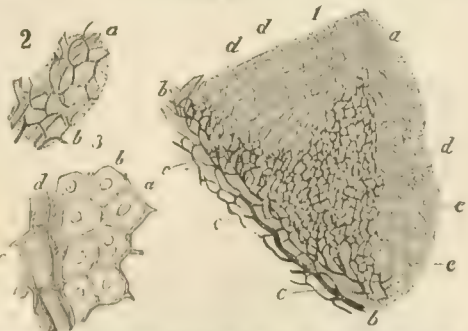
Intestinal villus: *a*, cylindrical epithelium; *b*, capillary blood-vessel; *c*, involuntary muscle-cells; *d*, central chyle radicle.

epithelium. Each contains a central lymph sinus, which terminates either by a blind extremity or in a loop, and which is the commencement of the lacteals. Between this and the periphery of the villus lie the blood-vessels, consisting of one or more minute arteries which break up into a capillary network, the blood from which is collected by a small vein. Each villus also contains a number of longitudinally arranged muscular fibre-cells, which are continuous below with the muscle of the mucous membrane. The crypts of Lieberkühn open on the surface of the mucous membrane between the villi, and are so arranged that the deeper portions of those adjoining opposite sides of the bases of the villi appear as close together as the others. Lying partly in the mucous membrane, partly in the upper portion of the submucosa of the small intestine, there are a number of lymph follicles, .015" to .08" in long diameter, which either occur singly (the solitary follicles), or are aggregated together in groups consisting of twenty or more follicles placed side by side (the patches of Peyer). These follicles are somewhat flask-shaped, their apices penetrating into the mucous membrane almost or quite to the epithelium, while their rounded bases lie in the submucosa. Their parenchyma resembles the adenoid tissue of the mucous membrane, with which it is continuous, except that the meshes of the reticulum in which the lymphoid elements lie are rather finer. They are surrounded by a vascular plexus which sends capillary branches into their parenchyma, and are partially enveloped inferiorly by rather wide lymph-sinuses. Immediately above each follicle the villi are absent. On the surface of the patches of Peyer, however, villi are found on the mucous membrane between the individual follicles. The solitary follicles are found in all parts of the small intestine; the patches of Peyer, on the other hand, occur chiefly in its lower portion, and especially in the ileum. In the upper part of the small intestine the submucosa contains a number of small racemose glands about .04" in average diameter, the glands of Brunner, the ducts of which perforate the mucous membrane and open into the intestinal canal. The muscular coat of the small intestine is from .015" to .02" thick, and consists of an internal circular and external longitudinal layer: some oblique fasciculi exist also, chiefly in the duodenum. The lymphatics form a network on the mucous membrane which surrounds the crypts of Lieberkühn, and are continuous with the central lymph-sinuses of the villi and the coarser plexus in the submucosa. The peritoneum has its own plexus of lymphatics, as in the stomach. On account of the milky appearance of their contents during the digestion of fatty matters, the lymphatics of the intestinal mucous membrane and the mesenteric lymphatic trunks with which they communicate are known as lacteals. As in the stomach, there are in both small and large intestines two nervous plexuses provided with numerous ganglia; the first, situated in the submucosa, is known as the plexus of Meissner; the second, between the circular and longitudinal layers of the muscular coat, is the plexus of Auerbach. In the *large intestine* there are no villi; in other respects its mucous membrane closely resembles that of the small intestine, except that it is rather thicker, the crypts of Lieberkühn somewhat longer,

and the muscle of the mucous membrane a little better developed. Solitary follicles rather larger than those of the small intestine, but otherwise resembling them, and having similar relations to the lymphatics, occur at intervals. The external longitudinal layer of the muscular coat is much thinner than the circular, except in three longitudinal bands, in which the two layers are of equal thickness, together measuring about .025".

*The Liver.* Two sets of blood vessels enter the liver and ramify in it side by side—branches of the hepatic artery and of the portal vein. The blood from these is carried by a common system of capillaries into the radicles of the hepatic vein. The hepatic artery and portal vein are accompanied in their ramifications by the branches of the biliary duct, and the three are united together by a delicate connective tissue, the sheath or capsule of Glisson, in which lie also the nerves and the deep lymphatics of the organ. By the final ramifications of the hepatic artery and portal vein the parenchyma of the liver is mapped out into irregular polygonal lobules or acini, .025" to .08" in diameter, which, however, in the human liver are not invested with a connective-tissue capsule, as they are in the liver of the pig and some other animals. The ramifications of the hepatic vein lie in a direction perpendicular to the course of the other vessels, so that their ultimate radicles occupy the centres of the acini, and hence are called intralobular veins; while the radicles of the portal veins lying between the lobules are called interlobular veins. A capillary network with comparatively small meshes lies in the substance of the acini, and conveys the blood from the interlobular to the intralobular vessels. The parenchyma of the liver consists of granular polygonal cells .0005" to .001" in diameter, containing one or two rounded or oval nuclei .0002" to .0003" in diameter, and frequently one or more oil-drops. Between these cells, which occupy the meshes of the capillary plexus of the acini, there ramifies a plexus of extremely fine capillary bile-ducts .00004" to .00008" in diameter, which do not, however, possess any proper walls, but are bounded by the hepatic cells themselves. These lie between the adjoining faces of the hepatic cells even more frequently than at their angles, and are arranged in such a manner that every hepatic cell is related, by at least one of its sides, to a capillary bile duct, and that the latter are always separated from the capillary blood vessels by the thickness of an hepatic cell. The ca-

FIG. 25.



Liver of rabbit: 1, part of a lobule—*a*, vena hepatica; *b*, portal twig; *c*, bile-ducts of portal vein; *d*, interlobular capillaries; *e*, portal blood-capillaries; *f*, bile-capillaries; *g*, hepatic cells; *h*, bile-ducts; *i*, capillary blood-vessel.

capillary bile-ducts open into the finest interlobular bile-ducts, which are passages channelled in the connective tissue accompanying the interlobular vessels, and lined by a single layer of polygonal cells. The larger ducts are lined by a columnar epithelium, and have a wall of connective tissue which becomes thicker as the tubes increase in diameter. In this wall numerous racemose mucous glands are imbedded, the excretory canals of which open into the bile-ducts. The liver is coated externally by a very thin capsule of connective tissue, and this again is covered, over the greater part of the surface of the organ, by the peritoneum. In the peritoneum and the subjacent connective tissue lies an abundant plexus of superficial lymphatics. The deep lymphatics, which penetrate the substance of the organ, lie in the capsule of Glisson, as has already been mentioned. The nerves of the liver are composed chiefly of non-medullated, with a few medullated, fibres. They enter the liver with the portal vein, and for the most part accompany its branches. They have not been traced into the substance of the acini, and their relations to the hepatic cells remain undetermined.

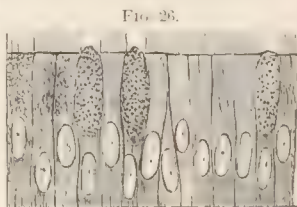
*The gall bladder* is lined throughout by a single layer of columnar epithelial cells, supported upon a membrane



of connective tissue, in which there are numerous decussatory fasciculi of muscular fibre-cells. Externally, it is in part coated by the peritoneum, in part comes into immediate contact with the hepatic tissue.

The *pancreas* agrees in its structure with the salivary glands so closely that no separate description of it need be given.

**The Respiratory Organs.**—The cartilages of the *larynx* are all of the hyaline variety, except the epiglottis and the cartilages of Whisberg and Santorini, which are composed of fibro-cartilage. The muscles are of the striated variety. The interior of the larynx is lined by a mucous membrane connected with the cartilages, ligaments, and muscles by a layer of submucous connective tissue. The epithelium of the mucous membrane on the anterior surface of the epiglottis resembles that of the oral cavity, but at its borders the superficial layers of cells become fewer and fewer, the cells of the deep columnar layer longer and longer, and a transition is thus effected on the posterior surface of the epiglottis into the ciliated epithelium which lines the larynx, and is continued through the trachea into the bronchial tubes. The ciliated epithelium consists of a layer of columnar cells .001" to .0016" long, attached to the mucous membrane by narrow elongated prolongations, while on their free margins they are provided with a number of thread-like processes about .00015" long (the cilia), which during life keep up a constant waving motion. Between the attached extremities of the ciliated cells are numerous smaller round and oval cells. The true vocal cords are ligaments composed chiefly of yellow elastic tissue, which lie in folds of the mucous membrane, on the surface of which the ciliated epithelium is replaced with a layer of pavement cells. A number of small racemose glands are found in the submucous connective tissue of the larynx, and open by their ducts upon the free surface of its mucous membrane. Similar glands occur abundantly in the trachea, which is lined by a mucous membrane in all respects resembling that of the larynx. The rings of the trachea are composed of hyaline cartilage, and are united together by a mixture of connective tissue and elastic fibres. Posteriorly, the rings are incomplete, the spaces thus left being occupied by a layer of transverse muscular fibre-cells.

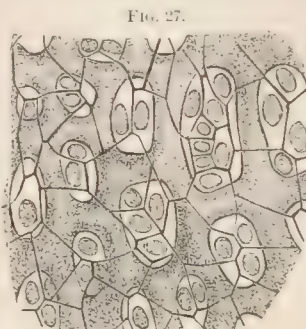


Epithelium of bronchial tubes.

**The Lungs.**—On entering the lungs the bronchial tubes branch in an arborescent manner, and finally terminate, when about .01" in diameter, in groups of infundibula, or funnel-shaped terminal expansions, each consisting of a number of polygonal cavities, the air-vessels or alveoli, which open into the central passage of the infundibulum. The infundibula of each group are connected with the small bronchial tube to which they belong by thin walled passages, the alveolar canals, which differ from the finest bronchial tubes chiefly in the character of their epithelium, and in having their walls beset by air-vesicles which open into them. Down to about .04" in diameter the bronchial tubes consist of four layers—an external fibrous coat in which are imbedded a series of incomplete rings and plates of hyaline cartilage; a thin layer of muscular fibre-cells; an internal fibrous coat rich in elastic fibres; and lastly, an epithelium similar to that of the trachea. Scattered groups of fat-cells lie in the outer portion of the external fibrous coat; in its inner portion there are a number of racemose mucous glands, the ducts of which open into the lumen of the tube. In bronchial tubes of less than .04" in diameter the external fibrous coat becomes thinner and thinner; the plates of cartilage and the mucous glands become more and more scanty, and finally disappear, and the muscular layer is gradually reduced to a few scattered fasciculi; the elastic inner fibrous coat is, however, prolonged upon the finest bronchial tubes, and is continuous with the elastic walls of the alveoli. The ciliated epithelium also continues in the smallest bronchial tubes, but its cells become shorter and shorter, and finally, at the transition from the bronchial tubes to the alveolar canals, lose their cilia and acquire the characters of the epithelial lining of the alveoli. The bronchial tubes are nourished by branches of the bronchial artery which supply the mucous membrane with a close capillary plexus. Their walls also contain numerous nerves and lymphatics. The air-vesicles, when undistended, measure from .006" to .01" in diameter, but can be blown up to twice these dimensions, or even more. Their walls are composed of a transparent connective tissue in which characteristically arching elastic fibres are plentifully imbedded,

and in which the capillaries derived from the pulmonary arteries form a close plexus with rounded or oval meshes. They are lined at birth by a layer of flat granular, nucleated hexagonal epithelial cells, which form a continuous lining for both the air-vesicles and the alveolar passages. In the adult only a part of the cells retain these characters, the rest being transformed into thin structureless plates. This epithelium, the existence of which has been a matter of dispute until quite recently, is best demonstrated by the silver method. The adjacent elastic walls of air-vesicles belonging to the same infundibulum coalesce to form a single septum. The walls of adjacent vesicles belonging to different infundibula are for the most part separated by a small quantity of interstitial connective tissue. The whole lung is made up of the bronchia and infundibula described, with blood-vessels, nerves, and lymphatics, united together by connective tissue. The nerves for the most part accompany the bronchial tubes and blood-vessels, and are largely distributed to their muscular fibre-cells. The lymphatics commence as anastomosing lacunae in the walls of the air-vesicles, whence proceed lymphatic capillaries, which unite to form trunks accompanying the bronchial tubes and the larger blood-vessels. There is, besides, an abundant superficial lymphatic network which lies just beneath the pleura.

**Urinary Organs.**—The *kidney* consists essentially of a great number of secreting tubes lined by epithelium, the tubuli uriniferi. These, with the blood-vessels, nerves, and



Epithelium of air-cell of lung.

lymphatics, united together by connective tissue. The nerves for the most part accompany the bronchial tubes and blood-vessels, and are largely distributed to their muscular fibre-cells. The lymphatics commence as anastomosing lacunae in the walls of the air-vesicles, whence proceed lymphatic capillaries, which unite to form trunks accompanying the bronchial tubes and the larger blood-vessels. There is, besides, an abundant superficial lymphatic network which lies just beneath the pleura.

**Urinary Organs.**—The *kidney* consists essentially of a great number of secreting tubes lined by epithelium, the tubuli uriniferi. These, with the blood-vessels, nerves, and

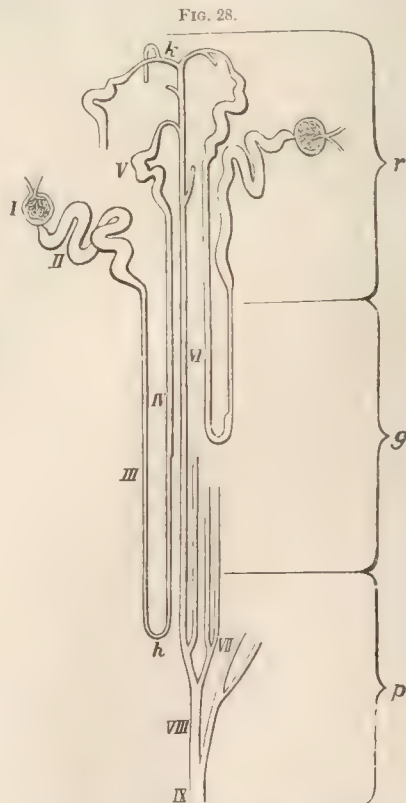


Diagram of course of uriniferous tubes in human kidney: p, papillary portion; g, boundary portion of medulla; r, cortex; i, capsule of glomerulus; ii, convoluted tubes; iii, descending limb of Henle's loop; h, loop; iv, ascending limb; v, intercalated portion; k, summit of collecting tube; vi, vii, viii, collecting tubes; ix, papillary duct.

lymphatics of the organ, are united together by a characteristic connective tissue composed of a nearly homogeneous matrix with stellate cells. The tubuli uriniferi com-



mence in the cortical portion of the organ as globular expansions, the capsules of Bowman, which embrace peculiar tufts of capillaries, the glomeruli of Malpighi. These, which are usually from .005" to .008" in diameter, consist of a number of capillary loops united together by connective tissue. The capsules of Bowman, which embrace them, are lined by a layer of large pavement epithelial cells, best demonstrated by the action of silver, and are continuous by constricted necks with the uriniferous tubes. Each uriniferous tube, which at first is about .002" in average diameter, pursues for a short distance a very tortuous course; it then rather suddenly diminishes in size to half its original diameter, or less, and runs in nearly a straight line into the base of the nearest pyramid, in which, at a variable depth, it turns back upon itself, forming a narrow loop (the loop of Henle), and returns to the cortical portion, where, after a time, it again becomes wide and tortuous, then again constricted, and finally unites with one or more tubuli which have pursued a similar course to form a straight collecting tube. This collecting tube runs towards the pyramid, receiving at first a few additional tubuli, after which it pursues a separate course into the base of the pyramid, where adjacent collecting tubes coalesce in pairs; so that the number of passages which finally open at the apex of each pyramid is very much smaller than the original number of tubuli. When sections of the kidney are examined by the naked eye, a number of striae (medullary rays) are seen proceeding from the bases of the pyramids almost to the surface of the cortical portion. These consist in part of bundles of the straight collecting tubes, in part of the straight narrow portions of tubuli, returning after having formed the loops of Henle. The glomeruli and the convoluted part of the tubuli lie in the parenchyma between these medullary rays. The walls of the tubuli uriniferi consist of a transparent nucleated membrane lined by a single layer of epithelial cells. These consist, in the first tortuous portion of the tubuli, of a granular protoplasm, without distinct cell-walls, and contain single, spherical, sharply-defined nuclei. In the narrow part of the tubuli, forming the loop of Henle, the epithelium appears as an attenuated layer of protoplasm, with swellings containing nuclei at intervals. On the other side of the loop the cells assume more of a columnar character, and being inclined to the axis of the tubuli, present an imbricated arrangement. When the tube again becomes tortuous the epithelium again assumes the character it possessed in the first tortuous portion, and finally, the collecting tubes are lined by a single layer of well-defined columnar epithelial cells.

The renal arteries divide in the pelvis of the kidney into a number of branches, which, on reaching the bases of the pyramids, ramify between these and the cortical portion of the organ, and send into the latter a series of straight twigs, the arteriæ interlobulares. These give off a number of short side-branches, each of which supports a glomerulus on its extremity. The efferent vein of each glomerulus, after leaving it, speedily breaks up into a capillary plexus continuous with that formed by adjacent efferent veins, and which surrounds the convoluted portions of the tubuli uriniferi. The venous radicles which collect the blood from this plexus open into the veins which accompany the interlobular arteries. In the medullary portion of the kidneys the capillary network which surrounds the uriniferous tubules is derived from a series of straight vessels, the so-called arteriæ rectæ, which in part arise from the arterial branches ramifying between the cortical substance and the bases of the pyramids; in part are not arteries at all, but the unusually prolonged efferent veins of the glomeruli adjacent to the bases of the pyramids. A superficial plexus of lymphatics is situated in the fibrous capsules of the kidneys. The deep lymphatics accompany the larger blood-vessels; their ultimate relations to the parenchyma of the organ are not yet known. The same remark applies to the nerves of the kidneys, which also accompany the vessels. A number of small ganglia occur in connection with these nerves.

The ureters and urinary bladder are lined by an epithelium consisting of several layers of cells. The most superficial are polygonal and somewhat flattened; to these succeed a layer of elongated cells, the upper extremities of which are rather broad, while the lower portions are prolonged into narrow processes, between which is a third

layer of oval cells. This epithelium rests on a layer of rather dense connective tissue, beneath which is the muscular coat composed of muscular fibre-cells. Externally to this is a second layer of connective tissue. The fundus of the bladder is, besides, coated by the peritoneum.

*Generative Organs.* The space assigned to this article permits only a brief sketch of the most characteristic organ of each sex. The testicle consists essentially of a number of secreting tubes lined by epithelium, the tubuli seminiferi. The organ is enclosed in a dense capsule of connective tissue, the tunica albuginea, from the inner surface of which a number of septæ proceed, dividing the gland into pear-shaped lobules 100 to 250 in number, each containing one to three convoluted tubuli seminiferi. These unite in the corpus Highmori, and form a network whence proceed twelve to fourteen canals, the convolutions of which constitute the epididymis. In the epididymis these canals unite and form finally a single excretory duct, the vas deferens. The tubuli seminiferi in the lobules are .008" in average diameter, and consist of a membrana propria, lined by secretory cells. The membrana propria is composed of homogeneous connective tissue with numerous nuclei imbedded. On its inner surface is a layer of nucleated cells with branching, anastomosing protoplasmic processes. To these succeed several layers of rounded cells with one or several nuclei, which, in fresh preparations, exhibit amoeboid movements. These are the so-called seminal cells, and it is in their interior that the spermatozoa are developed. The testicles are abundantly supplied with blood-vessels, lymphatics, and nerves. The lymphatics originate in wide passages between the tubuli seminiferi, lined by a characteristic epithelium, which forms a partial coating for the tubuli, and which is best demonstrated by the action of silver. The terminal branches of the nerves, according to Letzerich, can be traced through the membrana propria of the tubuli, and terminate between it and the first row of cells. The spermatozoa, which are the characteristic elements of the seminal fluid, are, in the human subject, about .0016" in average length, and have the form of thread-like filaments, enlarged at one extremity into an oval head .00015" to .0002" long.

The ovary consists of a stroma of vascular connective tissue in which are imbedded numerous cyst-like formations of various sizes, the Graafian follicles, containing the ova in various stages of development. The portion of the ovary which projects into the peritoneal cavity is not covered by the peritoneum, but by a layer of columnar cells, the so-called germ-epithelium. All the Graafian follicles, and the ova which they contain, are developed from ingrowing buds of this epithelium, which invade the connective-tissue stroma as gland-like tubules. A portion of the epithelial cells of these tubules are transformed into ova, while the remainder retain their epithelial character. The ova are subsequently isolated by the ingrowing of the connective-tissue stroma between the epithelial cells. Thin sections of the adult ovary show great numbers of the most unripe ova immediately beneath the surface of the organ.

FIG. 29.

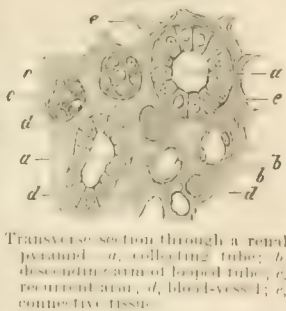
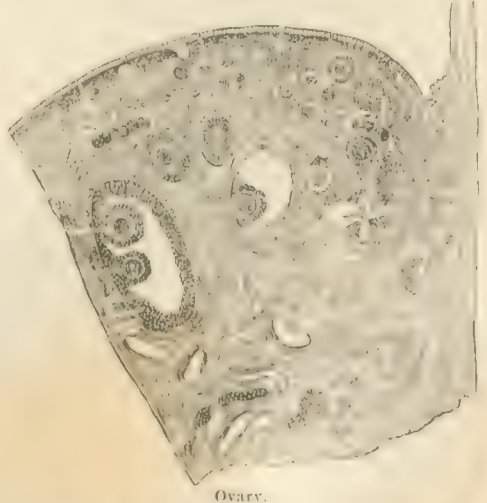


FIG. 30.



Ovary.

They appear as oval, nucleated cells, surrounded by an epithelium-like layer. Deeper in the organ ova are encountered in a more advanced stage of development, surrounded by an epithelial layer of several rows of cells. Finally, fluid accumulates between these cells, and the follicles then rapidly increase in size. The total number of



Graafian follicles, in all stages of development, contained in a young ovary has been variously estimated from 26,000 to 400,000. The fully-formed Graafian follicles are from .02" to .25" in diameter. They consist of a tunica propria of connective tissue, which is merely a condensation of the ovarian stroma, lined by several strata of nucleated epithelium-like cells—the epithelium of the follicle or the membrana granulosa—and filled with a transparent albuminous fluid. The elements of the epithelium of the follicles are accumulated at some one point into a little mass—the discus proligerus—in which the ovum is imbedded. Where a single follicle contains two or more ova, as occasionally happens in man, and very generally in Mammalia, there is a proligerous disk for each.

The human ovum, when fully developed, is a round or slightly oval vesicle, .008" to .01" in diameter. Its investing membrane exhibits distinct double contours, and is known as the zona pellucida; this encloses a granular protoplasm, the vitellus or yolk, in which is imbedded a distinct round nucleus .0016" in average diameter (the germinal vesicle), and this again presents a round prominent nucleolus—the germinal spot. The ovum of man and mammals differs from the eggs of birds and reptiles in that in these an ovum similar to that of the Mammalia is surrounded by a quantity of secondary yolk, as well as by additional layers acquired during its passage through the oviducts. As fluid continues to accumulate in the cavity of the ripe Graafian follicle, it approaches more and more to the surface of the ovary, until finally it ruptures and permits the ovum to escape. This is followed by hemorrhage from the vascular walls of the follicle, which is speedily filled with coagulated blood; numbers of white corpuscles soon migrate into the clot, and a retrograde metamorphosis of its constituents takes place, by which it acquires a yellow color, and is then known as the corpus luteum. Subsequently, connective tissue is developed in the substance of the corpus luteum, which becomes smaller and smaller until finally a mere cicatrix remains.

*Organs of Special Sense.*—A brief account of the special nerve-terminations in the organs of touch and taste has already been given. We recognize as the essential organs of *smell* certain nerve-terminations in the nasal mucous membrane. This mucous membrane is coated for the most part by a ciliated epithelium, closely resembling that of the respiratory organs; but in the proper olfactory region, which is limited to the uppermost part of the nasal cavities, extending downward three-quarters of an inch to an inch from the cribriform plate of the ethmoid bone, the cilia disappear, and a columnar epithelium remains, between the cells of which the proper olfactory cells appear in considerable numbers. These are oval, nucleated cells, the two extremities of which are prolonged as delicate filaments. One of these runs between the columnar cells of the epithelium to the surface, where it terminates in a free extremity, which gives off in most animals several fine, cilia-like projections; the other runs towards the connective-tissue layer of the mucous membrane, where it is believed, though not demonstrated, to be continuous with the terminal fibrils of the non-medullated fibres of the olfactory nerve. According to Max Schultze, the ciliar projections of the superficial extremities of the olfactory cells do not occur in man.

In the case of the *eye* our space permits only brief descriptions of the cornea, the crystalline lens, and the retina. The cornea substance proper is composed of connective tissue with stellate cells and a homogeneous matrix. It is coated anteriorly with a laminated pavement epithelium, which consists of a stratum of columnar cells, several layers of rounded or polygonal cells, and several layers of flattened cells; posteriorly it is coated by the membrane of Descemet, which is a single layer of flattened cells. The stellate cells of the proper substance of the cornea are designated corneal corpuscles. They are granular, flattened cells about .001" in long diameter, containing rounded, oval, or irregular nuclei .0004" to .0006" or more long. Each gives off a variable number of protoplasmic processes which anastomose with those of the adjacent cells. Besides these fixed cells, a certain number of wandering corpuscles are always present, and from the motions of these, as observed in recent cornea, the existence of a series of passages or channels in the matrix may be inferred. The corneal corpuscles are not visible in perfectly fresh cornea, but become so after the lapse of a short time. They may be displayed in an admirable manner by immersing the cornea in a solution of chloride of gold, and subsequently exposing it to light. The protoplasm of the cells and the nuclei are thus stained different shades of purple by the reduction of the gold, while the matrix remains uncolored or only slightly tinged. When the cornea is soaked in a solution of nitrate of silver and exposed to sunlight, the matrix is stained brown, and a series of light-colored, stellate, anastomosing figures make their appearance, which

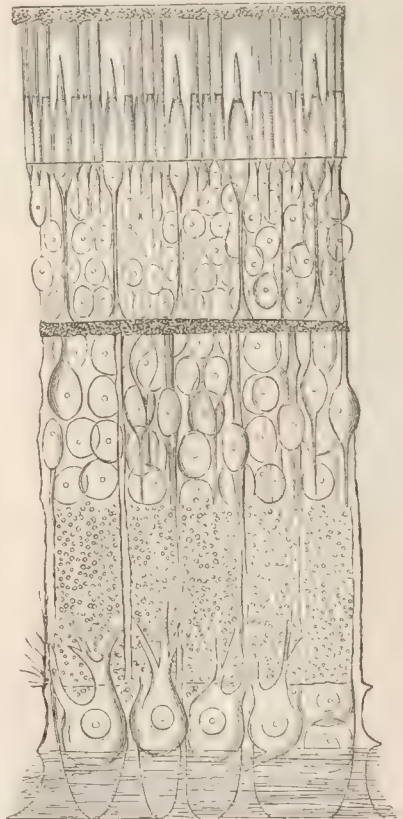
agree in distribution with the corneal corpuscles, but are rather larger, and have thicker, more varicose processes. These represent the serous canals of the matrix, in which



Nerves of cornea and corpuscles.

the corneal corpuscles lie, as may be shown by the subsequent action of chloride of gold or of carmine. The cornea is richly supplied with nerves, best demonstrated by the action of gold, which gives them a dark purple color. Twenty or thirty medullated nerve-fibres enter at its margin, and soon lose their medullary sheaths, while the axis-cylinders break up into fasciculi composed of a number of ultimate fibrils, with oval nuclei scattered along their course. These fasciculi branch and anastomose, forming a rich plexus in the corneal substance, and finally break up into ultimate nerve-fibrils, the extremities of which penetrate between the epithelial cells on the anterior face of the cornea, and terminate by giving off laterally, among the most superficial flattened cells of the epithelium, a number of fine terminal branches, which, having divided once or several times, terminate in somewhat swollen extremities. The crystalline lens consists of an extremely thin anterior and a thick posterior layer. The first is composed of a single stratum of flattened, polygonal, nucleated cells, which towards the margins of the lens become more and more elongated, and finally, at its equator, pass by gradual

Fig. 32.



Retina.

transitions into the fibres of which the thick posterior layer is composed. The fibres of the lens are flattened, six-sided elements .0002" to .0004" in breadth, and rather less than

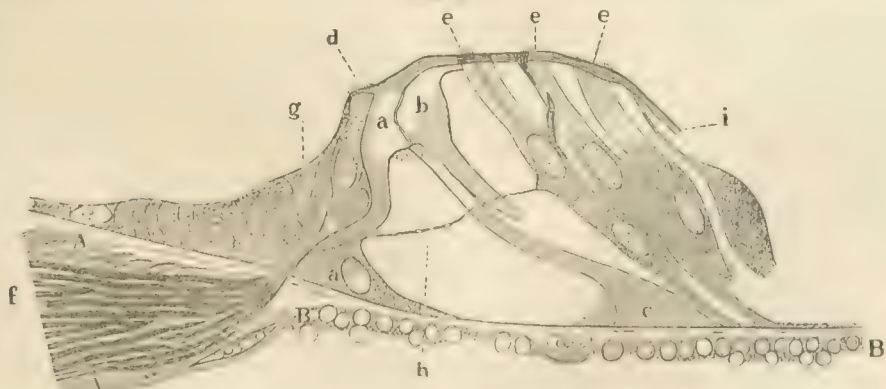


half as thick, and unite to form curved lamellae which cover each other concentrically, somewhat like the coats of an onion. In these lamellae a stellate raphe, radiating from the axis of the lens, is observed both anteriorly and posteriorly, which marks the commencement and termination of the individual fibres. In the deeper strata of the human lens this raphe presents but three rays; more superficially their number increases to as many as nine anteriorly and ten or more posteriorly. In these rays the opposite extremities of the individual fibres come into immediate juxtaposition, and are not separated by a homogeneous transparent substance, as was formerly believed. The lens is developed from an ingrowing bud of the epidermis of the embryo, and its fibres are to be regarded as greatly elongated epithelial cells. It is enclosed in a transparent, apparently structureless capsule. The retina is composed of the special terminal elements of the optic nerve, united together by delicate connective tissue, the whole forming a layer .008" thick in its posterior portion, and less than half as thick anteriorly. Its intricate structure has been the object of many investigations, of which those of Max Schultze are most noteworthy. According to this investigator, the following layers of elements may be discriminated: (1) Most internally the *membrana limitans interna*, a delicate layer of connective tissue which immediately adjoins the vitreous humor. (2) The optic fibre-layer, composed of non-medullated nerve-fibres of various sizes, continuous with the medullated fibres of the optic nerve. (3) The ganglion cell-layer, in which are imbedded numerous nucleated, for the most part multipolar, nerve-cells .0006" to .0012" in diameter. (4) The internal molecular layer, consisting of an admixture of extremely fine nerve-fibrils and delicate connective tissue. (5) The internal granular layer, composed of two kinds of elements, the first and most numerous resembling small bipolar nerve-cells with relatively large nuclei and scanty granular protoplasm; the second are oval, nuclear bodies, belonging to the supporting connective tissue. (6) The external molecular layer or intergranule layer, which is similar in its structure to the internal molecular layer, but much thinner. (7) The external granular layer, in which are numerous oval nucleated bodies, situated in the lower portion of the rod and cone fibres, and scattered oval nuclei belonging to the supporting connective tissue. (8) The *membrana limitans externa*, an extremely thin layer formed by a condensation of the supporting connective tissue. (9) The layer of rods and cones. This consists of two kinds of fibres. Each cone-fibre appears to commence on the surface of the

external molecular layer as a conical enlargement, speedily tapering to a fine smooth or varicose fibre, which runs in a radial direction through the external granular layer, and just before it reaches the *membrana limitans externa* presents a fusiform enlargement in which an oval nucleus is imbedded; it then penetrates the limiting membrane and forms the cone, a flask-like body which terminates in a conical point. The rod-fibres also can be traced only as far as the external molecular layer. In the external granular layer they each present one or several oval nucleated enlargements, after which, penetrating the limiting membrane, they form the rods, which are cylindrical bodies .002" in average length and .0001" or less in thickness, and consist of an inner and outer portion, of which the latter is more highly refractive than the former. The cones are rather more than half as long as the rods, and their bases three to four times as thick. As a rule, three or four rods intervene between each pair of cones. (10) The last layer enumerated by Max Schultze is the pigment layer. It is usually known as the pigment epithelium of the choroid, and consists of hexagonal elements containing the brownish-black pigment in the form of granules. The delicacy of the retina and the intricacy of its structure are such that the connections of the nervous elements in its several layers with each other have not fully been made out; but it is known that the non-medullated fibres of the optic fibre-layer are continuous with the cells of the ganglion cell-layer, and it may be conjectured with probability that the fine fibrils in which the processes of these terminate are continuous through the remaining layer with the bases of the rod and cone fibres.

In connection with the ear, space permits only a brief mention of the organ of Corti, which appears to be to the sense of hearing what the retina is to the sense of sight. The spiral canal of the cochlea is nearly divided in two by a thin plate of bone, the lamina spiralis. From the edge of this lamina two membranes proceed to the walls of the cochlear canal, which is thus divided into three passages—the scala vestibuli, the central canal of the cochlea, and the scala tympani. The membrane which divides the scala vestibuli from the central canal of the cochlea is extremely delicate, and is known as the membrane of Reissner. That which divides the central canal from the scala tympani is known as the *membrana lamina spiralis*, and is much thicker, consisting on the side of the scala tympani of the *membrana basilaris*, on the side of the central canal of the *membrana tectoria*, and between the two of the organ of Corti. The most remarkable elements in this complex

FIG. 33.



Vertical section through organ of Corti. A B, homogeneous layer of *membrana basilaris*; a, pedestal of inner pillar, e, pedestal of pillar, d, base of inner hair cell, c, c, c, outer hair-cells; g, bundle of nerves, g, epithelium of sulcus spiralis internus, h, nerve-fibre to hair-cell; i, lamina reticularis.

structure are the rods or pillars of Corti, which are elastic elements of a somewhat sigmoid form .002" to .003" in length, arranged in a double row in such a way that while one extremity of the rods in each row rests upon the *membrana basilaris*, the opposite extremities articulate so as to form a series of arches—the arches of Corti—enclosing a triangular space between the rods and the *membrana basilaris*, which extends the whole length of the lamina spiralis. The rods on the side of the arch next the bony lamina spiralis are spoken of as the inner rods, the opposite ones as the outer rods; they are so arranged that three inner rods correspond to every pair of outer ones. Their total number has been estimated at about 3200 inner and 3,000 outer rods. According to Pritchard, they progressively increase in length from the base of the cochlea to its apex, the differences being more marked in the outer than in the inner rods. The arches of Corti support on each side a complex arrangement of cells, of which the most conspicuous

are the hair cells. One row of these is supported by the inner rods, and three rows by the outer ones. They are elongated, somewhat conical, nucleated cells, provided at their upper extremities with a brush of stereocilia-like hairs. The cochlear nerve, as it passes up the modiolus or central pillar of the cochlea, gives off branches which run in canals in the bony lamina spiralis to the immediate vicinity of the organ of Corti, where the fibres break up into their ultimate fibrillae, and terminate in these hair cells. Besides the termination of the cochlear nerve in the organ of Corti, special terminations of the fibres of the auditory nerve in peculiar fusiform cells, with thread-like extremities, exist in the membranous labyrinth.

The foregoing outline, which is necessarily extremely meagre, will, however, it is hoped, serve to give the reader accurate elementary ideas with regard to normal human histology. It now remains to offer a few remarks on pathological histology.



**PATHOLOGICAL HISTOLOGY.**—In this domain we have to study, on the one hand, the changes which take place in the normal histological elements of the tissues; on the other hand, the development of new pathological elements which either occur diffused among the normal ones in the form of infiltrations, or are localized as morbid growths. Among the morbid changes in the normal elements we may enumerate—*cloudy swelling*, which takes place especially in the early stages of inflammation, and in which the elements increase in size and become more granular than normal; *fatty degeneration*, which may arise independently or occur as a sequel to cloudy swelling, and in which a portion of the substance of the affected elements is transformed into molecular fat or into minute fat-drops; *mucoid degeneration*, in which a portion of their substance is transformed into a material possessing the reactions of mucin; and *colloid degeneration*, in which a portion of their substance is transformed into globules of a peculiar gelatinous character. To the foregoing changes may be added those which result from the infiltration of the tissue-elements with various substances derived from the blood especially: *calcareous infiltration*, in which lime-salts are deposited in minute molecules; *pigment infiltration*, in which pigment-granules are deposited; *fatty infiltration*, which closely resembles fatty degeneration in its appearances; and the so-called *amyloid infiltration*, in which the affected elements are infiltrated with a peculiar transparent albuminoid substance, characterized by acquiring a mahogany-red color on treatment with iodine. This latter change has also been designated as lardaceous or waxy degeneration. Any of these degenerations and infiltrations may occur also in pathological new formations, as well as in the normal tissues.

The production of the pathological new formations is frequently initiated by those nutritive and circulatory disturbances which are embraced under the designation *inflammation*. When this process takes place in a vascular tissue a notable dilatation of the small arteries and veins occurs, which is usually preceded by their temporary contraction, and is followed by a diminution in the speed of the blood-stream, and an accumulation of white blood-corpuscles in the peripheral portion of the stream in the small veins. Soon after, as demonstrated by Cohnheim, the white corpuscles begin to migrate in considerable numbers, escaping not only from the small veins, but also from the true capillaries. In the inflammation of non-vascular parts a similar migration takes place from the nearest blood-vessels—in the case of the inflamed cornea, for example, from the blood-vessels of the sclerotic and conjunctiva. A portion, at least, of the cellular elements of the characteristic products of inflammation, pus and lymph, are simply these migrated corpuscles. Whether all of them have the same origin is still a matter of discussion. It was formerly believed that in inflammation the elements of the tissues, especially as indicated by Virchow, the connective-tissue corpuscles, multiplied by division, and thus gave rise to the pus and lymph cells as their progeny. The analogies of vegetable growth, and much that had been observed of the growth of animal tissue, favored this view. Unfortunately, however, the swarm of white corpuscles migrate so early in inflammation that the proper tissue-elements are speedily concealed by them, and it is difficult to trace with precision the changes they undergo. Stricker and Norris, however, have described appearances in the inflamed cornea which would seem to indicate that the wandering corpuscles may originate by the division of the fixed cells, as well as by migration from the blood-vessels. Whether by thus dividing and producing new elements, or by falling into a condition of fatty degeneration and perishing, the proper tissue-elements of the inflamed part may disappear, and be replaced by an accumulation of pus, forming an *abscess*; or when the affected tissue is superficially situated, the loss of substance may manifest itself as an *ulcer*. In other cases the inflammation terminates in *resolution*, the migrated corpuscles finding their way back into the torrent of the circulation through the lymphatics; or the inflammatory products may *organize* into new tissue. This at first resembles embryonic connective tissue, and is subsequently transformed into fully-developed connective tissue by a process in all respects similar to that which occurs in normal development, and which is accompanied by an outgrowth of blood-vessels, lymphatics, and sometimes of nerves, from the adjacent parts into the new tissue. Other new formations may occur under favorable circumstances; as, for example, epithelium may be developed out of the lymph-cells on the surface of healing wounds and ulcers; bone may be produced, as in the repair of fractures; in inflammatory processes involving the periosteum, etc. etc. By these various transformations of the inflammatory products, on the one hand, the repair of wounds and other losses of substance is effected, and on the other hand, the

adhesions, indurations, and thickenings which result from inflammation are produced. Moreover, degenerative changes may involve the new-formed tissue at any stage of its development. Fatty degeneration is especially frequent. It is prone to set in before the new elements have lost their original lymphoid character, and often goes so far as to convert the new formation into a cheesy mass of granular detritus, in which shrunken and deformed nuclei are all that remain of the original cell-forms.

Besides the pathological new formations which result from the inflammatory process, manifold new formations occur without previous inflammation, appearing sometimes as more or less extensive infiltrations, at other times as isolated masses or tumors. With regard to these also it is undecided how far the new elements originate by the transformation of migrated white corpuscles, or how far they may arise by the multiplication by division of the normal elements of the affected parts. The more important of these new formations are the following.

*New Formations resembling Connective Tissue in some Stages of its Development.*—These may occur as a more or less widely disseminated increase or hyperplasia of the connective tissue of the part affected—as, for example, in certain chronic diseases of the liver and kidneys, in the peculiar thickening of the skin and subcutaneous tissue known as elephantiasis, etc.—or they may manifest themselves as tumors. The group of tumors which resemble in their structure the embryonic stages of connective tissue is designated *sarcoma*, and several varieties are discriminated, according to the stage of development the cells have attained, their arrangement, and the characteristics of the matrix in which they are imbedded. According as the cells are round or elongated, a *round-celled sarcoma* and a *spindle-celled sarcoma* may be discriminated, and each of these again may be divided into a small-celled and a large-celled variety. The matrix may be homogeneous or more or less distinctly fibrillated, giving rise to considerable variations in the consistency and appearances of the growth. When the matrix consists of a mucin-yielding material, the tumor is discriminated from sarcoma under the designation *myxoma*. Certain tumors of the brain and nervous system, which resemble in their structure the neuroglia or connective tissue of the nerve-centres, are also separated from sarcoma under the designation *glioma*. Sometimes spindle-cells, like those of spindle-celled sarcoma, are so arranged as to form an areolar structure, the meshes or alveoli of which are filled with cells resembling those of round-celled sarcoma. The structure thus produced is so analogous to certain forms of cancer that it has been called *carcinomatous sarcoma*. The cells of such growths are sometimes the seat of an abundant deposit of black pigment, constituting one of the varieties of melanotic cancer. A similar pigment deposit also takes place sometimes in spindle-celled sarcoma. Tumors which resemble fully-developed connective tissue are known as *fibroid tumors* or *fibroma*. They are characterized by the abundant and distinctly fibrillated matrix in which their oval or spindle-formed cells are imbedded. All the tumors of the connective-tissue group are more or less abundantly supplied with blood-vessels. In certain cases these are so numerous and so large as to constitute the most prominent feature of the new formation. Such growths are embraced under the term *angioma*.

*New formations of adipose tissue* may occur either as a general hyperplasia of the fat of certain organs or of the whole body, as in obesity, or as the form of tumor known as *lipoma*, which is quite similar in its structure to normal adipose tissue. Sometimes a development of groups of fat-cells takes place in the substance of a sarcoma, constituting the variety known as *lipomatous sarcoma*.

*New formations of cartilage*, occurring in the form of tumors, are designated *enchondroma*. They most generally resemble hyaline cartilage in their minute structure, but present considerable diversities in the size and form of the cells and in the characters of the matrix. Portions of the matrix are frequently calcified; other portions are often found to have undergone mucoid softening. Combinations in the same tumor of enchondroma with sarcoma or with new-formed bone as osteoid-enchondroma also occur.

*New formations of bone* are observed in the formation of outgrowths from existing bones, as *osteophytes* or *exostoses*, which, when they acquire considerable size, are spoken of as bony tumors—*osteoma*; besides which, a partial ossification of sarcomatous and enchondromatous tumors, or even of cancerous growths, may take place, and must be distinguished from calcification due to a mere deposit of lime-salts.

*New formations of muscular fibres* sometimes occur, constituting the form of tumor known as *myoma*. Tumors composed chiefly of striated muscular fibres are rare, but have been observed in the walls of the ventricles of the



heart. Those composed of muscular fibre-cells are more common; they are sometimes found in connection with the muscular coat of the alimentary canal, and still more frequently in the uterus.

New formations of *nerv. fibres and nerv. cells* also occur in a rare form of tumor situated in the course of the nerves, and designated *neuroma*. The same term has been applied to sarcomatous tumors and various other growths situated on the nerves, but should be reserved for the group just indicated.

New formations of gland-tissue have been presumed to exist, constituting a variety of tumor known as *adenoma*, which is observed in the female breast, the salivary glands, etc. These tumors consist of gland-ducts and lobules, resembling those of the gland affected, but pushed apart by an intervening tissue which presents the characters of sarcoma. It has not been demonstrated, however, that the glandular tissue in these growths is actually of new formation, and it appears on the whole more probable that these growths are simply sarcomata entangling a portion of the structure of the gland in which they are seated.

Besides the foregoing new formations, the histological elements of which closely resemble those of the normal tissue, there are certain growths in which the resemblance is much less striking. These are *carcinoma* or cancer and *tubercle*. In fully-developed cancers the older portions of the growth consist of a stroma or framework which resembles more or less developed connective tissue in its structure, and which, being arranged in an areolar manner, has its interspaces or alveoli filled with cells of a more or less decidedly epithelial character. In the marginal or more recently formed portions of the growth a network of elongated cylindrical cell-masses are observed, which are continuous with the cell-masses of the older portions of the growth, and which evidently lie in the lymphatic passages of the part. The connective tissue between the terminal extremities of the cancer cylinders is infiltrated with a swarm of small elements resembling migrated white corpuscles, and a similar swarm infiltrates the connective-tissue stroma of all parts of the growth. In cancers of the skin, and those mucous membranes which are clad with a pavement epithelium, the elements of the cell-masses and cancer cylinders present a striking likeness to the cells of the deeper layers of the normal epithelium, a row of columnar cells being situated next to the connective-tissue stroma, and the remaining cells, which are oval or polygonal in outline, becoming more and more flattened in proportion as they are more removed from the columnar layer. The most distant cells even undergo a horny transformation, like that which occurs in the superficial layers of the epidermis, and accumulate in the midst of the older cell-masses as peculiar concentric bodies, the so-called pearly globules, or *globuli epitheliales*. Growths presenting these characters are designated *epithelioma* or epithelial cancer. In certain cancers commencing in the mucous membrane of the stomach and other situations, in which the surface is clad with a columnar or cylindrical epithelium, the cells of the alveoli and of the cancer cylinders present similar characters, constituting a variety of epithelial cancer known as *cylindroma*, or cylindrical epithelial cancer. In most other cancers—as, for example, in those commencing in the mammary gland—the resemblance of the cells of the cancer cylinders to epithelium is not so striking. They have comparatively small oval nuclei, and are surrounded by a scanty protoplasm without any distinguishable cell wall. In the older portions of the growth, however, the cells are larger, with larger nuclei and irregular polygonal outlines, so that they approximate to the epithelial type. Such cells were formerly called *cancer cells*, and supposed to be specific. When in cancers of this character the connective-tissue stroma is firm and abundant, making the tumors dense and hard, they are designated *scirrhus*; when the cell-masses of the alveoli are relatively the most abundant, the connective-tissue stroma being scanty and often imperfectly developed, they are known as *mollities canceris*. All the forms of cancer are characterized by the tendency of the primary growth to be succeeded by multiple growths of the neighboring lymphatic glands and in the internal organs, and by their proneness to undergo various degenerative changes. Fatty degeneration, which is one of the most frequent of these latter, speedily goes on to complete cheesy metamorphosis and destruction of tissue, resulting in the cancerous ulcer. Colloid degeneration also occurs, though less frequently, sometimes filling the alveoli with glue-like masses, and constituting what is known as *colloid cancer*.

*Tubercle* occurs primarily as minute nodules, the so-called gray granulations, situated most frequently in the adventitia of the minute arteries. They consist of lymphoid elements, smaller or larger cells, with strongly refractive nuclei, and sometimes still larger cell-like plates

with several nuclei, all united together by a finely fibrillated matrix. These growths are especially prone to undergo the cheesy metamorphosis, and are also prone to be associated with inflammatory processes in which the products of the inflammation also undergo the same change. This cheesy metamorphosis was formerly regarded as so characteristic of tubercle that inflammatory products which had undergone it were generally spoken of as tubercular, without reference to their association with the gray granulations. Especially was this the case in the chronic inflammations of the lymphatic glands and of the smaller bronchial tubes and lung alveoli. In the latter instance, when the cheesy metamorphosis of the inflammatory product involves also the entangled lung-tissue, giving rise to the production of cavities, the disease has been very generally confounded with tubercular phthisis; from which, however, most modern histologists would separate it. (The reader, desirous of further information, must be referred to the special treatises.)

*Bibliography.*—S. Stricker, *Handbuch der Lehre von den Geweben des Menschen und der Thiere* (Leipzig, 1870-72, translated (London, 1870-73), New York, 1872, is especially commendable for the thorough study of histology. The following works may be used in connection with it: H. Frey, *Handbuch der Histologie und Histochemie des Menschen* (2te Aufl., Leipzig, 1867; J. Hentle, *Handbuch der systematischen Anatomie des Menschen* (Braunschweig, 1856-71); A. Kolliker, *Handbuch der Gewebelehre* (Leipzig, 1867; also, by the same, *Manual of Human Microscopic Anatomy* (London, 1860). The following works are especially devoted to the methods of research: E. Klein, section on histology in *Handbook for the Physiological Laboratory*, edited by J. Burdon-Sanderson (London, 1873); H. Frey, *Das Mikroskop und die Mikroskopische Technik* (4te Aufl., Leipzig, 1871); also the same, translated by George R. Cutter (New York, 1872); Lionel S. Beale, *How to Work with the Microscope* (11th ed., London, 1868; also American ed., Philadelphia, 1870); William B. Carpenter, *The Microscope and its Revelations* (4th ed., London, 1868); Charles Robin, *Traité du Microscope* (Paris, 1871). Those who desire to trace the progress of histology from the commencement of the century may consult with advantage the following works: X. Bichat, *Anatomie Générale* (Paris, 1801); F. Hildebrandt, *Handbuch der Anatomie des Menschen* (4te Aufl., besetzt von E. H. Weber, Braunschweig, 1830-32); Th. Schwann, *Microscopical Researches into the Accordance in the Structure and Growth of Animals and Plants*, and M. J. Schleiden, *Contributions to Phyto-genesis* (printed for the Sydenham Society, London, 1847); J. Berres, *Anatomie der Mikroskopischen Gebilde des menschlichen Körpers* (Vienna, 1850-42); A. Donne, *Comes du Microscope*, with atlas (Paris, 1844); C. J. M. Langenbeck, *Mikroskopisch-anatomische Abbildungen* (Göttingen, 1846-50); L. Mandl, *Anatomie Microscopique* (Paris, 1858-57); F. Leydig, *Lehrbuch der Histologie des Menschen und der Thiere* (Frankfurt am Main, 1857); J. Gerlach, *Handbuch der allgemeinen und speziellen Gewebelehre des menschlichen Körpers* (2te Aufl., Vienna, 1860); J. Quain and William Sharpey, *Human Anatomy* (London, 1846-47; 6th ed., London, 1856); A. H. Hassall, *Microscopic Anatomy of the Human Body* (London, 1846-49); J. Quekett, *Lectures on Histology* (London, 1852); also by the same, *Catalogue of the Histological Series in the Royal College of Surgeons of England* (London, 1850); R. E. Todd and W. Bowman, *The Physiological Anatomy and Physiology of Man* (2d ed., London, 1850; also new edition of the same by L. S. Beale (London, 1866). Among the works on pathological histology the following may be mentioned: J. Müller, *Über den Feinbau und die Formen der Krankhaften Geschwülste* (Berlin, 1828); I. Guersburg, *Die pathologische Gewebelehre* (Leipzig, 1845-48); J. Vogel, *Lehrbuch Histologie Pathologica* (Leipzig, 1845-48); Carl Wedl, *Elementary of Pathological Histology*, translated for the Sydenham Society (London, 1850); H. Lebert, *Traité d'anatomie pathologique, générale et spéciale* (Paris, 1857-61); R. Virchow, *Die Cellular-Pathologie* (Berlin, 1858), translated by Frank Clarke (Philadelphia, 1867; also by the same, *Die Cellular-Pathologie* (Berlin, 1867-67) a work which still retains its authority, but which is especially rich in the nomenclature of the subject; Lionel S. Beale, *The Microscope and its Application to Practical Medicine* (1st ed., London, 1867; also Amer. reprint (Philadelphia, 1867); T. Billroth, *Die allgemeine chirurgische Pathologie und Therapie* (2te Aufl., Berlin, 1866); also translation of the 10th ed. by C. E. Hackley (New York, 1871); F. R. Thiersch, *Lehrbuch der pathologischen Gewebelehre* (1te Aufl., Leipzig, 1873; also translation of the 2d ed. for the New Sydenham Society (London, 1872-73; also American translation, Philadelphia, 1872); A. Thierfelder, *Über die Pathologische Histologie* (Leipzig, 1872-73; unfinished. J. J. Woodward.



**History** [Gr. *ιστορια*, from *ιστορειν*, to "learn by inquiry," to "examine,"], etymologically, denotes *ascertainment by inquiry*; hence the process of investigation; hence, further, an account of the circumstances thus ascertained. In its most ordinary sense it is restricted to a narrative of transactions in the order of time, with or without critical and philosophical commentary. As such alone we propose to consider it. We shall commence with a brief account of the progress of historical narrative from its primitive origin to our own times; we shall next enumerate the recent modifications which are more and more transforming it from a simple record to a complex department of study; and shall conclude with a few words of advice on the method of obtaining a competent acquaintance with it.

In its origin, history, considered as a method of recording events, is indistinguishable from oral tradition, which seldom preserves the memory of any but the most remarkable occurrences beyond three or four generations. A considerable advance was made when traditions assumed the form of ballads, easily remembered and repeated, but no really authentic record could exist previous to the invention of writing. The first application of this art was to monumental purposes, and along with the invocation of deities, chronicles of the actions of kings began to figure upon Egyptian temples. The invention of papyrus as a writing-material was a further step in advance, and from this period (possibly about 3000 B. C.) the Egyptians may be said to have possessed an historical literature. The practice of recording events in writing spread in due time to the Hebrews, the Phœnicians, the Chaldeans, and the Assyrians, but the pursuit of history as a branch of literary art, and the study of it as a department of intellectual culture, were reserved for the Greeks. About the middle of the fifth century B. C., Herodotus of Halicarnassus composed the first work fully answering to our present idea of history, presenting the results of his own inquiries into a series of previous transactions in a thoroughly artistic form. As more narrative the work of Herodotus has never been surpassed to this day, and, notwithstanding his occasional credulity, he is fully impressed with the principle that the historian's first duty is to ascertain and record the truth. A considerable step in advance was taken by the next great historian, Thucydides, who, not content with relating the actions of men, endeavors to penetrate into their motives, and to investigate not merely the accompanying incidents, but the determining causes of changes in human affairs. As Herodotus is the first great narrator, so is Thucydides the first great philosophical historian; and almost all good history since their time has been written on the model afforded by one or the other. Some new elements were added to the conception of Thucydides by the next distinguished philosophical historian, Polybius, who, living in the age when all other states were succumbing to the power of Rome, was enabled to investigate the causes of national greatness and decay on a much larger scale than his predecessor. Xenophon's *Anabasis* and Cæsar's *Commentaries* are perfect examples of pure narrative unaccompanied by reflection. Of the two great Roman historians, Livy, like Herodotus, aims principally at narrative, but aims at another purpose alien to the simplicity of his model—the glorification of his own people, whose prose epic, in fact, he has written. He also follows the example of Thucydides in interspersing his own reflections, frequently in the form of speeches placed in the mouths of historical personages; his work may be considered as the finest ancient example of the eclectic or composite style. Tacitus imitates Thucydides, but with the addition of an element distinctively his own—an intense moral purpose. Escaped from an era of tyranny, the subject of his history, he aims at painting it in the blackest colors to prevent any subsequent relapse into it. He has thus become the typical representative of an important department of history. Many valuable historians flourished during the decline of the Roman empire, but we meet with none of special mark before Eusebius (A. D. 330), the first great ecclesiastical historian, and Procopius (A. D. 550), neither philosophical nor eloquent, but the model of the dry, impartial, business-like historian.

During the Middle Ages history was entirely eclipsed, except among the Saracens. Ignorance, superstition, the slow circulation of intelligence, the barbarism of language, and the total loss of the critical spirit conspired to reduce historians for several centuries to mere annalists. The intellectual revival of the twelfth century produced a marked improvement, but History was not replaced upon her old footing until the resurrection of classical literature had brought good models to light, and the invention of printing rendered them generally accessible. Two great Italian historians, Macchiavelli and Guicciardini, kindred spirits to Thucydides and Tacitus, traced, the former the mediæval, the latter the contemporary history of his coun-

try, with a mastery that fixed the standard of historical composition for the language. Their example, though not their style, was emulated by De Thou, the French, and Davila, the Italian, historian of the wars of religion in France; by Mariana, the historian of Spain, and Strada, the elegant but inaccurate narrator of the revolt of the Low Countries; Raleigh, the first Englishman to attempt a history of the world, and Clarendon, whose account of the Rebellion is perhaps the best example of a partisan history. These remain the only eminent English historians until Hume, the magic of whose style and the symmetry of whose narrative atones in some degree for his negligence and prejudice. Robertson gave the first example of a high-class English historian devoting himself to the transactions of foreign nations. His knowledge of the world ensured him a full measure of success as a political historian, though his *History of America* has been superseded by Prescott, and his *History of Charles V.* is marred by his ignorance of German. A far greater name is that of his contemporary, Gibbon, whose *Decline and Fall of the Roman Empire* is perhaps the greatest historical work ever produced—the most signal example of diligence in the accumulation and of mastery in the control of enormous materials. Gibbon's judgment is almost infallible, and his historical portraits are as accurate as they are brilliant. His principal defect is his insensibility to the spiritual side of man's nature.

Since the eighteenth century history has claimed more and more the attention of superior minds, and we must be content with a bare enumeration of some of the principal works. Early English history has been treated by Freeman, that of the Tudor dynasty by Froude, the Commonwealth by Guizot, the Revolution by the dazzling but too rhetorical Macaulay, Scottish history by Tytler and Burton. France boasts a constellation of the brightest historical names, including Michelet, her general historian; Thierry, the investigator of her early history; Thiers, the least scrupulous, but the most genuinely national of all her writers; Guizot, Barante, Lamartine, Louis Blanc, Henri Martin, etc. The subordinate historical branch of memoir-writing has also flourished more among the French than among any other nation. In virtue of its subject, Mr. Carlyle's *French Revolution* may be included among French histories. This extraordinary work, a poem rather than a narrative, is the only modern book that has added an entirely new type to history.

Some of the most valuable contributions to Italian history have been made by foreigners, Sismondi, Roscoe, Gregorovius, but Italy also boasts her Botta, Cantù, and Colletta. Germany has produced a national historian in Johannes Müller, and the greatest of merely political historians in Ranke; her mediæval history is recounted by Von Raumer. Schlosser's general history of the eighteenth century, Schiller's *Thirty Years' War*, and Heeren's *History of Commerce* are additional instances of first-class German histories; the number of the simply meritorious is legion. The American Motley has immortalized himself as the historian of the revolt of the Netherlands. The history of Bohemia has been classically written by Palacky, of Russia by Karamsin, of Sweden by Geijer, and of Portugal by Herculano. The story of the Greek war of independence has been told by Tricoupi. Bancroft is as yet the standard historian of the U. S., though it is unlikely that he will remain so. The best histories of the Spanish conquest of South America are by Prescott and Arthur Helps. Very great ability has been displayed in technical military histories, of which we can only mention that of the Peninsular war by Gen. W. F. P. Napier.

The reconstruction of philology and archæology has directed attention to classical history, which, with the exception of the era comprehended in Gibbon's work, may be said to have been completely rewritten during the present century. Niebuhr, though sometimes unduly skeptical, effectually disentangled the legendary from the authentic portions of early Roman history. The history of the Republic has been written on a grand scale by Mommsen, and the interval between him and Gibbon has been ably bridged by Dean Merivale. Grote has produced what will long remain the standard history of the Greek republics, although its animation is by no means equal to its erudition and sagacity. The history of the Christian Church has been admirably told by Milman. Duncker's *History of the Aryan Race* gives a brilliant and comprehensive view of the early historical period of this section of mankind. The history (as yet so obscure) of Egypt is told by Brugsch, and that of Assyria by Rawlinson. India has found eminent historians in Mill and Orme, and its ancient annals have been critically investigated by Lassen and his coadjutors. The rise of Mohammedanism has employed the pens of Muir, Sprenger, and others. Nor ought we to omit the native Oriental historians, among whom may particularly be named Mirkhond, the historian of Persia.



Finally, an important class of history, much cultivated in modern times, may be described as collateral or auxiliary to history proper. Its office is to treat of the origin and progress of human pursuits or institutions, such as commerce or law, which involves a chronological arrangement, though the mention of persons or events is only subsidiary to the main design. Hallam's *Constitutional History* is an example.

The spirit of modern times has modified the study of history in four principal ways: (1) By the resort, as a main source of information, to archives, including statutes, charters, public documents of all kinds, diplomatic and even private correspondence. (2) By the endeavor to reconstruct the private as well as the public life of nations, involving an intimate knowledge of the minutiae of their daily existence. (3) By the application of the mythical theory to fabulous, sometimes even to extraordinary, narratives. (4) By the attempt to frame a philosophy of history—i. e. to discover the general laws on which particular events depend.

*Archives, Statutes, etc.*—It was long before it was recognized that the history of every civilized people was in some sort written in its public institutions, and that the essential principles underlying great struggles were displayed in such manifestoes as the Solemn League and Covenant or the Declaration of Independence. Such were comparatively rare in antiquity, during which period the value of documentary evidence as an aid to history was very imperfectly recognized. Nor was it sufficiently attended to among the moderns until the obscurity and imperfection of the annals of the Middle Ages led historians to resort to the contemporary archives as a supplementary source of information. It was soon discovered that laws and charters not only filled up the outlines of historians, but corrected their errors; and it is now universally admitted that an authentic history of any period must be based upon documentary testimony where such is procurable. The principle is of course liable to exceptions from the occasional deliberate falsification of such testimony, the preambles of laws frequently stating considerations notoriously at variance with truth, and letters expressing the wishes and designs, rather than the convictions, of the writer. It is nevertheless certain that this self-delineation presents, on the whole, both a truer and livelier picture of an age than any formal narrative; and no history would now be considered adequate where every possible use had not been made of documentary materials. The researches of palaeographical scholars, and the disclosure of state archives long jealously secluded, have immensely increased the resources of this nature at the disposal of historical scholars. The valuable histories of Ranke are based almost entirely upon the examination of confidential state papers. Much has been done and is doing in England by the official publication of abstracts of the correspondence preserved in the Record Office.

*History in its Relation to Private Life.*—It was natural that in its infancy the attention of history should be principally fixed upon great public events and picturesque occurrences. "To rescue from oblivion the memory of former incidents, and to render a just tribute of renown to the many great and wonderful actions both of Greeks and barbarians," Herodotus of Halicarnassus produces this historical essay." The same principle actuated all ancient historians, and their references to the state of manners or the social condition of the people are in general merely incidental. The conviction that the intrigues of cabinets and the shocks of armies are only important in so far as they affect the general well-being originated with the humane philosophy of the eighteenth century. It has now thoroughly leavened every branch of historical research, and has powerfully contributed to give birth to a philosophy of history. External incidents, so far from being considered as the sole objects of historical inquiry, are now chiefly valued for the light they afford to the primal causes on which the march of history depends, and, unless in the case of professedly military or political histories, no historian is satisfied unless he can exhibit the moral and social condition of a nation at a given period with the same vividness as that with which he would detail a public occurrence or depict a political character. Macaulay's view of the social state of England at the Revolution, and Mill's picture of the condition of India at the British conquest, are famous examples. This expansion of the scope of history has necessarily introduced the most important modifications into historical composition, and greatly extended the range of accomplishments requisite for the historian.

*The Mythical Theory.*—In the earliest ages of historical authorship stories of the supernatural, even if referring to contemporaries, were accepted as intrinsically credible, and all the early history of nations was enveloped in a cloud of legend. The existence of a critical spirit, however, soon

makes itself manifest, but the legendary element was scrutinized on no satisfactory principle. According to the theory of Euhemerus, improbable stories were regarded as distortions of actual prosaic occurrences; thus, when Hercules is said to have slain the Lernean hydra, it is to be understood that he drained the Lernean marsh. Another theory, prevalent in the Middle Ages, and of which Bryant is the most characteristic modern representative, regards all legendary fables as perversions of a really veracious archetype; thus, Hercules is to be identified with Samson. Both these views are now exploded, and legends regarded either as "the natural effusions of the unlettered, imaginative, and believing man" (*Grotte*), or as anthropomorphic representations of natural phenomena, whose original signification had been forgotten. (*Ueber die Mythen*, etc.) Whether their origin be referred to nature or imagination, they are equally regarded as poetry, only available in small measure and with the utmost caution for the ascertainment of authentic history. The first application of this principle on a large scale was made by Niebuhr in his Roman history, and the result has been to clear our histories of innumerable popular legends, and to free ancient history in particular from formidable chronological difficulties, besides destroying one great source of error in the construction of theories to account for what never took place. The study of folk-lore has also discredited many occurrences not intrinsically incredible; the story of Tell and the apple, for instance, loses its claims to credence as soon as it is shown to be an ordinary incident in popular mythology. It can scarcely be disputed, on the other hand, that the interpretation of tradition has frequently afforded pretexts for the most extravagant theories, such as the resolution of the heroes of the *Iliad*, *Ramayana*, and other epics into mere celestial and atmospheric phenomena. It might be safe to admit, as a general principle, that where gods alone are introduced in a legend the deification of Nature may be suspected, but that there is room for the supposition of actual event where mortals are also concerned.

*Philosophy of History.*—The idea of a philosophy of history could not arise until after the conception of a universal history had been formed; and this was scarcely possible until after the realization of a universal empire. The Roman empire, however, was hardly established ere it began to decline, and the accompanying decadence of intellectual power prevented any attempt at a general philosophy of history until the days of St. Augustine, who was led to undertake it by the necessity of exonerating his religion, to whose prevalence the downfall of the empire was naturally attributed by its adversaries, from responsibility for the political disasters of the time. From this point of view his *De Civitate Dei* is a masterly performance, but its inadequacy to afford a theory of the course of historical development may be inferred from its regarding the whole course of occurrences merely in their relation to the Christian Church, and its consequent restriction to the records of the Old and New Testaments, and of the heathen nations affected by the promulgation of Christianity. Its limitations, however, were unnoticed by the incurious spirit of the Middle Ages; and no progress towards historical philosophy was discernible until (in 1567) Jean Bodin enunciated the proposition that the course of events is controlled by definite laws admitting of investigation by the human intellect. The next great writer who took up the subject was Bossuet, but his *Discourse on Universal History*, often cited as the foundation of the science, is little more than an improved republication of Augustine. The true founder of historical philosophy was the Italian Vico, whose *New Science* (1725) first attempted that scientific explanation of the course of events whose possibility had been asserted by Bodin. The author, who had reflected profoundly on the phenomena attending revolutions in human history, deduces from them the principles which regulate the origin and development of society. The germ of his political speculations exists in a memorable passage in Plato's *Republic*, but what with Plato is mere assertion is with Vico corroborated by a command over the vast mass of experience which had accumulated since Plato's age. His great problem is to reconcile the existence of a divine plan of history with the freedom of human agency, in which he has perhaps been as successful as any of his successors. The idea of a deduction of all human events from first principles being once admitted, various attempts to ascertain these principles began to be made, leading to the establishment of rival historical schools. The great maxim, that the grand determining causes of history are general laws which even the most distinguished individuals obey while they seem to control, was placed in the clearest light by Montesquieu (1734). The chief merit of his contemporary, Voltaire, is not the application of any principle, but the fearless and independent spirit which cleared history of everything intrinsically insignificant or dependent



upon mere traditional sanction. With all his brilliancy of detail, his general view of history is discouraging and ignoble. Condorcet (1793) arrived at the opposite conclusion, and first laid it down distinctly that the operation of the laws recognized by Vico leads definitely and inevitably to the elevation of humanity as a whole. This generalization would now hardly be disputed by any philosophical writer, but great differences still exist as to what tendencies should be allowed to rank as laws, and as to the best method of expressing and classifying them. The grandest attempt ever made to sum up all historical principles under a single formula is, so far, that of Hegel (1837). Hegel conceives the development of history to represent the progress of the principle of the universe itself from a condition of chaos to one of self-consciousness. Every important stage in history is identified with some ruling idea which it has been its mission to express and exhaust, that humanity may proceed to develop the next. Friedrich von Schlegel, on the contrary, explains history as the striving back of mankind to a lost condition of original blessedness. It is the great merit of Herder (1791) to have pointed out the vast influence of external nature on mankind, and of St. Simon (1813) to have shown the connection of history with the physical sciences. St. Simon, borrowing perhaps a hint from Turgot, also enunciated the principle of two necessary stages of human thought—the theological and the physical—subsequently expanded by Comte into his famous doctrine of the three stages—the theological, the metaphysical, and the positive. The significance of this pregnant suggestion is evinced by the debate which it has excited; but it certainly cannot be allowed to rank as a demonstrated law so long as all three of these hypothetically successive stages continue to coexist in all civilized nations. Michelet and Pierre Leroux have contributed valuable principles to historical science by insisting on the fundamental unity of all peoples in spite of national distinctions, and De Tocqueville by his recognition of the fact that real progress inevitably tends to democracy. Bonald, on the contrary, has revived the theocratic conception of Augustine. To Buksen we are indebted for the proof of the degree to which history has inscribed itself upon language; to Buckle, for a demonstration of the paramount importance of intellectual progress as an instrument of national development. Mr. Lecky has exhibited in a most striking manner the sudden and, as it almost appears, spontaneous disappearance of accredited beliefs, whose hold upon men's minds has long been imperceptibly loosening. The principal danger of such speculations is their tendency to subordinate individual action altogether to general laws, and to overlook the diversities of human character as agencies in shaping the destinies of nations. The American and French Revolutions were no doubt equally inevitable, but in the present state of our knowledge no satisfactory reason can be given why one might not as well as the other have brought forth a Washington. Russia owes her present position to Peter, Prussia to Frederick, but no rule can be deduced from historical science to show that either of these sovereigns must necessarily have been a man of genius. Mr. Carlyle, on the other hand, greatly exaggerates the hero's independence of circumstances. An excellent account of the chief writers on the philosophy of history, by Prof. Flint of St. Andrew's, is now in course of publication.

*The Study of History.*—As there is no study more delightful than that of history, so is there none more vitally necessary to the citizen of a free state. The constitution of a democratic republic especially, assuming as an indispensable condition of its working that every citizen shall take an intelligent interest in public affairs, imposes the study of history as a duty incumbent upon all. It is impossible to form a correct judgment of present circumstances without the means of comparison with the past supplied by a knowledge of history. The student must bear in mind, however, that all such knowledge is not equally useful. The annals of great military monarchies supply comparatively little that the citizen of a free state can turn to account, and some of the most attractive chapters of human history—that of Egypt, for instance—are chiefly important to the cultivators of special studies. The American citizen should especially familiarize himself with the history of free states, his own country before all others; then the great and free country from which it sprang, and from whose institutions its own are derived; then the prototypes of freedom in ancient Greece and Rome. If possible, he should also familiarize himself with the slow development of Roman institutions into the feudalism of the Middle Ages, and the continuous transformation undergone by the latter. To state the conclusions which he might probably deduce from such an inquiry would involve trespass on the ground of contemporary politics; nor need we do more than allude to the splendid examples of excellence

with which history abounds, and their obvious tendency to encourage a high standard of public and private virtue. The best method of study is that which commences with an outline or skeleton of the subject, serviceable even if the student proceeds no further, but capable of being filled up indefinitely. Commencing with simple and condensed narratives, such as the excellent series now appearing under the editorship of Mr. Freeman, let the student proceed to comprehensive histories like Grote's or Gibbon's, filling up, as it were, the interstices of his knowledge by a resort to memoirs and detached narratives of particular transactions, and crowning his labors by the endeavor to comprehend and apply some system of the philosophy of history. Such general conspectuses of a subject as Voltaire's *Essai sur les Mœurs* will save him much toilsome research; but with these, even more than with regular historical narratives, he will need to be on his guard against the idiosyncrasies of his author, no matter of what school. In conclusion, we may confidently affirm that the more progress he is able to make towards recognizing all history as one great whole pervaded by an absolute unity of plan, the more reason will he have to congratulate himself on genuine progress in his historical studies.

R. GARNETT.

**Hit** [anc. *Is*], town of Asiatic Turkey, on the W. bank of the Euphrates, about 90 miles W. N. W. of Bagdad, still noted for the fountains of naphtha and bitumen existing in its neighborhood. This bitumen was used in the building of Babylon, and was carried to Egypt by Thothmes III. of the eighteenth dynasty, some 1500 or 1600 B. C. The modern town is mean and dirty, and has a population of about 2000.

**Hitch'cock**, county in the S. W. of Nebraska, bounded S. by Kansas. It is traversed by the Republican River, and affords good pasturage. Area, 720 square miles. Cap. Culbertson.

**Hitchcock** (CHARLES HENRY), A. M., Ph. D., b. at Amherst, Mass., Aug. 23, 1836; graduated at Amherst College, Mass.; has been instructor in geology in that institution and at Lafayette College, as also professor of geology at Dartmouth College, N. H., 1869; assistant geologist of Vermont 1857-61; State geologist of Maine 1861-62, and of New Hampshire 1868. He has written largely upon geology, and in 1870-71 established the meteorological observatory upon Mount Washington, N. H., which has since been adopted by the signal service of the U. S. army.

**Hitchcock** (EDWARD), D. D., LL.D., b. in Deerfield, Franklin co., Mass., May 24, 1793. His father, Deacon Justin Hitchcock, was a hatter in moderate circumstances. His mother, Mrs. Mercy (Hoyt) Hitchcock, was a woman of active mind and marked character. Interrupted in his preparation for Harvard College by sickness and weakness of the eyes, he educated himself while following the plough. From 1815 to 1818 he was principal of Deerfield Academy, assisted by Miss Orra White, the lady who afterwards became his wife, who rendered him invaluable aid in illustrating his scientific works, and to whom he dedicated his *Religion of Geology*. His first publication was *The Downfall of Bonaparte*, a dramatic poem of 500 lines; this appeared in 1815. From that date till 1818, while principal of the academy, he furnished the calculations for the *Farmer's Almanac* and frequent corrections to the *Nautical Almanac*. From 1821 to 1825 he was pastor of the Congregational church in Conway, and meanwhile found exercise, health, and recreation in making a geological survey of Western Massachusetts. From 1825 to 1844 he was professor of chemistry and natural history in Amherst College. In 1830 he was appointed State geologist of Massachusetts, having suggested the survey which he was appointed to make. In 1836 he was commissioned to do the same work in the first district of New York, but resigned the office on account of his health. From 1844 to 1854 he was president of Amherst College and professor of natural theology and geology, and the college never had a more inspiring lecturer nor a more popular and progressive president. He accepted the presidency when it was sinking under the weight of poverty and debt; and having secured for it liberal endowments, doubled the number of students in ten years, and greatly increased its literary and scientific advantages, he resigned that office, and, retaining the professorship, devoted the remainder of his life to his favorite science of geology, but always in its connection with religion. He was an eloquent preacher and the faithful pastor of the college church. Religion was the inspiration of his writings and his life. He was a prolific writer. He left a record of the titles and dates of 24 volumes, 35 pamphlets (including sermons), 94 papers in the journals, and 80 newspaper articles—some 8000 pages in all—on a great variety of subjects, but chiefly on his favorite themes of science and religion. His earliest publications in geology and natural history were *Geology of the Connecticut Valley*



(1823) and *Catalogue of Plants within Twenty Miles of Amherst* (1829; new ed., revised by Prof. Tuckerman 1874). In 1830 he published *Dyspepsia Forestalled and Resisted*, and about the same time several other productions on temperance. In 1832 appeared *First Report on the Economic Geology of Massachusetts*, and in 1833 the full report on the geology, zoology, and botany of the State, which have given Massachusetts the honor of being the first in Europe or America to provide at public expense for the survey of an entire State. The final report on the geology of Massachusetts was made in 1841 in 2 vols., quarto of 831 pages, with 55 plates. Further works on geology are *Fossil Footsteps in the U. S.* (1848), *Outlines of the Geology of the Globe, and of the U. S. in Particular* (1853), *Illustrations of Surface Geology*, published by the Smithsonian Institution (1866), and *Report to the Government of Massachusetts on the Technology of New England* (1858); also reports on the *Geology of Vermont* (1857-59), and *Final Report* (in part by his son, Prof. C. H. Hitchcock) in 1861 (pp. 988, 38 plates, and 365 wood-cuts). *The Elementary Geology*, which first appeared in 1840, has gone through many editions in America and England, and has been widely used as a textbook in schools and colleges. *The Religion of Geology and its Connected Sciences* (1851) and *Religious Truths Illustrated from Science* (1857), together with numerous kindred articles in the *Biblical Repository*, the *Bibliotheca Sacra*, and other journals, were the works to which he gave the most thought and study. Among the most popular of his books have been *History of a Zoological Temperance Convention in Central Africa* (1850), *A Wreath for the Tomb* (1839), and *Religious Lectures on the Peculiar Phenomena of the Four Seasons* (1850), which illustrate his playful fancy, creative imagination, and strong moral, philanthropic, and religious nature. Several of Dr. Hitchcock's works have been reprinted in England, and they have been favorably noticed by the leading journals and scientific men of both countries. (See *N. Amer. Rev.*, xlii, 422-448; lii, 103-107; lvi, 135-151; *Amer. Jour. of Sci.*, i, 106; xxii, 1; xli, 232; *Lond. Cong. Mag.*, 1842, etc.; and testimonies by Dr. J. Pye Smith, Dr. Mantell, Dr. Buckland, and the elder Prof. Silliman.) In turn he furnished introductions to American editions of Dennis Crofton's *Genesis and Geology*, and to the *Plurality of Worlds*, a new edition of the latter being published in 1875.

Pres. Hitchcock was one of the originators and founders of Mount Holyoke Seminary and of the Massachusetts Agricultural College. And in connection with these we may mention his *Memoir of Mary Lyon and his Report to the Massachusetts Legislature on the Agricultural Schools of Europe*, which he visited and examined by appointment of the government in 1850. He was for many years a member of the Massachusetts board of agriculture, and was invited to become its secretary. He was a favorite of the farmers and the common people, who had very generally made his acquaintance in his geological explorations. The last book which he published was the *Reminiscences of Amherst College*, 1863, in which he interweaves with history and autobiography many valuable suggestions touching college education. His most unique and enduring monument is the Hitchcock Ichneological Museum of Amherst College, created by his genius, science, and industry, and containing a complete collection, comprising every known variety of those fossil footmarks from the Connecticut Valley which he was the first scientifically to examine, classify, and interpret. Dr. Hitchcock was among the first and foremost of the pioneers of American geology. The American Geological Society owes its existence to his suggestion, and he was its first president. He left his mark especially in the inauguration of new enterprises and institutions, and in the origination of new doctrines and arguments in geology and natural theology. He d. Feb. 27, 1864, and the plain and massive granite obelisk which marks the place of his burial is fitly inscribed with those favorite words of his: "The cross in nature, and nature in the cross," which were the principal theme of his writings and the keynote of his character and life. W. S. TYLER.

**Hitchcock** (EDWARD A. M., M. D., b. at Amherst, Mass., May 23, 1828; graduated at Amherst College 1849, and at Harvard Medical School 1852; has since been an instructor in the Williston Seminary, Easthampton, Mass., and in 1861 was appointed professor of hygiene and physical education in Amherst College.

**Hitchcock** (ETHAN ALLEN, b. at Vergennes, Vt., May 18, 1798; graduated from the U. S. Military Academy, and entered the army as third lieutenant of artillery July, 1817. Till 1829, except for three years as assistant instructor of infantry tactics at West Point, he served on garrison and recruiting duty, after which he became commandant of cadets at the Military Academy. At the outbreak of

the Florida war, he volunteered his services, and became acting inspector-general in Gaines's campaign of 1836. From Florida he returned with Gen. Gaines to the Western department, from which he was transferred to recruiting service, and subsequently to Indian duty, where his honest administration of affairs as disbursing agent was of great value in protecting the Indians against swindlers. Promoted to be major 8th Infantry in 1838, he was placed on garrison duty from 1839 until called to Washington in 1841, and placed in charge of the Indian bureau. Leaving Washington in 1842, he joined his regiment in Florida, from which (in 1842-43) he removed Pascofa's band of hostile Indians. In the Mexican war he was inspector-general of Gen. Scott's army, and for his services in battle received the brevets of colonel and brigadier-general. After the Mexican war he made an extended tour in Europe and the East, and on his return was placed on duty in Washington. In 1851, then colonel of the 2d Infantry, he was ordered to San Francisco, Cal., and commanded the military division of the Pacific till 1854, where his services were most valuable. In consequence of personal differences with the secretary of war he resigned Oct. 18, 1855, and made his home at St. Louis, where he devoted himself to literature and the peculiar philosophical investigations which had for many years occupied his thoughts. On the outbreak of the civil war he offered his services to the U. S. government. Though not accepted at the time, in Feb., 1862, his merits were recognized by his appointment as major-general of volunteers, which, though once declined on account of failing health, he was induced to retain, and was placed on duty in the war department, and to which duties were added in November those of commissioner for exchange of prisoners of war and commissary-general of prisoners. These duties he discharged ably and acceptably, and was retained in service till Oct., 1867. Among the published works of this accomplished officer and student of the "problem of life" are—*The Doctrines of Swedenborg and Spinoza Identified* (1846), *Remarks upon Alchemy and the Alchemists* (1857), *Swedenborg a Hermetic Philosopher* (1858), *Christ the Spirit, being an attempt to state the Platonic View of Christianity* (1861), *Remarks on the Sonnets of Shakespeare, and Coleridge's Unexplored* (1865), *Notes on the Vita Nuova of Dante* (1866). D. at Sparta, Ga., Aug. 5, 1870. G. C. SIMMONS.

**Hitchcock** (HENRY LAWRENCE, D. D., b. at Burton, O., Oct. 31, 1813; son of Chief-Justice Peter Hitchcock (1780-1853) of Ohio; graduated at Yale 1832; studied divinity in Lane Seminary; held Presbyterian pastorates in Morgan, O., 1837-40, in Columbus 1840-55; president of Western Reserve College 1855-71, a position which he filled with great ability and usefulness. D. at Hudson, O., July 6, 1873.

**Hitchcock** (PETER), LL.D., b. at Cheshire, Conn., Oct. 19, 1780; graduated at Yale 1801; was admitted to the bar 1804; removed to Ohio 1806; was chosen to the Ohio general assembly 1810; State senator 1812-16; in Congress 1817-19; was afterwards for twenty-seven years a justice of the supreme court of the State, and a part of that time chief-justice. D. at Painesville, O., May 11, 1853.

**Hitchcock** (ROSWELL DWIGHT), D. D., LL.D., was b. in East Machias, Me., Aug. 15, 1817; joined the sophomore class in Amherst College in 1833; graduated in 1836; was principal of an academy in Jaffrey, N. H., 1836-37; pursued biblical and other studies under private tuition 1837-38; entered Andover Theological Seminary in 1838; was assistant teacher in Phillips Academy, Andover, for one term; was tutor at Amherst 1839-42; and in 1869 was elected one of the trustees of the college. From 1842 to 1844 he was a resident licentiate at Andover; then preached for a year in Waterville, Me.; and was ordained and installed over the First Congregational church in Exeter, N. H., Nov. 19, 1845. One year (1847-48) was spent in Germany at the universities of Halle and Berlin. In 1852 he resigned his pastorate to accept the call as professorship of natural and revealed religion in Bowdoin College; and in 1855 he was chosen Washburn professor of church history in Union Theological Seminary, N. Y., which position he still (1875) holds. In 1866 he visited Italy and Greece, and in 1869-70 Egypt, Sinai, and Palestine. In 1871 he was made president of the American Palestine Exploration Society. During the civil war he took a decided stand on the side of the general government. He received the degree of D. D. from Bowdoin College in 1855, and of LL.D. from Williams College in 1873. From 1863 to 1870 he was one of the assistant editors of the *American Theological Review*, for which, as previously for the *Pastor and Quarterly*, he has written many articles, mostly relating to church history. Besides publishing numerous orations, addresses, and sermons, he has also edited the *Life, Character, and Writings of Edward Robinson* (1864), *A Complete*



*Analysis of the Bible* (1869), and has edited (with Drs. Ebbly and Schafl) *Hymns and Songs of Praise* (1874) and *Hymns and Songs for Social and Sabbath Worship* (1875).

**Hitchcock** (SAMUEL A.), a prominent citizen of Brimfield, Mass., b. about 1784; acquired great wealth, and was distinguished as the founder of the Hitchcock Free High School, Brimfield, and as a liberal benefactor of Amherst College, Mass., Tabor College, Ia., Illinois College, Andover Theological Seminary, and of various churches and charities. These gifts exceeded \$650,000 in aggregate value. D. at Brimfield Nov. 24, 1873.

**Hit'chin**, town of England, in Hertfordshire, on the Ivel, has breweries, manufactures of straw-plaiting, and a trade in corn, malt, and flour. Pop., with surroundings, 27,657.

**Hitopadesa** [Sans., "good instruction"], a celebrated collection of fables of a didactic character and quite ancient origin, existing in the Sanscrit language. It is an abbreviation of the old *Panchatantra*. The text of the *Hitopadesa* was published by Von Schlegel and Lassen (Bonn, 1829), a German translation by M. Müller (Leipzig, 1844), and an English translation by Wilkins and Jones (1787). In substance, the *Hitopadesa* is nearly identical with the reputed fables of Pilpay, and obviously came from the same source.

**Hit'tereu**, an island on the W. coast of Norway, belonging to the stift of Trondhjem, and important for its fisheries. It is 30 miles long by 10 miles broad, and has about 3700 inhabitants.

**Hittites** [Heb. *Chitti*, "descendants of Heth"], a Canaanitish nation whose original seat was Hebron. They were a commercial race, are frequently mentioned on the Egyptian monuments, as well as in the Bible, and seem to be noticed in the cuneiform inscriptions. After the conquest of Palestine it is almost certain that they established a kingdom in the Orontes valley. Numbers of them remained with the Jews even as late as the time of Ezra and Nehemiah. The Egyptian records contain the names of several of the Hittite kings.

**Hitt'le**, tp. of Tazewell co., Ill. Pop. 940.

**Hitt'torff** (JACQUES IGNACE), b. at Cologne Aug. 20, 1793; studied in Paris; travelled through England, Germany, and Italy, where he spent two years in archaeological studies in Sicily; and d. in Paris Mar. 25, 1867. The most prominent of his works as a practical architect are—the Cirque de l'Impératrice, Hôtel de Louvre, and different embellishments of the Place de la Concorde and Bois de Boulogne. The most remarkable of his writings are—*Architecture antique de la Sicile*, and *Architecture moderne de la Sicile*, but especially his *Architecture Polychrone chez les Grecs*, showing the connection, with the Greeks, between painting, architecture, and sculpture.

**Hitz'ig** (FERDINAND), b. June 23, 1807, at Haningen, Baden; studied after 1824 at the universities of Heidelberg, Halle, and Göttingen, and was in 1833 appointed professor at the University of Zurich, whence in 1861 he removed to that of Heidelberg. In Halle he heard Gesenius, and from that time he concentrated his studies principally on the exegesis of the Old Testament; and by his freedom from dogmatic prejudices, by his comprehensive learning and acuteness, he contributed much to the true understanding especially of the Prophets and Psalms, on which he published large exegetical works. He also wrote *Die Einführung des Alphabets* (1840), *Vorgeschichte und Mythologie der Phönicier* (1845), etc., and *Geschichte des Volkes Israel*. D. in 1875.

**Hivaoa**, an island in the Pacific Ocean, belonging to the Marquesas. It is the most fertile and most densely peopled of the whole group, but its inhabitants, numbering about 6500, are described as the wildest and most inaccessible to European civilization of all the Polynesian tribes. All efforts of missionaries, Catholic and Protestant, have so far been in vain.

**Hi'vites** [Heb. *Chievi*, "midlanders" or "villagers"], a Canaanitish race conquered by the Hebrews. A part of them, the Gibeonites and their neighbors, became Jewish proselytes, but the great mass of them, living in the region of Tyre, seem to have been unconquered; but Solomon made them tributaries, and even menial subjects. They were a peaceful commercial race, of whom little is known.

**Hiwas'see**, tp. of Clay co., N. C. Pop. 418.

**Hix'ton**, post-tp. of Jackson co., Wis. Pop. 899.

**Hoad'ley** (BENJAMIN), b. at Westerham, Kent, Nov. 14, 1676; was educated at Clare Hall, Cambridge, of which he became a fellow in 1697; took holy orders 1700; became rector of St. Peter-le-poor 1702; rector of Streatham 1710; was distinguished by his advocacy of Low Church views in a famous controversy ("the convocation controversy")

with Atterbury and others, Burnet and Wake being on Hoadley's side. In 1715 he was made bishop of Bangor, and in 1717 a sermon preached before the king on the words, "My kingdom is not of this world," led to the famous Bangorian controversy, in which he was assailed by the non-jurors and the High Church party, headed by William Law, Archdeacon Warren, and Canon Snape. This controversy led to the prorogation of the convocations and the almost complete extinction of their powers. In 1721 he was translated to the see of Hereford, to Salisbury 1723, and to Winchester 1734. D. at Chelsea Apr. 17, 1761. Among his works are—*Letters on Miracles* (1702), *Reasonableness of Conformity* (1703), *Brief Defence of Episcopal Ordination* (1707), *A Preservation against the Principles of Non-jurors* (1716), *Nature and End of the Lord's Supper* (1735).—His two sons, BENJAMIN and JOHN, also distinguished themselves. The former was b. in London Feb. 10, 1706; studied at Cambridge; took his degree as doctor of medicine in 1729; settled in London; was appointed physician to the royal household in 1746; and d. at Chelsea Aug. 10, 1757. He wrote in 1747 the comedy *The Suspicious Husband*, assisted Hogarth in his *Analysis of Beauty*, and published in 1756 *Observations on a Series of Electrical Experiments*.—The younger brother, John, was b. in London Oct. 8, 1711; studied first law, and then theology; took orders, and became chaplain to the prince of Wales; d. Mar. 17, 1776. He wrote several comedies—*The Contrast* (1731) and *Love's Revenge* (1737)—several oratorios and pastorals, and edited his father's works.

**Hoaglin**, tp. of Van Wert co., O. Pop. 622.

**Hoang-Hai**. See YELLOW SEA.

**Hoang-Ho** ("yellow river"), one of the principal rivers of China, rises in Thibet, flows first in a north-eastern direction into Mongolia, then in a southern and south-eastern direction through China proper, and enters into the Yellow Sea in lat. 34° N. Its course is winding and tortuous; its current rapid and turbulent, and when it reaches the lowland it becomes almost unmanageable, and is scarcely navigable. The immense amount of yellow clay which it carries along with it, and from which it has received its name, is deposited partly at its mouth, partly along its bed. Thus, not only the level of its waters, but even the level of its bed, is higher than the surrounding land, which must be protected against its inundations by immense levees. It costs the Chinese government yearly \$7,000,000 to keep these levees in good repair, and an extensive system of canals has been devised and constructed in order to lead parts of its waters into other river-beds, and prevent the devastations with which it threatens one of the most fertile provinces of the empire. Its principal affluent is Hoei-Ho; among the large cities along its shores are Lan-Choo and Kai-Fung. In 1853 the Hoang-Ho broke from its old course, and began pouring its waters into the Yellow Sea by a mouth some hundreds of miles N. of its former one.

**Hoar** (EENEZER ROCKWOOD), LL.D., b. at Concord, Mass., Feb. 21, 1816, a son of Samuel Hoar (1778-1856). He graduated at Harvard in 1835, and was admitted to the bar in 1840; was 1849-55 a judge in the court of common pleas; a judge of the supreme judicial court 1859-69; U. S. attorney-general 1869-70; joint high commissioner on the Washington treaty of 1871; member of Congress from Massachusetts 1873-75.

**Hoar** (GEORGE FRISBIE), a son of Hon. Samuel Hoar, b. at Concord, Mass., Aug. 29, 1826; graduated at Harvard in 1846; was admitted to the bar in 1849, and settled at Worcester, Mass. He was elected to the 41st Congress, and re-elected to the 42d, 43d, and 44th. In 1877 was elected to the U. S. Senate from Massachusetts.

**Hoar** (SAMUEL), LL.D., b. in Lincoln, Mass., May 18, 1778; graduated at Harvard, 1802; was a teacher in Virginia two years; was admitted to the bar in 1805, and attained great eminence as a lawyer; was in 1820 a member of the State constitutional convention; a State senator 1825 and 1833; a State councillor 1845-46; and a member of Congress 1835-37. In 1844 he was sent by the legislature of Massachusetts to South Carolina to test the constitutionality of certain acts authorizing the imprisonment of free negroes from outside the State, and on Dec. 5 of that year he was forcibly expelled from Charleston, the State legislature on the same day authorizing the governor to expel him. D. at Concord, Mass., Nov. 2, 1856. He was an active member of many charitable and religious organizations.

**Hoare** (SIR RICHARD COLT), b. at Stourhead, England, Dec. 9, 1758; d. May 19, 1838. He inherited a large fortune from his father, and made extensive scientific travels on the Continent and in his native country, of which he published richly illustrated accounts: *A Classical Tour*



through Italy and Sicily (1818), and *Ancient History of South Wiltshire* (8 vols. folio, 1810-19 and 1822-52, edited by the aid of other antiquarians).

**Hoare** (WILLIAM), b. near Ipswich in 1707; d. at Bath in 1792. He was the first English painter who went to Rome to finish his education, and he was one of the original members of the Royal Academy. The best-known of his paintings are his portraits of Pitt, Grenville, Lord Chesterfield, etc. His son, PRINCE, was b. at Bath in 1751, and d. at Brighton in 1834. After studying at the Royal Academy and in Rome, he succeeded Boswell in 1799 as foreign secretary to the Academy, and was a very prolific dramatic writer, especially in the department of comic opera.

**Ho'atzin**, the *Opisthocomus cristatus*, a South American bird resembling somewhat the peacock in appearance. It exhibits a number of peculiarities in structure, and is the type of a group of Gallineous birds of equal value with the *Alcedoromphæ* (Phasianides), *Pterocloromorphæ*, and *Turnicimorphæ*. It has a large crop and a small gizzard, is gregarious, and frequents marshes, where it feeds upon the leaves of *Arum arborescens*. Its flesh has an intolerably rank taste.

**Ho'bart**, tp. and post-v. of Lake co., Ind., on the Pittsburgh Fort Wayne and Chicago R. R., 33 miles S. E. of Chicago. Pop. 1937.

**Hobart**, post-v. of Stamford tp., Delaware co., N. Y., on the Delaware River, 4 miles below Stamford; has a national bank.

**Hobart** (HARRISON C.), b. at Ashburnham, Mass.; graduated at Dartmouth College 1842; removed to Wisconsin in 1846, and settled at Sheboygan; was a member of the Territorial legislature and of the first State senate; Speaker of the assembly 1859; accompanied the 4th Wisconsin Vols. to the seat of war as captain; subsequently appointed lieutenant-colonel and colonel of his regiment; was captured and confined in Libby Prison, Richmond, and one of the party who escaped by means of the famous tunnel in 1864. In 1865 he was Democratic nominee for governor of Wisconsin. G. C. SIMMONS.

**Hobart** (JOHN HENRY), S. T. D., an American bishop, b. in Philadelphia Sept. 14, 1775; graduated with honors at Princeton in 1793; was tutor there 1796-9; obtained degree of the Protestant Episcopal Church in 1798, a priest in 1801; became assistant bishop of New York in 1811, and bishop in 1816. In 1799 he was made rector of Christ church, New Brunswick, N. J.; in 1800, for a short time rector of St. George's, Hempstead, L. I., and in the same year assistant minister of Trinity church, New York, of which in 1812 he became assistant rector, and in 1816 rector. In 1821 he became professor of pastoral theology and pulpit eloquence in the General Theological Seminary, New York, of which he was one of the founders. Among his writings are *Companion for the Altar* (1804), *Apology for Apostolic Order* (1807), 2 vols. of sermons (1824). (See *Memoir* by WILLIAM BERRIAN, D. D., published with his posthumous works (3 vols., 1833); *The Early Years of Bishop Hobart* (1834) and *The Professional Years of Bishop Hobart*, by J. McVICKAR (1836). D. at Auburn, N. Y., Sept. 10, 1830.

**Hobart** (JOHN SLOSS), LL.D., b. at Fairfield, Conn., in 1738; graduated at Yale in 1757; was in the New York Congress, and in 1766 was appointed a member of a committee to prepare a State constitution; became in 1777 a justice of the district court of New York, and afterwards was on the bench of the State supreme court; U. S. Senator in 1798; resigned in the same year, and became justice of the U. S. district court for New York. D. Feb. 4, 1805.

**Hobart Town**, or **Hobartton**, capital of Van Diemen's Land, on the navigable Derwent, which at its entrance into Storm Bay forms an excellent harbor, safe and accessible to the largest vessels. Hobart Town was founded in 1804. It is beautifully situated at the foot of Wellington Mountain, and well built with straight and broad streets and many handsome buildings, among which there are several Episcopalian, Roman Catholic, and Presbyterian churches and a Jewish synagogue, and fine government house, 4 banks, 3 public libraries. Has good public schools, gas and water works, etc. It is connected with Melbourne by steamers, and carries on quite a lively trade. It has an Anglican and a Roman Catholic bishop. Pop. 19,092.

**Hob'bema**, or **Hobbima** (MINDERHOUT), a celebrated Dutch landscape painter. Of his personal life nothing is known, but the circumstance that the figures in his landscapes are painted by Berghem, Van der Velde, Langelbaach, and I. van Loo shows that he lived in the latter part of the seventeenth century, and by some he is believed to have been a disciple of Ruysdael. He painted mostly for-

ests and ruins, and his pictures are found in all the large galleries.

**Hobbes** (THOMAS), one of the most distinguished thinkers of the period of English emancipation from scholasticism, b. Apr. 5, 1588, at Malmesbury, in Wiltshire. His father was a country clergyman. After a thorough preparation, he was sent to Oxford before his sixteenth year, and there studied Aristotle and scholastic philosophy for five years, acquiring certain nominalistic principles which marked all his subsequent thinking, although he early assumed a hostile attitude towards scholasticism. He became tutor to the future earl of Devonshire, and in 1610 travelled with his charge through France, Italy, and Savoy. On his return, and on subsequent visits to the Continent, he met the foremost thinkers of the time, and became more or less intimate with Lord Bacon, Ben Jonson, Lord Edward Herbert of Chesham, Descartes, Gassendi, Galileo; later in life with Selden, Cowley, and Dr. Harvey. In 1628 he translated and published Thucydides, with the express purpose of showing his countrymen a warning example of the "fatal consequences of intestine troubles." Just at this time the foundations of civil order were shaken by the struggle between the House of Stuart and the supporters of individual liberty and the rights of conscience. Of an unusually timid disposition (congenital, arising from premature birth at the fright occasioned by the approach of the Spanish Armada), Hobbes felt very keenly the lack of security which the state should afford, and this subject (the state) occupied his chief thoughts for the rest of his life. Retiring to Paris with the royalists in 1640, he published a small edition of his *Elementa Philosophiæ de Cive* in 1642, the work being reprinted, much enlarged, in 1647 at Amsterdam by the famous Elsevirs. In 1647 he became mathematical instructor to Charles, prince of Wales, a relation which was broken in alarm upon the publication of his views on political, moral, and theological subjects in the treatises (1) *Treatise on Human Nature* in 1650, (2) *De Corpore Politico* (London, 1650), and (3) his collected views in the *Leviathan, or the Matter, Power, and Form of a Commonwealth Ecclesiastical and Civil*, in 1651. He escaped persecution by fleeing secretly from Paris and taking refuge in England, where Cromwell's absolute power in 1653 furnished a government much in accordance with Hobbes' doctrines. He published a remarkable *Letter upon Liberty and Necessity* in 1654, and the first and second divisions of his great work, *Philosophical Rudiments*, in 1650-58; the first division treating of *Body*, the second division of *Human Nature*, the third of the *State*. His *Leviathan* and *De Cive* were censured in Parliament in 1666, and very many works were written to refute them, the most able of these being Cudworth's *Intellectual System*. After the Restoration, Hobbes received a pension of £100 from Charles II., his former pupil. In 1675 he published a translation of Homer's *Iliad* and *Odyssey*. He wrote his autobiography in Latin verse, and his *Behemoth*, a dialogue on the civil wars between 1640 and 1660, was finished in the year of his death, which occurred in Dec., 1679, at the seat of the earl of Devonshire, his constant friend and supporter.

The literary style of Hobbes is pronounced admirable, being always clear and never tedious. His system of philosophy was a materialistic scaffolding built for the purpose of supporting and complementing his philosophy of the state, which is his only valuable contribution to human thought, besides certain negative or skeptical principles afterwards elaborated by Locke and Hume. He held sensation to be the basis of all knowledge; matter to be the only reality; philosophy to be the knowledge of effects in their causes and of causes in their effects; scientific method, consequently, to be twofold (a) inductive or analytical, and (b) deductive or synthetical. In his *Prima Philosophia* he defines the ideas of space, time, thing, cause, etc., somewhat after the manner of the Schoolmen. But the subject of philosophy is the two kinds of bodies, natural and artificial, the latter including human organizations, of which the state is the highest example. He held mind to be material; thought to be a process of adding and subtracting representations produced by physical impressions; language to be the most essential instrumentality to human life, rendering possible the existence of civil society and the state and the development of science and reason itself; ideas of good and evil to have their origin in the sensations of pleasure and pain; the human will to be under the control of circumstances and necessity. The state of nature is not the ideal state of man, but a state of war on the part of each against all, *bellum omnium contra omnes*, and its result a condition of complete misery. Self-interest impels man to combine with his fellows and institute government, a "leviathan power" which adjusts and subordinates individual selfishness and produces the maximum of happiness. Outside the state are forced constant war, fear,



poverty, filth, ignorance, and wretchedness; within the state dwell peace, security, riches, science, and happiness. Coercion is essential, and absolute monarchy is the most perfect form of government. Individual conviction should not be considered. The state is the Grand Man which makes possible the rational development of the individual man, like a mortal god subduing his caprice and passion, and compelling obedience to law, developing the ideas of justice, virtue, and religion, creating property and ownership, nurture and education. Hobbes was so much impressed with the importance of the authority of the state that he could not appreciate the necessity of mediation by which the individual will shall be adjusted and reconciled to the universal will (of the state) through the principle of popular representation. Complete *Works*, ed. by Molesworth, 16 vols. (5 vols. Lat., 11 vols. Eng.), London, 1839-43. W. T. HARRIS.

**Hobbs**, tp. of Jefferson co., Neb. Pop. 378.

**Hob'by**, name given in Great Britain to certain small falcons, especially to the *Hypotriorchis subuteo*, a bird about one foot in length and of very elegant shape. It was once much employed in hawking.

**Hob'house** (JOHN CAM), LORD BROUGHTON, b. June 27, 1786; graduated at Cambridge in 1808; entered the cabinet of Earl Grey as secretary of war in 1831; was made secretary of state for Ireland in 1833, and president of the board of control from 1835 to 1841 and from 1846 to 1852; was created a baron in 1851, and d. June 3, 1869. His *Journey through Albania and other Provinces of Turkey with Lord Byron* (1812), *Illustrations of the Fourth canto of Childe Harold* (1818), and *Italy* (1859), attracted much attention.

**Ho'boken**, city of Hudson co., N. J., on the W. side of the Hudson River, directly opposite New York City, and N. of and adjoining Jersey City; incorporated in 1855. Four lines of European steamers start from this point, and the Morris and Essex and the Delaware Lackawanna and Western R. Rs. have their eastern termini here, and connect the city with all the great railroad systems S. and W. of New York City. Various lines of street-cars also connect it with Jersey City and the villages in the northern part of the county. Its trade in coal is extensive, it being one of the principal depôts from which New York City and its shipping are supplied. It has 3 good public schools, several academies, 12 churches, 3 weekly newspapers, the St. Mary's Hospital, 2 savings and 1 national bank, several foundries, and a large lead-pencil factory. Prominent among its academies is the Stevens Institute of Technology, which has very extensive, expensive, and complete apparatus and arrangements for teaching the natural sciences and their applications to the arts and industries. The Franklin Lyceum Association has a library of over 2000 volumes. Its principal industries are connected with the European steamers and the coal-docks. Pop. 20,297. DONALD MANN, ED. "HUDSON COUNTY DEMOCRAT."

**Hob'son's Choice**. It is related in the *Spectator* (509) that Tobias Hobson, university carrier at Cambridge and the subject of two poems by Milton, was the first person in England who kept a hackney-stable. He always politely asked his customers to take their choice of his forty horses, but no matter which horse was chosen, Hobson always managed to put off the traveller with the horse which stood nearest the door. Hence "Hobson's choice" signifies a nominal choice with no real alternative.

**Hoche** (LAZARE), b. June 25, 1768, at Montreuil, the son of a poor workman, who could give him no education. In 1784 he enlisted in the army; in 1791 he fought as sergeant in the regiment of Gardes Françaises with the rabble before the door of Marie Antoinette; in 1792 he became lieutenant in the regiment of Rouergue; and in 1793 he distinguished himself in the siege of Thionville and in the battle of Neerwinden. Having been imprisoned on some suspicion, he sent a plan of a campaign to the Committee of Public Safety, and he was immediately liberated, made a brigadier-general, and sent to serve in the army of Houchard. He soon received an independent command, and in 1793 he defeated the Austrians at Weissenburg, and compelled them to withdraw from Alsace. In 1795 he foiled the invasion of the royalists and the English, attempted from the peninsula of Quiberon. In 1796 he pacified the Vendée, while his expedition to Ireland failed, as stormy weather scattered his ships. In Apr., 1797, he again commanded against the Austrians, and defeated them in three battles; he was at Wetzlar when the armistice of Lisbon ended the war. In the fall of that year he was suddenly taken ill, and d. Sept. 18, twenty-nine years old; a post-mortem examination showed that he had been poisoned.

**Hochelaga**, county of Quebec, Canada, includes the eastern part of the island of Montreal in the river St.

Lawrence. It territorially includes the city of Montreal, which, however, does not belong to it. Cap. Hochelaga. Pop. 25,640.

**Hochelaga**, the county-seat of Hochelaga co., Quebec, Canada, is a beautiful suburb of Montreal, with which it is connected by a street railway. Its convent of the Holy Name is the largest nunnery in the province. Pop. of sub-district, 1061.

**Hoch'heim**, town of Prussia, in the province of Hesse-Nassau, is situated on the Main, and is celebrated for its excellent wine. Pop. 2536.

**Hoch'kirch**, v. of Saxony, 7 miles S. E. of Bautzen. Here Frederick the Great was completely defeated by the Austrians under Daun, Oct. 14, 1758.

**Höchst**, town of Prussia, in the province of Hesse-Nassau, at the influx of the Nidda into the Main, is noted for the battles fought here—June 20, 1622, in which Tilly defeated Duke Christian of Brunswick, and Oct. 11, 1795, in which the Austrians defeated the French under Jourdan. Pop. 3013.

**Hoch'stadt**, town of Bavaria, on the Danube, is famous for the battle fought here Aug. 13, 1704, in which the Austrians and English under Prince Eugene and Marlborough utterly defeated the French and Bavarians. The battle is by the English named after Blenheim (or Blindheim), a small village near Höchststadt, at which one of the most decisive episodes of the battle took place.

**Hock**, a popular name in Great Britain for all Rhenish wines. It originally designated the wines of Hochheim, in the Main Valley. Of the Hochheim vineyards, the small Dechanerei and Stein plantations, the property of the German emperor, have the best reputation. Still and sparkling hocks are produced. (See RHEINISH WINES.)

**Hock'ing**, or **Hockhocking**, a river of Ohio, rises in Fairfield co., flows S. E. through Hocking co., and joins the Ohio in Athens co., after a course of 80 miles. For nearly 70 miles it is navigable for boats; the Hocking Canal connects with the Ohio Canal.

**Hocking**, county of S. E. Central Ohio. Area, about 390 square miles. It is hilly and fertile, and has mines of coal and iron. Cattle, grain, tobacco, and wool are staple products. It is intersected by the Hocking Valley R. R. and the Hocking River and Canal. Cap. Logan. P. 17,925.

**Hocking**, tp. of Fairfield co., O. Pop. 2005.

**Hock Tide**, or **Hoke Days**, the Monday and Tuesday occurring two weeks after Easter, a former English festival in memory of Ethelred's great victory over the Danes in 1002. Tolls were taken at the town-gates and money was collected throughout the parish for the priest. Traces of the old customs existed in some places in the eighteenth century.

**Hodeida'**, or **El Hudaidah**, seaport of Arabia, on the Red Sea, in lat. 14° 40' N., about 2 miles N. W. of Mocha, is of some importance for the transfer of pilgrims from India and for the exportation of coffee.

**Hodg'don**, post-tp. of Aroostook co., Me., on the New Brunswick line, 5 miles S. of Houlton. It has 3 churches, and manufactures of furniture and lumber. Pop. 989.

**Hodge** (ARCHIBALD ALEXANDER), D. D., son of Dr. Charles Hodge, noticed below, was b. in Princeton, N. J., July 18, 1823; graduated at the College of New Jersey in 1841; was tutor 1844-46; graduated at Princeton Theological Seminary in 1847; went the same year as a missionary to Allahabad, India; returned in 1850 on account of the impaired health of his wife; was settled as a pastor in Lower West Nottingham, Md., 1851-55; at Fredericksburg, Va., 1855-61; and at Wilkesbarre, Pa., 1861-62. In 1864 he was elected by the General Assembly of the Presbyterian Church to the chair of didactic, historical, and polemic theology in the Western Theological Seminary, Allegheny, Pa. In connection with the professorship, he became in 1866 pastor of the North Presbyterian church of the same city. In 1862 he received the degree of D. D. from the College of New Jersey. He has published *Outlines of Theology* (1860), *The Atonement* (1867), *Commentary on the Confession of Faith* (1869). He wrote for this work the admirable article on CALVINISM.

R. D. HITCHCOCK.

**Hodge** (CHARLES), D. D., LL.D., of Scotch-Irish descent, was b. in Philadelphia, Pa., Dec. 28, 1797. His father, Dr. Hugh Hodge, a physician of large practice and great promise, d. early. In 1812 he entered the sophomore class in the College of New Jersey, and graduated with the highest honors in 1815. From 1816 to 1819 he was a student in the Theological Seminary at Princeton, in the same class with Bishops McIlvaine and Johns. In 1820 he accepted the appointment of assistant teacher of the original languages of Scripture in the seminary, and in 1822 was



elected by the General Assembly professor of Oriental and biblical literature. In 1828 he returned to his chair, after an absence of some three years spent in study at the universities of Paris, Halle, and Berlin. In 1840 he was transferred to the chair of exegetical and didactic theology, to which, in 1852, polemic theology was added, Dr. Archibald Alexander, the incumbent of that professorship, having died in 1851. He was moderator of the General Assembly (Old School) at Philadelphia in 1846, and in 1858 one of a committee to revise the *Book of Discipline*. The celebration at Princeton, Apr. 24, 1872, of the semi-centennial anniversary of his professorship was a memorable occasion, the first of its kind in American history. The patriarch of our theological professors, he is still (1874) in active service. His contributions to sacred literature have been of the most scholarly and solid character. In 1825 he founded the *Biblical Repository*, the scope of which was enlarged and *Princeton Review* added to its title in 1829. In 1872 it was united with the *Presbyterian Quarterly* and *American Theological Review*, the organ of the New School branch. Till then, for nearly forty years, he had been not only editor-in-chief of the *Princeton Review*, but also chief contributor, more than one-fifth of all that was written for it coming from his pen. He has also published *A Commentary on the Epistle to the Romans* (1835; abridged 1836; rewritten and enlarged 1866), *Constitutional History of the Presbyterian Church in the U. S.* (2 vols., 1840-41), *The Way of Life* (1842), commentary on *Ephesians* (1856), *First Corinthians* (1857), *Second Corinthians* (1860), *What is Darwinism?* (1871). But the great work of his life is *Systematic Theology* (3 vols., 1871-72), which is regarded as one of the ablest expositions of Calvinism ever made. (See *Index Volume of the Bib. Rep. and Princ. Rev. from 1825 to 1866* (1871) and *Semi-Centennial Commemoration of the Professorship of Charles Hodge, D. D., LL.D., Sept. 24, 1872* (1872).) D. June 19, 1878. R. D. HITCHCOCK.

**Hodge (HUGH LENOX), M. D., LL.D., b.** in Philadelphia June 27, 1796, brother of Prof. Charles Hodge and son of Dr. Hugh Hodge, an eminent practitioner; graduated at Princeton with honors 1814; took the medical degree in 1817 at the University of Pennsylvania; professor of obstetrics in that institution 1835-63, when he became emeritus professor. Author of a *System of Obstetrics* and a work on *Diseases Peculiar to Women*, both standard treatises of the first authority; wrote much and ably for the professional journals, and had a wide fame as a practitioner and instructor. D. at Philadelphia Feb. 23, 1873.

**Hodge (H. LENOX), M. A., M. D., b.** July 30, 1836, in Philadelphia, Pa.; studied at the University of Pennsylvania, and received the degrees of B. A. 1853, M. A. 1858, and M. D. 1859; was resident physician in the Pennsylvania Hospital 1858-60. In 1861 was appointed demonstrator of surgery and chief of the surgical dispensary of the University of Pennsylvania, and in 1870 was made demonstrator of anatomy. During the war was one of the surgeons attached to the U. S. Satterlee Hospital, belonged to the Pennsylvania reserve corps of surgeons, and was pension examining surgeon to the U. S. Sanitary Commission; was present with the army in McClellan's campaign before Richmond, in the Gettysburg campaign, and at Fredericksburg in Grant's advance on Richmond; has been attending surgeon to the Children's Hospital since 1864, and attending surgeon to the Presbyterian Hospital since its opening in 1872. He has written and published a number of articles in medical journals in connection with original investigations on the subjects of metallic sutures, treatment of fractures of the thigh by an improved apparatus, drainage of wounds by a solid metal probe instead of Chassaignac's soft-rubber tube, deformities after hip disease, tracheotomy in cases of pseudo-membranous croup, ovariectomy, and a new form of trochar for the evacuation of ovarian and other fluids, excision of the hip-joint, etc.

**Hodge (man),** county of the W. of Kansas, in the valley of the Arkansas. Area, 900 square miles. It is well adapted to grazing.

**Hod'genville,** post-v., county-seat of La Rue co., Ky. Pop. 404.

**Hod'ges (JAMES), b.** at Queenborough, Kent, England, 1816; was assistant engineer of the railway tunnels and cliff-works near Dover 1839-44; was employed upon the construction of Lowestoft harbor 1844-48; constructing engineer of the Grand Trunk Railway, Canada, 1849-50; and published in 1860 a full account of the Victoria Bridge at Montreal.

**Hodges (WILLIAM), b.** in London about 1744; painted landscapes and theatrical decorations; accompanied, in 1772, Cook on his South Sea voyage, and furnished the illustrations to his account; went in 1784 to India on the invitation of Warren Hastings. Published in 1792 *Travels in India*, with plates, and d. Mar. 6, 1797.

**Hodg'kinson (EATON), b.** at Anderton, Cheshire, Feb. 26, 1789; evinced early a decided talent for the study of mechanics; made a series of experiments concerning the strength of iron when applied as columns, for an account of which he received the gold medal of the Royal Society; made the calculations entering into the construction of the Britannia bridge, which were rewarded with a medal at Paris in 1825; was appointed a member in 1847 of the royal commission on the application of iron in railway buildings; and communicated a number of valuable engineering papers to the *Transactions of the British Association*. D. at Broughton, near Manchester, June 18, 1861.

**Hodg'son (JOHN E.A.), b.** in London in 1811; made many studies in Venice and the East; and was in 1873 elected an associate of the Royal Academy. Of his pictures, *The Recognition of the Army of Morocco* and *The Snake-Charmers* are the most widely known.

**Hodgson (WILLIAM BALLANTYNE), a political economist, b.** at Edinburgh in 1815; studied at the university of his native city; was principal of the Liverpool Institute from 1839 to 1847, and of the Chorlton High School in Manchester from 1847 to 1851; traveled through France, Italy, Germany, and Switzerland; resided from 1863 to 1870 in London, where he acted as examiner in political economy at the University of London; and was in 1871 appointed professor in political and commercial economy and mercantile law at the University of Edinburgh. His principal writings are—*Lectures on Education* (1837), *Classical Instruction* (1838), *The Conditions of Health and Wealth educationally considered* (1860), *Unappreciated Estimates of Reading and Writing as Means of Education* (1867), *What is Capital?* (1868), *The Scope of Economic Science* (1870), *Competition* (1870), and *Turgot, his Life, Times, and Opinions* (1870).

**Hod'ograph (ὁδός, "path," and γράφειν, to "write" or "describe").** If from any fixed point lines be drawn at every instant representing in magnitude and direction the velocity of a point describing any path in any manner, the extremities of these lines form a curve which is called the *hodograph*. The invention of this construction is due to Sir W. R. Hamilton, and the most beautiful of the many remarkable theorems to which it leads is this: *The hodograph for the motion of a planet or comet is always a circle, whatever be the form and dimensions of the orbit.* Since the radius-vector of the hodograph represents the velocity at each instant, it is evident that an elementary arc represents the acceleration, and thus a finite arc represents the whole acceleration of the moving point during the corresponding time; and it is evident also that the tangent to the hodograph is parallel to the direction of the acceleration of the moving point in the corresponding position of its orbit. (*Thomson and Tait*.) The intensity of heat and light emanating from a point, or from a uniformly radiating spherical surface, diminishes with increasing distance according to the same law as gravitation. Hence the amount of heat and light which a planet receives from the sun during any interval is proportional to the whole acceleration during that interval—i. e. to the corresponding arc of the hodograph. From this it is easy to see, for example, that if a comet move in a parabola, the amount of heat it receives from the sun in any interval is proportional to the angle through which its direction of motion turns during that interval. There is a corresponding theorem for a planet moving in an ellipse, but somewhat more complicated. (*Ibid.*)

**Hodom'eter** [Gr. ὁδός, a "road," and μέτρον, "measure"], a more correct form of the word ODOMETER (which see).

**Hoe, an instrument of farm-husbandry of various forms.** The best known is a plate of steel attached to a handle at somewhat less than a right angle, and used for cutting and drawing the earth. The shuille-hoe is drawn and thrust backward and forward for the purpose of cutting off weeds. Various forms of horse-hoe are used for cultivating those crops which are planted in rows and drills.

**Hoe (RICHARD MARSH), an inventor, b.** in New York Sept. 12, 1812, the son of Robert Hoe (1784-1833), an ingenious English mechanician who became a manufacturer of printing-presses in New York. R. M. Hoe became after his father's death a partner in the business, to which was added the manufacture of saws, in which Mr. Hoe introduced important improvements. In 1841, Mr. Hoe, with his brothers, Robert Hoe and Peter Smith Hoe, assumed the whole business, the former partners retiring. In 1846 he brought out "Hoe's lightning press," extensively employed for newspaper work. It has been since much improved. He has also made many less celebrated inventions.

**Hoe'fer (JOHANN CHRISTIAN FERDINAND), b.** Apr. 24, 1811, at Dörschütz, in the principality of Schwarzburg-Ru-



dolstadt, and educated at the gymnasium of Rudolstadt. In 1830 he started, for the sake of his health, on a rather adventurous journey; went from Bremen to Lille, where he enlisted in the foreign legion as a soldier, and from Lille to Marseilles, whence he was sent to Navarino, the station of his regiment; returned in 1831 to France and, taught foreign languages at the Colleges of Lyons, St. Etienne, and Roanne; co-operated with Cousin in translating Kant's *Kritik der reinen Vernunft* in 1834, and removed to Paris, where he began to study natural science and medicine, while he made his living by writing and translating for different periodicals. In 1840 he received the degree of doctor, and in 1848 he was naturalized as a French citizen. The most prominent of his writings are—*Histoire de la Chimie* (1842), the first complete history of the science of chemistry; *Dictionnaire de Physique et de Chimie* (1846), *De Médecine pratique* (1847), *De Botanique* (1850), *D'Agriculture et d'Horticulture* (1853), *Histoires du Café, du Chocolat, de la Pomme de Terre, du Lotus, du Poirier, etc.* (1850-51), *Histoire du Maroc* (1848); besides a great number of articles in the *Biographie Générale*, of which he is editor-in-chief.

**Hoei-Shin**, or **Hui-Shên**, a Buddhist monk from China, who, according to his own narrative, regularly entered on the Chinese Year-Books, returned A. D. 499 from a long journey to the East, where, as he declared, he had visited a country which, according to the distances as he gave them, would be California or Mexico. He describes a plant as being very common there which he calls *fusang*, and from which he named the country. From its fruit, "like a red pear," and the description of the cloth and paper made from its fibres, this appears to have been the maguay or *Agave Americana*, so characteristic of the country. "No iron," he says, "is found in this land, but copper, gold, and silver are not prized, and do not serve as a medium of exchange in the market." In this and all other particulars the narrative of Hoei-Shin applies accurately to what is known in part of Mexico and in part of Peru. The monk declares that he found Buddhist institutions which had been introduced fifty years before him by five beggar-priests from Kipin (Beloochistan). The writer in a work on this subject (*Fu-sang, or the Discovery of America by Chinese Buddhist Priests in the Fifth Century*, London) explains the coincidence of certain details in the narrative with what is known of Peru by the probability that Peruvian customs derived from Mexico descended to the South subsequent to the fifth century. The account of *Fusang* was first introduced to Europe by a learned Sinologist, De Guignes, who in 1761 published an admirable memoir on the subject in the *Mémoires de l'Académie des Inscriptions et Belles-Lettres* (vol. xxviii.). In 1841, Prof. Karl Neumann translated Hoei-Shin's narrative again more accurately from the original, adding to it copious comments of his own. This work, translated by the writer into English, with the aid and under the superintendence of Prof. Neumann, appeared in the New York *Knickerbocker Magazine* in 1850. De Guignes' memoir was attacked by Klaproth in his *Annales des Empereurs du Japon* in a spirit very little to his credit; but Klaproth was in turn refuted in a series of articles distinguished for their moderate tone, but replete with sagacious criticism and sound scholarship, by M. Gustave d'Eichthal (*Revue Archéologique*, Paris, 1862-63). (See also *L'Amérique sous le nom de pays du Fu-Sang, où elle se trouve en Asie d'après le cinquième siècle de notre ère, dans les grandes annales de la Chine*, Paris, by M. TARAVEY; also, by the same writer, *L'Amérique sous le nom de Fu-Sang - Nouvelles épreuves que la pays de Fu-Sang est l'Amérique* (quoted by André and Geiger, 1864, *Bibliotheca Sinologica*.) Julius Heinrich von Klaproth renewed his attack from the *Annales d'E. du Japon* in 1831 in a work entitled *Recherches sur le pays de Fou-sang mentionné dans les livres chinois et pris mal après pour une partie de l'Amérique, in Nouvelles Annales des Voyages*, t. 21, deuxième Série, 1851; also K. F. Neumann, *Ostasien und West-Amerika, Zeitschrift für allgemeine Erdkunde*, Apr., 1864, and an article by José Perez in the *Revue orientale et Américaine*, No. 46, p. 189, 195. A few minor articles on the subject were also published in the *Notes and Queries* for China and Japan, 1867-70, and the *Chinese Recorder* for 1870. A summary of all that has appeared on the subject, with the most perfectly revised version of the original Chinese narrative of Hoei-Shin yet made, including an article by Col. Barclay Kennon, late of the North Pacific U. S. surveying expedition, on the feasibility of a passage from China to California, may be found in the work *Fu-sang* already cited. C. G. LELAND.

**Hoe'ven, van der** (JAN), b. Feb. 9, 1801, at Rotterdam; studied medicine at Leyden; practised 1826 at Rotterdam; became professor of zoology at Leyden in 1835; and d. there Mar. 10, 1868. He wrote a *Handbook of*

*Zoology* (1833), which was translated into German and English, and *Eijdegaen tot de natuur lijke Geschiedenis van den Negerstam* (1842).

**Hof**, town of Bavaria, in Upper Franconia, on the Saale. It has extensive manufactures of cotton, woollen, linen, leather, and colors. Pop. 16,010.

**Ho'fer** (ANDREAS), b. at St. Leonard, in the Tyrol, Nov. 22, 1767; became a vintner and horse-merchant; took command of a party of riflemen serving against the French 1796; took a prominent part (1803-09) in the public affairs of the Tyrol; led in the uprising of the people against the French and Bavarians 1809; gained the important battles of Sterzing and Innsbruck; defeated Lefebvre and drove him out of the province, and was declared ruler of the Tyrol. Soon after, Austria having been reduced to submission by Napoleon, Hofer became unable to sustain himself. Betrayed for money by one of his most trusted followers, he was taken prisoner and shot by order of Napoleon at Mantua Feb. 20, 1810.

**Hoffman** (CHARLES FENNO), A. M., b. in New York in 1806, and educated at Columbia College. In 1817 he met with an accident which required the amputation of a leg. When twenty-one years of age he was admitted to the bar, and was afterwards editorially connected with the New York *American*, the *Knickerbocker Magazine*, the New York *Mirror*, etc. He published *A Winter in the West* (1835), *Wild Scenes in the Forest and Prairie* (1837), *Greyslaer*, a novel (1840), *The Vigil of Faith and Other Poems* (1842), *The Echo*, poems (1844), *Love's Calendar* (1848), and an edition of his poetical works, edited by E. F. Hoffman, appeared in 1874. He was in 1846-47 editor of the *Literary World*, and soon after was attacked by a mental disease, in consequence of which he has since lived in retirement. He is a brother of Ogden Hoffman.

**Hoffman** (DAVID), LL.D., OXON., J. U. D. GÖTTINGEN, b. in Baltimore Dec. 25, 1784; was professor of law in the University of Maryland 1817-36; after which he practised law in Philadelphia, though passing some years in Europe, from which he returned in 1853. He published *A Course of Legal Study* (1836), *Legal Outlines, Miscellaneous Thoughts*, etc., by Anthony Grumbler (1837), *Viator* (1841), *Legal Hints* (1846), *Chronicles from the Originals of Cartaphilus, the Wandering Jew*. D. in New York Nov. 11, 1854.

**Hoffman** (JOHN THOMPSON), LL.D., b. at Sing-Sing, N. Y., Jan. 10, 1828; graduated in 1846 at Union College; was admitted to the bar in 1849; became in 1860, and again in 1863, recorder of New York City; was Democratic mayor of New York 1866-69; governor of the State 1869-73.

**Hoffman** (MURRAY), b. in New York Sept. 29, 1791; graduated in 1809 at Columbia College; was admitted to the bar, and was (1839-43) assistant vice-chancellor, and (1853-61) judge of the superior court of New York. He has published *Office and Duties of Masters in Chancery* (1824), *Practice in the Court of Chancery* (1840-43, 3 vols.), *Treatise on the Corporation of New York, Vice-Chancery Reports* (1839-40), *On the Law of the Protestant Episcopal Church* (1850), *Ecclesiastical Law in New York* (1868), *The Ritual Law of the Church* (1872). D. May 7, 1878.

**Hoffman** (OGDEN), a son of Judge Josiah Ogden Hoffman, b. in New York in 1799, and graduated at Columbia College in 1812; served three years as a midshipman in the war with Great Britain; was admitted to the bar of Orange co., N. Y.; removed to New York City in 1826; became a partner of Hugh Maxwell, and held various important offices; was a member of Congress 1837-41, and was again elected in 1848. In 1854 he was chosen attorney-general of New York. D. May 1, 1856. He was a most able and eloquent jury-lawyer, and a prominent Whig leader.

**Hoffman** (WILLIAM), b. in the city of New York Dec. 2, 1807; graduated from the U. S. Military Academy, and entered the army as brevet second lieutenant of infantry, rising through successive grades to be colonel, 1862; he early saw much active service in the Black Hawk and Florida wars against the Sac and Seminole Indians, being thus engaged and on frontier duty till 1846; in the war with Mexico he participated in the siege of Vera Cruz and the various battles up to and including the final assault and capture of the city of Mexico, receiving the brevets of major and lieutenant-colonel for gallant conduct. Subsequently he commanded various expeditions, being on duty in Texas at the outbreak of the civil war in 1861, where he was made a prisoner of war; exchanged Aug., 1862. Appointed commissary-general of prisoners in 1862, he supervised and controlled all captured and paroled prisoners until the close of the war (brevetted brigadier-general and major-general), when he assumed command of his regiment. At his own request he was in 1870 retired from active service.

G. C. SIMMONS.



**Hoffmann** (ERNST THEODOR WILHELM), a German novelist of great talent, but of somewhat unsound character, b. at Königsberg in 1776. He studied law, and held for some years various judicial offices in Posen and Warsaw. In 1816 he was appointed councillor of the court of judicature in Berlin, in which city he d. in 1822. His life was full of troubles and very unhappy. His father, who deserted him, was a man of bad temper, and his uncle, who educated him, was a man of pedantic character. He himself, who had his father's temper, was trained to take his uncle's habits, and the result was an unnaturalness and unsoundness of mind which he never outgrew. In his early manhood he was thrown out of his position by Napoleon's invasion, and for several years he was compelled to earn an uncertain livelihood by giving lessons in music and drawing, two arts of which he was a perfect master; he composed several operas. When he was once more reinstated in his judicial office he evinced an irritability of mind and had contracted habits which made him unfit for society. He retired from the drawing-room to the tavern, where his sparkling wit and brilliant imagination soon gathered a circle of revellers around him, and where the last of his fine gifts were as rapidly destroyed. His first book, *Phantasiestücke in Callot's Manner* (1814), is a collection of essays or papers chiefly on music, and in spite of a somewhat wilful singularity, both in style and ideas, they belong to the finest and most charming efforts of German genius. His next great work, *Eleonore des Teufels* (1816), is still more brilliant and powerful, though it is wild, weird, and eccentric. His last effort was *Lebensansichten des Kater-Murr* (1821-22); but although this book by many is considered his chief work, it is really only the ruin of his mind. Its humor is forced, its pathos is bombast, its irony is despair, and its passion is hardly anything more than gesticulation. Among his minor novels there are many which may be considered as masterpieces, such as *Meister Martin*, *Freiäulein Seudery*, *Doge und Dogeresse*, etc.; and for the student of German genius and character his writings in general are of the greatest importance.

CLEMENS PETERSEN.

**Hoffmann** (FRIEDRICH), M. D., F. R. S., b. at Halle, Germany, Feb. 19, 1660; graduated M. D. at Jena 1681; practised medicine with great renown at Minden and Halberstadt; became physician to the king of Prussia 1708; was professor of medicine at Halle 1693-1742. D. at Halle Nov. 12, 1742. Hoffmann is memorable as one of the first to introduce the modern or scientific spirit into the Galenic or regular medical system of his time. His special medical theories, however, were of only temporary value, and have been long forgotten. His greatest work was *Systema Medicinæ Rationalis* (3 vols., 1718-40). Others were *Medicina Consultatoria* (12 vols., 1721-39) and other works, including 5 vols. of posthumous *Opuscula*. His name is perpetuated by "Hoffmann's anodyne" (*Spiritus ætheris compositus*), a preparation devised by him.

**Hoffmann** (JEAN JACQUES), b. at Bâle in 1635. He studied in his native city, where he later on became professor in Greek and history, and where he d. May 10, 1706. His principal works are *Lexicon Universale Historico-Geographico-Chronologico-Poetico-Philologicum* (1667) and *Historia Paparum* 1687, besides a great number of *Poemata* and *Dissertationes*.

**Hoffmann** (WILHELM), D. D., b. at Kornthal 1806; studied at Tübingen; president of the mission-house at Bâle for twelve years; chaplain to the king of Prussia, and general superintendent of Brandenburg; d. at Berlin Aug. 28, 1873. An able scholar and eloquent preacher. Wrote against Strauss in defence of the gospel history, several volumes of sermons, and on the mission of Prussia and Germany.

**Hoffmann von Fallersleben** (AUGUST HEINRICH), b. Apr. 2, 1798, at Fallersleben, in Hanover; studied at Göttingen and Bonn; became librarian in 1823, and professor of German language and literature in 1830 at the University of Breslau, but was dismissed in 1842 on account of his *Unpolitische Lieder*, and banished from Prussia. For several years he led a wandering life, but settled in 1845 in Mecklenburg; was rehabilitated in Prussia in 1848 and received a pension; edited 1851-57 the *Wiemar Jahrbuch*, and became in 1860 librarian at the castle of Corvey. The most prominent of his linguistic and historical writings are—*Home Belgica* (1830-62), *Fundgruben für Geschichte Deutscher Sprache und Literatur* (1830-37), *Geschichte des Deutschen Kirchenliedes bis auf Luther* (1832), *Die Deutschen Gesellschaftslieder des 16. und 17. Jahrhunderts* (1860). Of his poems, besides the above mentioned, *Unpolitische Lieder* (1841), *Altdeutsche Lieder* (1843), *Soldatenlieder* (1851), *Kinderlieder* (1845), etc.

**Hoffmann's Anodyne** (*Spiritus ætheris compositus*), a valuable anodyne mixture of common ether, ethylic alco-

hol, and the heavy oil of wine. It overcomes spasm, pain, and nausea. It is very expensive, and consequently much that is sold under this name is a comparatively worthless mixture. It was named from its inventor, Friedrich Hoffmann (1660-1742).

**Hoffmannsegg** (JOHAN CENTURIUS), COUNT, b. in Dresden May 23, 1766, and d. there Dec. 13, 1849. He studied at Leipzig and Göttingen, and spent four years in Portugal exploring the flora of that country. From 1809 to 1833 he published in Berlin his magnificent *Flore Portugaise* in Latin and French, containing descriptions of several hundred new plants. He also wrote *Voyage en Portugal* (1805).

**Hofhof**, or **El Hofhof**, town of Arabia, in the Lahsa oasis, near lat. 25° 20' 56" N., lon. 49° 40' 56" E., about 4 miles S. of Mebaraz. It is somewhat decayed. Pop. 24,000.

**Hofland** (BARBARA), b. in 1770 at Sheffield, Eng., the daughter of Robert Wrecks, a manufacturer; married in 1796 Mr. Hoole, who d. in 1798, and in 1808 Mr. Hofland, an artist; produced about 70 novels and moral tales; and d. Nov. 9, 1844. The best known of her compositions are *The Clergyman's Widow* and *The Son of a Genius*.

**Höfler** (KARL ADOLPH KONSTANTIN), b. at Memmingen, Bavaria; studied at Munich and Göttingen; visited Italy; became professor of history at Munich in 1840, but was removed in 1847 on account of his *Concordat and Constitution der Katholiken in Bayern*, and accepted in 1851 a chair of history at Prague. The most prominent of his writings are—*Die Deutschen Päpste* (1829), *Fränkisch Studien* (1853), *Die Geschichtsschreiber der hussitischen Bewegung* (1856-65).

**Hofmann** (AUGUST WILHELM), PH. D., F. R. S., b. at Giessen, Germany, Apr. 8, 1818; studied philology and law, and was trained as a chemist by Liebig; was afterwards professor of chemistry at Bonn, and then director of the College of Chemistry, London. In 1864 he became a chemical professor at Berlin. He has made important discoveries in chemistry, and is author of *Einleitung in die Moderne Chemie* (1865) and other works.

**Hofwyl**, a v. of the canton of Berne, Switzerland, 6 miles N. of Berne, and near Schönbühl station on the Central Railway to Bâle. It is noted as the site of the educational establishments founded and for many years conducted by Fellenberg, and for some years after his death by his sons.

**Hog** [a word of Cymric origin], the domestic swine,<sup>2</sup> the remote offspring of the wild swine (*Sus scrofa*; see BOAR). Its flesh, rejected as unclean by Jews, Mohammedans, and ancient Egyptians, and untouched by Hindus and strict Buddhists, is a very important article of food among most civilized and many barbarous nations. This arises from the fact that the swine is easily kept and fattened, and affords an easy and profitable means of converting bulky and low-priced farm-products into a portable and salable commodity. The flesh is not the only valuable product. The skin makes a leather valued by the saddler; the bristles make the best brushes; the fat supplies lard, lard oil, glycerine, soap, and star candles. There are many breeds of domestic swine, which differ greatly among themselves in size, fattening qualities, and profitability in raising. Among these we may specify the Neapolitan stock; the large and coarse Berkshire swine; the delicate and easily fattened Chinese varieties, crosses of which with the old European stocks have led to great improvements in swine, new breeds having been developed having more hardness and greater size than Chinese pigs and far more valuable fattening qualities than the old breeds of Europe. The Sussex and Bedford breeds are among the stocks thus improved. The Chester whites, a breed which originated in Pennsylvania, and the Magic stock from Ohio, are among the American breeds; but some breeders deny that either stock has characters sufficiently marked and permanent to warrant for it a distinct name as a breed. When neglected and bred in the woods, and fattened upon nuts and acorns, the swine tends strongly to revert to the wild type. Pigs for market should be fed when young upon a relatively small amount of grain, mixed with fruits, boiled vegetables, clover, grass, and weeds; and when older they should be fed almost exclusively with grain. Ground (and especially cooked) Indian corn, buckwheat, and barley are excellent fattening materials. (For other species of the hog family, *Suidæ*, see BARYPOSSA, BACCHARK, PIGARY, WART-HOG, etc.)

**Ho'gan**, tp. of Dearborn co., Ind. Pop. 949.

\* In many parts of England, and in most recent English farming and market literature, the word *hog* denotes a young sheep, a lamb in his second year. Domestic swine are there almost universally called pigs.



**Hogan** (JOHN), b. at Tallow, Waterford, in 1800; studied at Rome; and d. at Dublin Mar. 27, 1858. Most of his works are religious and monumental; his *Drunken Fawn* became widely known.

**Hogarth** (GROVER), b. about 1797 in Scotland; became a writer to the Signet at Edinburgh; was many years dramatic and musical critic for the *London Morning Chronicle*; in 1846 became associated with Charles Dickens, his son-in-law, in conducting the *Daily News*. Author of *Musical History, Biography and Criticism* (2 vols., 1836), *Memoirs of the Musical Dramas* 1838, revised and republished as *Memoirs of the Opera* (2 vols., 1841), both works of permanent value. D. Feb. 12, 1870.

**Hogarth** (WILLIAM), a celebrated English artist, foremost in his line of subjects; b. in London 1697 or 1698, date uncertain; d. Oct. 26, 1764. His father, a schoolmaster, apprenticed him in 1712 to a silversmith as an engraver of armorial bearings on plate. A few years later he was engaged in engraving for booksellers. His first profession was that of portrait-painter, where he exhibited great facility in catching likenesses and originality in grouping figures; but his talent leading him in other directions, he soon struck the vein that made him famous. The genius for delineating scenes in real life, which early showed itself in grotesque forms, as in the *Songster at Highgate* and other ludicrous sketches, burst forth in full splendor in the remarkable series of plates entitled the *Harlot's Progress*, soon followed by the *Rake's Progress* and *Marriage à la Mode*, all done between 1734 and 1744. The rule prints that he engraved and published from these paintings had an immense sale. The paintings were the wonder of the town. Sir James Thornhill forgave the genius who had stolen his daughter. Hogarth's industry was indefatigable, and his achievements too numerous to be mentioned here even by name. His works are legion. No phase or aspect of life escaped him. Seven prints in illustration of Apuleius's *Golden Ass*, twelve prints for *Hudibras*; *The Sleepy Congregation*, *The Distressed Parent*, *The Enraged Musician*, *Struggling Actresses in a Barn*, *Garrick as Richard III.*, *The Stagecoach*, *The March to Finchley*; four prints of *The Election*, *Paul before Felix*, *Moses and Pharaoh's Daughter*, *The Good Samaritan*—display the breadth and variety of his work. *The Analysis of Beauty*, a volume published in 1753, contained much keen observation and abounded in clever hints, but has not materially added to his fame. The public galleries of London hold many of Hogarth's great pictures, the best of which are accessible to everybody in prints from the artist's own plates. A list of the most important of these may be found in Spooner's *Dictionary* and Mrs. Clements' *Handbook*. The estimate of Hogarth's genius and artistic ability has been steadily on the rise since the beginning of the present century, owing in large measure, probably, to the persuasive *Essay* of Charles Lamb. The judgment of him as a coarse and vulgar caricaturist has been superseded by the enthusiastic and almost unqualified praise of later generations, which see in him one of the most eminent masters and powerful moral teachers in the whole realm of art. (For the life of Hogarth see the *Encyclopædia Britannica*; IRELAND'S *Hogarth Illustrated*; NICHOLS'S *Essay*, including anecdotes; *Blackwood's Magazine*, Aug., 1869; *Edinburgh Quarterly*, Jan., 1836. The best editions of his *Works* are BOYDELL'S folio, London, 1790; NICHOLS and STEVENS'S 4to, 1808-17; 12mo, London, 1874.) O. B. FROTHINGHAM.

**Hogbuck**, tp. of Transylvania co., N. C. Pop. 243.

**Hogg** (JAMES), "the Ettrick Shepherd," b. in Ettrick parish, Selkirkshire, Scotland, Jan. 25, 1772; followed his ancestral occupation of shepherd, and several times attempted, with poor success, to gain a living as a farmer on his own account. His school education was very slight, but he was a great reader, and when twenty-four years old began to compose songs, some of which attracted much attention and gave him a local fame. In 1801 he published *Scottish Pastorals, Poems and Songs*, followed by *The Mountain Bard* (1803); became in 1810 editor of *The Spy*, a journal in Edinburgh. Here he was the associate of Scott, Wilson, and the other Tory men of letters, and a frequent contributor to *Blackwood*. His figure in the *Noctes Ambrosianæ* did not please him, but it added to his fame. In 1817 the duke of Buccleugh settled him upon the farm of Altrive, where his unlucky business ventures brought him many troubles; but here he lived for the greater part of his remaining years, engaged mainly in literary work, varied by field-sports, of which he was very fond; and here he d. Nov. 21, 1835. His best work, *The Queen's Wake* (1813), was followed by a large number of volumes of prose and verse of very unequal merit, his best poems and simplest tales evincing a rare genius.

**Hogg Island**, tp. of Russell co., Ala. Pop. 885.

**Hog-Gum**, or **Gum Hog**, a variety of Bassora gum,

used in preparing paper for the marbling process. The hog-gum of the West Indies, used in medicine and for paying boats, is furnished by various trees of the genera *Clusia* and *Moronebia*, and perhaps by *Rhus Metopium* and *Albugia balsamea*.

**Hog Island**, an island off the coast of Northampton co., Va., extending from Great to Little Matchepungo Inlet. It has a lighthouse in lat. 37° 23' 16" N., lon. 75° 41' 35" W.

**Hog Isle**, off the coast of Hancock co., Me. Pop. 6.

**Hog Plum**, the fruit of *Spondias lutea*, *tuba rosa*, *purpurea*, and *Mombin* of Brazil and the West Indies, so called because hogs are fed upon the abundant and rather agreeable fruits. The fruit of *S. Birrea* of Senegal and Abyssinia yields an intoxicating drink. That of *S. dulcis* or *Poupartia*, in the Society Islands, is very delicious. Several of the above and other species have medicinal qualities. They belong to the order Anacardiaceæ.

**Hog-Rat**, a name given to certain large rodents of the rat family, and genus *Capromys*, mostly arboreal and natives of Cuba. They are sometimes employed as food. Some of the species are reported as having somewhat prehensile tails. The hair is coarse, but not spiny.

**Hogs-head** [derivation uncertain], in wine-measure one half a pipe, or 63 wine-gallons. In beer-measure a hogshead contains 54 beer-gallons. The first kind contains 52½ imperial gallons, nearly; the second about 55 imperial gallons. Any large cask is in popular language called a hogshead. A hogshead of tobacco weighs from 750 to 1200 pounds, varying in the different States.

**Hohenlinden**, a v. of Bavaria, in Upper Bavaria. Here the French under Moreau completely defeated the Austrians Dec. 3, 1800.

**Hoh'enlohe**, a princely family of Germany, sprung from Franconia, where the castle of Holloch was the family seat; since the twelfth century the possessors of this castle have called themselves lords of Holloch. They acquired much landed property, became counts, and branched off into various lines. In 1776 the counts of Hohenlohe were created princes of the empire. At present the family comprises two principal lines—Hohenlohe-Neuenstein and Hohenlohe-Waldenburg, of which the former is subdivided into the lines of Hohenlohe-Langenburg and Hohenlohe-Oehringen, the latter into those of Hohenlohe-Bartenstein and Hohenlohe-Schillingsfürst; these lines consist furthermore of many branches. The following members of the family are known to history: (1) FRIEDRICH LUDWIG, prince of Hohenlohe-Ingelfingen, Prussian general, b. 1746; d. 1818. He is famous for the infamous capitulation at Preuzlau, Oct. 28, 1806, where, having received the command of the Prussian army after the duke of Brunswick, who was wounded in the battle of Jena, he made 17,000 men lay down their arms. (2) LUDWIG ALOYSIUS, prince of Hohenlohe-Waldenburg-Bartenstein, b. 1765; d. 1829. He distinguished himself in the French, Dutch, and Austrian services as an able officer, and became marshal and peer of France; he always fought against Napoleon. (3) ALEXANDER LEOPOLD FRANZ EMMERICH, prince of Hohenlohe-Waldenburg-Schillingsfürst, b. 1794; d. 1849. He was educated by the Jesuits, became a priest, wrote mystical books, attracted great swarms of believing patients, and had a great fame as a healer of the sick by miraculous power, and d. bishop of Sardica in *partibus*. (4) CHLODWIG, prince of Hohenlohe-Waldenburg-Schillingsfürst, ambassador of the German emperor to France, was b. Mar. 31, 1819. He entered the Bavarian service, pursued a national policy, worked with success for a good understanding between Prussia and Bavaria, and became president of the Bavarian ministry in 1866. He has done much for the unity of Germany, especially as vice-president of the German Zoll-Parliament of 1868 and 1869. But the anti-union party in Bavaria became so hostile that he resigned his office a short time before the Franco-German war broke out. In 1874 the German emperor appointed him ambassador to the French government. A. NIEMANN.

**Hoh'enstaufen** was the name of a princely family in Germany which arose in the middle of the eleventh century, bore the imperial crown from 1138 to 1254, and died out in the latter part of the thirteenth century. The founder of the family was Friederich von Büren, who in the middle of the eleventh century moved his residence from Büren, a place in the valley, on the bank of the Danube, in the present kingdom of Württemberg, to the castle of Hohenstaufen, situated on the brow of the hill. With the change of residence changed also the name of the family. Friedrich von Büren's son, FRIEDRICH VON STAUFEN or HOHENSTAUFEN, followed Henry IV. as his true knight, and distinguished himself so much by valor and military talents, especially in the battle of Merseburg (1080), that



the king made him duke of Suabia, gave him his daughter Agnes in marriage, and appointed him regent in Germany during his absence in Italy. By this rapid rise the family of Hohenstaufen (also called by the Italians *Ghibellines*, from another of their possessions, the castle of Weibingen) could not help coming into collision with the powerful family of the Welfs or Guelphs, which in Germany held the dukedom of Bavaria, besides large possessions in Italy. Friedrich had to defend his dukedom by armed force, but was compelled by his enemies to renounce parts of it. On his death in 1190 he left two sons, of whom the eldest, Friedrich II., was confirmed as duke of Suabia by Henry V., and the younger created duke of Franconia in 1112. Both the brothers adhered with great fidelity to the emperor, and when, in 1125, the Franconian dynasty died out with Henry V., the family of Hohenstaufen inherited a large part of the emperor's private fortune, which greatly increased its wealth and power. Friedrich II. even attempted to obtain the imperial dignity, but failed. Lothair the Saxon, an enemy of him and his family, was chosen emperor, and at one time the Hohenstaufens were pressed so hard that they had to sue for peace at the diet of Mühlhausen in 1130. Nevertheless, on the death of Lothair in 1138, Friedrich II.'s brother, Conrad, duke of Franconia, succeeded in being elected emperor, and the family now held the dignity for more than a century in the persons of Conrad III., 1138-52; Frederick I. Barbarossa, 1152-90; Henry VI., 1190-97; Philip, 1197-1203; Frederick II., 1212-50; Conrad IV., 1250-52. The general character of these men, whose biographies will be found in other places in this book, was vigor and energy, tending towards despotism, but generally allied with magnanimity and many brilliant qualities. The most prominent feature of their reign was their perpetual contest with the Guelphs and the popes, during which, however, the poetry and art of German chivalry reached their highest perfection. In 1252, Conrad IV. left Germany for Italy, in order to consolidate his power in his inherited countries in Southern Italy, but in 1254 he was poisoned. His half-brother, Manfred, endeavored to sustain the authority of the family, but was killed in the battle at Benevento in 1266, and when (1268) Conradin, the son of Conrad IV., tried once more to come into possession of Naples, he was defeated at Tagliacazzo and beheaded. The male line of the family of Hohenstaufen died out with him, and its possessions in Germany were divided between Bavaria, Baden, and Württemberg. A branch of the family, descending from Manfred's daughter, Constance, who married Peter III., king of Aragon, ascended fourteen years later the throne of Sicily.

**Hoh'enstein**, town of Saxony, 12 miles N. E. of Zwickau. It has extensive manufactures of woollens and linen. Pop. 5400.

**Hohenzollern**, a small territory of Germany, entirely enclosed by Württemberg and Baden, but belonging to Prussia. Its area is 433 square miles; it is mountainous, but fertile, watered by the Neckar and the Danube. Pop. 65,568, mostly Roman Catholics. Until 1849 it formed two independent principalities, Hechingen and Sigmaringen, which represent the elder line of the house of Hohenzollern, while the younger line is represented by the reigning dynasty of Prussia. In 1849 the king of Prussia bought the sovereignty of the country by paying the two princes an annual pension.

**Hohenzollern**, a princely family of Germany, which now occupies the imperial throne in the person of the emperor Wilhelm. The history of the family begins in the eighth century, at which time its ancestors possessed the castle of Hohenzollern. Thassilo, count of Zollern, was the oldest member of the family known to history; he d. about the year 800, and left four sons, of whom the eldest, Thareho, propagated the family and d. in 866. His son Rudolf rendered good service in the war between the German king, Henry I., and the Huns and Wends. A descendant of his, Rudolf II., acquired much landed property by the important services he rendered in the battle of Tübingen between the count palatine, Hugo of Tübingen, and the Guelphs. On his death (1210) the family branched off into two lines, of which the elder kept the paternal possessions in Suabia, and continued up to our days under the name of Hohenzollern, while the younger line, called the Conradine, settled in Franconia, founded the house of the burgraves of Nuremberg, and formed the dynasty of Brandenburg and Prussia. Count Konrad I. of Zollern, the younger son of Rudolf II., married Maria, the daughter and heiress of Count Diebold of Vohburg, and came thereby into the possession of the burgraviate of Nuremberg, which belonged to Vohburg. The Suabian line separated in 1576 into two branches—Hohenzollern-Hechingen and Hohenzollern-Sigmaringen. The former was raised to the princely rank Mar. 28, 1623, by the emperor Ferdinand

II., but the title of prince was bestowed only on the chief and the first-born; the other members of the family were counts. The emperor Leopold I. gave the title of prince to all members in 1692. In the same year a covenant of inheritance was concluded between the two branches of the family, of which the younger one had now assumed the name of Brandenburg. Hermann Friedrich Otto, sovereign prince of Hohenzollern-Hechingen, joined in 1806 the Rhenish confederation, but as the prince could not master the revolution of 1849, he concluded a treaty with Prussia, by which he transferred his sovereignty to the Prussian crown, Apr. 8, 1850. The branch of Hohenzollern-Sigmaringen obtained the princely dignity in 1638, joined the Rhenish confederation in 1806, became allied to the imperial house of Napoleon by the marriage of Prince Carl with the daughter of Murat, king of Naples, and ceded its sovereignty to Prussia in consequence of the revolution of 1849. The male line of the branch of Hohenzollern-Hechingen is now extinct; the princes of Hohenzollern-Sigmaringen take rank as younger sons of the house of Prussia; one of them is sovereign prince of Roumania. The younger line, the Franconian, generally named after its chief possession, the burgraviate of Nuremberg, obtained the princely dignity in 1273 from the emperor Rudolf. Friedrich VI., burgrave of Nuremberg, bought the margraviate of Brandenburg from the emperor Sigismund for 250,000 gulden, and was created elector of Brandenburg in the same year. In 1605, the elector Joachim Friedrich obtained the regency in the duchy of Prussia, and his successor, Johann Sigismund, secured for his family the possession of that country. Georg Wilhelm added the title of duke of Prussia to his other titles, and his successor, Frederick William, the "Great Elector," gave the country political influence, acquired new provinces, and left at his death (Apr. 29, 1688) a state with 1,500,000 inhabitants. His son, Frederick III., attained the royal dignity, and was crowned Jan. 18, 1701, in Königsberg as Frederick I., king of Prussia. He was followed by the thrifty Frederick William I.; then Frederick II., "the Great," who left his state with 6,000,000 inhabitants; then Frederick William II.; then Frederick William III., who was defeated by Napoleon, but regained his country; then his son, Frederick William IV.; and then his younger son, William, who assumed the dignity of emperor of Germany Jan. 18, 1871.

AUGUST NIEMANN.

**Hoho'kus**, tp. and post-v. of Bergen co., N. J., on the Erie R. R., 23 miles N. by W. of Jersey City. Pop. 2632.

**Ho'kah**, tp. and post-v. of Houston co., Minn., on the Southern Minnesota R. R., 6 miles W. of La Crosse, Wis. Pop. of v. 525; of tp. 1038.

**Hokendau'qua**, post-v. of Lehigh co., Pa., on the Lehigh River and the Lehigh Valley R. R., 4 miles N. of Allentown.

**Hoke's Bluff**, tp. of Etowah co., Ala. Pop. 1049.

**Hol'bach, von** (PAUL HENRI THÉRY), BARON, b. at Heidelberg, in the Palatinate, in 1723. He went at an early age to Paris, where he married and spent his whole life. D. Jan. 21, 1789. His father had left him a large fortune, and in his rich and elegant house he gathered, with the greatest hospitality, a large circle of literary men. At his dinner-parties, which took place twice a week, Helvétius, D'Alembert, Diderot, Raynal, Grimm, Buffon, Rousseau, Marmontel, and others met, learned to know each other, and discussed their ideas with the utmost freedom. The baron himself was a man both of knowledge and talent, and a very prolific author. His first works, *Le Christianisme dévoilé* (Amsterdam, 1767), *Esprit du Clergé* (London, 1767), and *De l'imposture sacerdotale* (Amsterdam, 1767), made an attack on Christianity more open, direct, and vehement, than any to which it hitherto had been exposed. The Christian doctrines are declared to be an incoherent mass of fiction, the Christian morals to be inferior to most other moral systems, and the influence of Christianity to have been very detrimental to the development of the human race in every social, political, and moral respect. In a second series of writings, *Le système de la nature* (London, 1770), *Le bon sens, ou idées naturelles opposées aux idées surnaturelles* (Amsterdam, 1772), and *Le système social* (Amsterdam, 1773), he gives the positive, systematic development of those materialistic and atheistic views which in the first series are given under form of criticism only. All these writings contain hardly anything new or original. D'Holbach repeated the ideas of Voltaire and D'Alembert, of Diderot and Helvétius; he only pushed them farther. Indeed, he pushed the ideas of the Encyclopedists so far that the Encyclopedists themselves would not acknowledge them. His style is dry or sentimental, affected or trivial. But his influence is said to have been very great. He reached layers of society to which philosophy never before had penetrated, and his



cynical ideas are often recognizable during the first years of the Revolution. Personally, he was a good and kind-hearted man, without pretensions. He wrote his books under different pseudonyms, and for a long time even his most intimate friends knew nothing of his authorship.

**Holbein** (HANS), called THE YOUNGER, b. at Augsburg, Bavaria, in 1494, or perhaps even a few years earlier, received his first instruction from his father, a painter of some note. The days of his youth were spent in Bâle, and as early as 1512 his brilliant talent had attracted great attention, and he received large orders both for private houses and public buildings. Erasmus admired his work, and with a letter of introduction from him to Sir Thomas More he went to England in 1526. After living three years in More's house, he was introduced to the king, and Henry VIII. was so charmed by his pictures that he made him court-painter and heaped both honors and money on him. D. in London in 1533, of the plague. In accuracy of drawing, in truth and richness of coloring, Holbein surpassed all contemporary painters in Germany, and stands, indeed, among the greatest painters of the world. His portraits especially are excellent, and he produced a great number, which are scattered among all the larger European galleries. He painted a portrait of Erasmus which the latter preferred to the one engraved by Dürer. One of his finest pictures is the portrait of his friend and patron, Boniface Amerbach, to whom we owe the collection of Holbein's drawings and paintings now at Bâle. While in England, Holbein painted or drew not only the king, but his queens, Jane Seymour and Anne of Cleves, Prince Edward, and nearly every distinguished nobleman and noble woman of his court, besides distinguished commoners. These pictures and drawings are a splendid possession alike for art and for history. Holbein worked for the engravers, but to what extent is not precisely known. Two important series, *The Dance of Death* (see DANCE OF DEATH) and *Pictures from the Old Testament*, are ascribed to Holbein. One of the most famous pictures by Holbein is the *Madonna of the Meyer Family*, in the gallery of Dresden. This is now, however, believed to be a copy, probably by Holbein's own hand, of the original in the palace of the dukes of Darmstadt. Many of Holbein's best pictures have been engraved, and nearly all his finest drawings photographed, the last chiefly by Braun. (See *Hans Holbein der jüngere*, von Ulrich Hegner (Berlin, 1827), a well-executed, useful work, which only needs revision to take its place among the standard books on the subject; *Holbein und seine Zeit*, by Alfred Woltmann (Leipzig, 1867, 2 vols. and appendix; 2d ed. 1 vol., 1874), a book absolutely necessary to the student for its facts, but ill-arranged, and, critically, little to be depended on; the second ed. is full of contradictions of the first; *Life and Works of Holbein*, by R. N. Wornam (1 vol., London, 1867), almost useless from its want of arrangement, its slipshod style, and its want of the critical spirit.)

CLARENCE COOK.

**Holberg** (LUDVIG), b. Nov. 6, 1684, in Bergen, Norway; studied at the University of Copenhagen; travelled in Holland, France, and Northern Italy, and stayed for one and a half years at the University of Oxford; was in 1718 appointed professor at the University of Copenhagen; accumulated great wealth, which he bequeathed to an educational institution, the Academy of Sorø; was created a baron in 1747, and d., unmarried, Jan. 27, 1754. His sound practical ideas, and clear, solid reasoning, sustained by learning and seasoned by humor, made his works on history, *Ecclesiastical History*, *History of Denmark*, *Jewish History*, *Lives of Great Men and Women*, and on philosophy, *Epistles and Moral Meditations*, a most influential element in the Danish civilization. (For his comical writings see DANISH LANGUAGE AND LITERATURE.)

**Holbrook**, a beautiful post-v. and tp. of Norfolk co., Mass., on the Old Colony R. R., 14 miles S. of Boston. It has a large manufacture of boots and shoes, a free library, a town-hall, a fire department, and good public schools. It was incorporated in 1872, before which time it was called EAST RANDOLPH.

**Holbrook** (ALFRED), b. at Derby, Conn., in 1816, son of Josiah Holbrook, a prominent and philanthropic educator and inventor. The son was for a time pupil of Elizur Wright in the academy at Groton, Mass. Though possessed of remarkable inventive talents and of a decided taste for civil engineering, he devoted himself to the work of instruction; founded a large and successful institution, chiefly for the training of teachers, at Lebanon, O. Author of a volume of *Lectures* on the subject of education.

**Holbrook** (JOHN E.), M. D., b. in Beaufort, S. C., Dec. 31, 1796; d. in Norfolk, Mass., Sept. 8, 1871. He was carried North when an infant; graduated in 1815 at Brown University, and took the degree in medicine at the Uni-

versity of Pennsylvania. After visiting the hospitals of Europe, he commenced the practice of his profession in Charleston, S. C., and upon the organization of the Medical College of South Carolina was assigned to the chair of anatomy, which he occupied for more than thirty years. Dr. Holbrook would never attend an obstetrical case nor perform a surgical operation, yet as a lecturer on anatomy he was seldom equalled. He possessed a peculiar talent for description, and a minute comprehension of comparative anatomy. His reputation rests especially upon his investigations as a naturalist. In 1842 he published his great work on herpetology, and this, with the unfinished one on the fishes of South Carolina, gave him high distinction. His friend, the late Prof. Agassiz, said before the Natural History Society of Boston, "I well remember the impression made in Europe, more than five and thirty years ago, by his work on the North American reptiles. Before then, the supercilious English question, so effectually answered since, 'Who reads an American book?' might have been repeated in another form, 'Who ever saw an American scientific work?' In that branch of investigation Europe had at that time nothing to compare with it." Author of *American Herpetology* (5 vols., 1842), and of unfinished works on *Southern Ichthyology* and the *Ichthyology of South Carolina*.

PAUL F. EVE.

**Holcomb**, tp. of Dunklin co., Mo. Pop. 608.

**Holcombe** (AMASA), A. M., b. at Southwick, Mass., June 18, 1787, a farmer's son; when nineteen years old made surveyors' compasses, and at twenty began to compile almanacs, several of which he published. When twenty-seven he began to teach engineering, astronomy, and surveying; adopted the profession of civil engineer 1826; began to make telescopes in 1828, and had, it is believed, no competition from any other maker in the U. S. until 1842. He was a member of both branches of the State legislature, and was the recipient of several medals and other distinctions. The honorary degree of A. M. was conferred upon him by Williams College.

**Holcombe** (JAMES P.), b. in Lynchburg, Va., in 1820; was educated at Yale College and the University of Virginia, where he was for some years a law-professor. Author of *Leading Cases upon Commercial Law* (1847), *Digest of Decisions of the U. S. Supreme Court* (1848), *Merchants' Book of Reference* (1848), *Literature in Letters* (1868).

**Holcombe** (WILLIAM FREDERIC), M. D., b. at Sterling, Mass., Apr. 2, 1827; graduated at the Albany Medical College in 1850, and studied several years in Europe; became professor of ophthalmic and aural surgery in the New York Medical College, surgeon to the New York Ophthalmic Hospital, and secretary and librarian of the New York Genealogical and Biographical Society.

**Holcombe** (WILLIAM H.), M. D., b. at Lynchburg, Va., in 1825; was educated at Washington College, Va., and studied medicine in the University of Pennsylvania; has practised his profession in Lynchburg, Cincinnati, and New Orleans. In 1852 he became a homœopathist. He has published *How I became a Homœopath* (1867), *Scientific Bases of Homœopathy* (1855), *Yellow Fever* (1856), *Poison* (1860), *Our Children in Heaven* (1868), *The Sexes* (1869), besides numerous brochures and contributions to homœopathic and Swedenborgian periodical literature.

**Holcroft** (THOMAS), b. in London Dec. 10, 1745, a shoemaker's son; served for a time as a stable-groom at Newmarket; became an actor, and then an author; was arrested for high treason in 1794, being a member of the Society for Constitutional Information, but was released without trial. D. Mar. 23, 1809. Author of 30 plays, besides novels, poems, translations, etc., some of which are of an irrelevant tendency. His noteworthy works are *The Road to Ruin*, a comedy (1792), still popular; *The Life of Trenck* (1788), from the German; *Hermann and Dorothea* (1801), translated from the German of Goethe; *Memoirs* by himself, finished by Hazlitt (3 vols., 1816).

**Hold**, a compartment or series of compartments in a ship, below the lowermost deck. The hold extends fore and aft the whole length of the ship. In it are stored portions of the cargo, the ship's stores, ballast, etc.

**Hold**, a musical character ♯, placed over a note, signifying a pause, or the holding of the note longer than its proper time. The hold may also be placed over a rest or a double-bar, or as an indication of the end of a canon or other piece.

**Holdbrook's**, tp. of Cabarrus co., N. C. Pop. 1115.

**Holden**, post-tp. of Penobscot co., Me., 6 miles S. E. of Bangor. Pop. 758.

**Holden**, post-tp. of Worcester co., Mass., 52 miles from Boston, on the Boston Barre and Gardner R. R. It is a good farming town, with abundant water-power, manufac-



tures of woollen, cotton, and other goods, 3 churches, and numerous small villages. Pop. 2062.

**Holden**, post-tp. of Goodhue co., Minn. Pop. 1199.

**Holden**, post-v. of Johnson co., Mo., 50 miles S. E. of Kansas City, on the Missouri Pacific and the Missouri Kansas and Texas R. Rs. It has 4 churches, 2 banks, 1 newspaper, 4 dry-good stores, 2 hardware and agricultural implement stores, 2 boot and shoe stores, 3 jewelry stores, 2 hotels, 1 mill, etc. Holden is situated in a fine farming section; timber, coal, and building-stone are plenty. Pop. 1576. G. N. RICHARDS, ED. "ENTERPRISE."

**Holden**, tp. of New Hanover co., N. C. Pop. 2056.

**Holden**, tp. of Wayne co., N. C. Pop. 751.

**Holden** (OLIVER), the composer of the psalm-tune *Coronation* and other excellent pieces; was a carpenter, and afterwards a music-teacher and the keeper of a musical bookstore; d. at Charlestown, Mass., in 1831. Published *American Harmony* (1793), the *Worcester Collection* (1797), and other tune-books, and was one of the pioneers of American psalmody.

**Hol'derness**, post-tp. of Grafton co., N. H., 36 miles N. of Concord. It has manufactures of lumber, boxes, etc. Pop. 793.

**Hol'dich** (JOSEPH), D. D., b. Apr. 20, 1804, at Thorney, Cambridgeshire, Eng.; came in 1818 to the U. S.; entered the Methodist ministry in 1822; was stationed in Philadelphia, New York, and other cities; received the degree of A. M. from Princeton in 1828; that of D. D. from La Grange College 1843; was 1835-36 assistant professor, and 1836-49 professor, of moral science and belles lettres in the Wesleyan University, Middletown, Conn.; became in 1849 corresponding secretary of the American Bible Society. Author of *Life of Wilbur Fisk* (1842), of *A. H. Ward* (1839), *Bible History* (1833), and other works.

**Hold'ing-note**, in musical compositions of two or more parts, a note sustained or prolonged in one of the parts while the others are in motion. In fugues, and in adagio, andante, and legato movements, holding-notes are of constant occurrence, and give unity, compactness, and a binding effect to the general texture of the harmony.

**Holed**, tp. of Somerset co., Me. Pop. 1.

**Holins'hed** (RAPHAEL or RALPH), M. A., an English chronicler who d. between 1578 and 1582. He took the master's degree, probably at Cambridge, and was perhaps a clergyman. Almost nothing is known of his life, but his fame is perpetuated by the *Chronicles of England, Scotland, and Ireland* (2 vols. folio, 1577), but he was not the sole author, for Harrison, Stow, Fleming, Staniburst, Thin, Hooker, and others prepared large portions. There is no doubt that Shakspeare found abundant material for his historical plays in the pages of Holinshed.

**Hol'kar**, the name of a family of Mahratta chieftains who have played a conspicuous part in the history of India during the two last centuries, and often proved themselves formidable enemies of the British empire in Hindostan. Mulhar Rao Holkar was the founder of the family. He was born in 1693, received in 1736 the western part of Malwah, with Indore for its capital, and d. 1765. But the most remarkable member of the family was Jeswant Rao Holkar, a natural son of Tokhagi Holkar, who reigned from 1801 to 1811. Although he was defeated at Indore (Oct. 14, 1801) by Dowlat Rao Sindia, his reputation for valor and energy was so great that a part of the victorious army went over to his side, and next year (Oct. 25, 1802) he entirely routed Sindia at Poona. Sindia took refuge with the British, and now a war began between Holkar and the British, which was carried on with various success to Dec. 24, 1805, when peace was concluded and Holkar compelled to give up some maritime districts, and bind himself to take no Europeans into his service. He d. insane, and was succeeded by his son, Mulhar Rao Holkar, who reigned from 1811 to 1833. He began war against the British in 1817, but was defeated, and under the peace of Jan. 6, 1818, an English residency was established at Indore. The present ruler of Indore, Mulkerji Rao Holkar, who came into power in 1852 and remained true to the English in 1857, is not of the Holkar family, though he bears the name; with Kumbdi Rao Holkar the family died out in 1852.

**Hol'land**. See NETHERLANDS.

**Holland**, North and South, two provinces of the Netherlands, adjacent and very similar in all natural and social relations. The ground is very low, and must be protected against inundations of the North Sea and the Zuyder-Zee by artificial dams and dykes. It is everywhere intersected by rivers, the Rhine, Yssel, Lek, Maas, and Merwede, and canals. But the soil is very fertile, and marvellously well cultivated. The rearing of cattle and the production of butter and cheese are the main pursuits of

the inhabitants, but many other kinds of industry are carried on with success. North Holland has an area of 955 square miles, with 602,539 inhabitants; the area of South Holland is 1162 square miles, with 710,753 inhabitants. The principal towns of North Holland are Amsterdam, Haarlem, and Alkmaar; of South Holland, The Hague, Leyden, Rotterdam, and Gouda. (See NORTH HOLLAND CANAL and NORTH SEA CANAL of HOLLAND.)

**Holland**, post-tp. of Shelby co., Ill. Pop. 1352.

**Holland**, post-tp. of Hampden co., Mass., 70 miles W. S. W. of Boston, on the Connecticut line. Pop. 344.

**Holland**, post-v. of Ottawa co., Mich., on the Chicago and Michigan Lake Shore R. R. It contains 1 college, 1 public school, several churches, 5 papers, 2 tanneries, 1 savings bank, 3 hotels, 3 drug-stores, and 1 iron-ore smelting furnace, with the usual number of shops, etc. The town was settled by Hollanders, who form three-fourths of the present population. Pop. of v. 2319; of tp. 2353.

WM. BENJAMINSE, PUB. "DE HOLLANDER."

**Holland**, tp. and post-v. of Erie co., N. Y., on the Buffalo New York and Philadelphia R. R., 26 miles S. E. of Buffalo. The township has 4 churches, 3 cheese-factories, and manufactories of lumber, leather, etc. Pop. 1451.

**Holland**, post-tp. of Orleans co., Vt., on the Canada line, 59 miles N. E. of Montpelier. It has manufactures of lumber and shingles. Pop. 881.

**Holland**, post-tp. of Brown co., Wis. Pop. 1279.

**Holland**, tp. of La Crosse co., Wis. Pop. 819.

**Holland**, tp. of Sheboygan co., Wis. Pop. 2704.

**Holland** (HENRY), BART., M. D., D. C. L., F. R. S., b. at Knutsford, Cheshire, England, Oct. 27, 1788; graduated M. D. at Edinburgh 1811; was for many years a physician in ordinary to Queen Victoria, and one of the most popular men, professionally and socially, in London. He several times visited the U. S., and travelled extensively in Europe and Asia. His second wife, a daughter of Sydney Smith, and a writer of ability, d. Nov. 2, 1866. Sir Henry was the author of several books on various subjects; the most important are *Medical Notes and Reflections and Recollections of Past Life* (1871). D. Oct. 28, 1873.

**Holland** (HENRY RICHARD VASSALL-HOLLAND), LORD, b. in Wiltshire Nov. 21, 1773; succeeded in 1774 to the peerage as the third Lord Holland of the Fox family, but his patronymic was changed from Fox to Vassall in 1797, the latter being the family name of his wife, the divorced Lady Webster, by whom he had had a son, the late Gen. Charles R. Fox, b. before the divorce. Holland was a man of fine manners and most amiable character. His uncle, Charles James Fox, trained him up to liberal political principles, and he was educated at Eton and Christ Church, Oxford; he was (1806) made a commissioner and plenipotentiary for settling disputes with the U. S.; was lord privy seal 1806-07; chancellor of the duchy of Lancaster 1830-40. D. at Kensington Oct. 22, 1840. Lord Holland was a most brilliant debater and parliamentary tactician, the steady friend of every political reform, and had a large personal following of strongly attached social and political friends. He did much to develop a taste for Spanish literature. Author of *Life and Writings of Lope de Vega Carpio* (1806), *Three Comedies from the Spanish* (1807), *Foreign Reminiscences* (1830), *Memoirs of the Whig Party* (1852), and other works.

**Holland** (JOSIAH GILBERT), M. D., b. at Belchertown, Mass., July 24, 1819; graduated at Berkshire Medical College, Pittsfield, and practised medicine three years; was for a short time an editor in Springfield, Mass., and for one year superintendent of schools Vicksburg, Miss. He was (1849-66) editorially connected with the *Springfield Republican*, and in 1870 became editor of *Scribner's Monthly*, New York. His works, some of them published under the name of "Timothy Titcomb," are a *History of Western Massachusetts* (1855), *The Bay Path*, a novel (1857), *Letters to the Young* (1858), *Butter Sweet*, a poem (1858), *Gold and Iron* (1859), *Miss Gilbert's Career*, a novel (1860), *Lessons in Life* (1861), *Letters to the Joneses* (1863), *Three Talks on Familiar Subjects* (1865), *Life of Lincoln* (1866), *Kathleen*, a poem (1867), *The Miracle Prophecy* (1872), *Arthur Remond Castle* (1873), *Garnered Sheaves*, poems (1873), *The Mistress of the Manor* (1874).

**Holland** (SIR NATHANIEL DANSE), b. in London in 1734; studied in Rome, and painted portraits and landscapes; but having married a wealthy lady and become a baronet and member of Parliament, he gave up art. D. at Winchester in 1811.

**Holland** (PHILEMON), b. at Chelmsford in 1531; studied at Cambridge; became master of the free school of Coventry; and d. Feb. 9, 1636. He gave the first English translation of Livy, Suetonius, Ammianus Marcellinus, Pliny, and Plutarch's *Moralia*.



**Holland Island**, tp. of Dorchester co., Md., consisting of Bloodworth Island, Holland Island, etc. Pop. 141.

**Holland Patent**, post-v. of Trenton tp., Oneida co., N. Y., on the Utica and Black River R. R., 12 miles N. from Utica. It has 6 churches. Pop. 320.

**Hollansburg**, a v. of Harrison tp., Darke co., O. Pop. 239.

**Hollár** (WENZEL), b. at Prague in 1607; attracted the attention of the earl of Arundel, ambassador to the German emperor, and followed him in 1636 to England; became implicated during the time of the Commonwealth in political affairs, and was imprisoned for a short time; joined then the earl of Arundel at Antwerp in 1645, and returned with him in 1652 to England, where he d. Mar. 28, 1677. His most celebrated engraving is that of Holbein's *Dance of Death*.

**Hollenback**, tp. of Luzerne co., Pa. It has beds of anthracite coal. Pop. 1393.

**Hollingsworth**, tp. of Montgomery co., N. C. P. 695.

**Holley**, post-v. of Orleans co., N. Y. It has 4 churches, 1 weekly newspaper, 1 bank, 1 hotel, 1 furnace, foundry and machine-shop, 2 lumber and coal yards. Pop. about 1000. C. MARSH, PUB. "STANDARD."

**Holley** (ALEXANDER LYMAN, C. E.), b. July 20, 1822, at Lakerville, a part of Salisbury tp., Conn.; graduated at Brown University 1853, and was technically educated at the Corliss Steam-Engine Works. From 1856 to 1861 he edited and contributed to various engineering newspapers, and published his *Railway Economy*, and, in connection with the late Zerah Colburn, a *Report on European Railways*. In 1864 he published his *Treatise on Ordnance and Armor*. In 1865 he introduced the Bessemer process into America, and built the first steelworks at Troy, N. Y. He afterwards built Bessemer steelworks and rolling-mills at Harrisburg, Troy, Chicago, Joliet, and Pittsburg, and is now consulting engineer to a number of iron and steel works.

**Holley** (HORACE), LL.D., b. at Salisbury, Conn., Feb. 13, 1781; graduated at Yale 1803; studied law, and then divinity; was pastor of the Hollis street church, Boston, 1809-18; became a Unitarian; president of Transylvania University, Ky., 1818-27; went to New Orleans to take charge of a seminary, but fell sick and d. on the passage thence to New York July 31, 1827.

**Hollidaysburg**, post-b., cap. of Blair co., Pa., 7 miles from Altoona, on a branch of the Pennsylvania R. R. It has 2 rolling-mills, 2 nail-factories, 2 furnaces, and 3 foundries, a large and flourishing female seminary, 2 newspapers, 7 churches, a fine court-house and jail, and a national bank. Its industries are principally manufacturing. Pop. 2952. DAVID OVER, ED. "REGISTER."

**Hollins** (GEORGE N.), b. at Baltimore, Md., Sept. 20, 1799; appointed midshipman U. S. navy in 1814, and was with Com. Decatur on the frigate President when she was captured by the British, and held as prisoner at Bermuda during the remainder of the war; subsequently served with Decatur in the war with Algiers, and at its close commanded an East India merchant ship. In 1825 was commissioned lieutenant U. S. navy, rising to be captain 1855. In 1854 he commanded the Cyane, and gained considerable notoriety by the bombardment and destruction of the town of Greytown (San Juan de Nicaragua). In 1861 he resigned from the U. S. navy, but his resignation was not accepted, though he effected his escape, and, joining the Southern cause, was appointed commodore in the Confederate navy. On the morning of Oct. 12, 1861, before dawn, with the ram Manassas, three fire-rafts, and five armed steamers, he surprised the U. S. squadron blockading the mouths of the Mississippi, causing much confusion, but in reality effecting scarcely any damage, although he sent exaggerated despatches announcing a great victory, and was made naval commandant at New Orleans. He was, however, superseded before the decisive attack of Admiral Farragut in 1862. D. Jan. 18, 1878. G. C. SIMMONS.

**Hollis**, tp. and v. of Peoria co., Ill., on the Illinois River, 8 miles below Peoria, at the junction of the Peoria, Pekin and Jacksonville and the Toledo Peoria and Warsaw R. Rs. Pop. of tp. 980.

**Hollis**, post-tp. of York co., Me., on the Portland and Rochester R. R., 18 miles S. W. of Portland, has 3 churches, and manufactures of woollens and lumber. Pop. 1541.

**Hollis**, tp. and post-v. of Hillsborough co., N. H., 7 miles from Nashua and 3 miles from the Worcester and Nashua R. R. It has a high school, 1 church, a town-hall, and a library containing 1800 volumes. Large quantities of lumber and some 70,000 casks are annually manufactured. Principal occupation, farming. Pop. of tp. 1079. S. H. KEELER.

**Hollis** (THOMAS), a successful merchant of London, b. in England in 1659. In 1721 he founded the Hollis professorship of divinity in Harvard College, and in 1727 founded a professorship of mathematics and natural philosophy; he also presented books for the library, and considerable sums of money. Several others of the Hollis family were benefactors of the college. *A Life of Thomas Hollis* was published by T. B. Hollis (1786). Thomas Hollis, Sr., was a Baptist, though a member of an Independent church, and was distinguished for his charities both to Baptist and Independent churches. D. Feb., 1731.

**Hollister**, post-v., cap. of San Benito co., Cal., 94 miles S. of San Francisco. It contains 1 seminary, a graded public school, 5 church organizations, 3 public halls, and 2 telegraph and 1 express office. It derives its trade from agriculture, stock-raising, and quicksilver-mining. There are 2 weekly newspapers, about 30 business-houses, 1 steam flouring-mill, 1 brewery, 2 lumber-yards, and 4 hotels and stables. The principal tobacco plantations of California are near the town, and the quicksilver and coal developments are rich and promising in the mountain-ranges. Pop. about 2000. F. W. BLAKE, ED. "ADVANCE."

**Holliston**, post tp. of Middlesex co., Mass., 26 miles S. W. of Boston, on the Milford branch of the Boston and Albany R. R. It has important agricultural interests, manufactures of boots, shoes, nails, pumps, wrenches, etc., 1 national and 1 savings bank, 4 churches, a high school, and a free library. Pop. 3073.

**Holloman**, tp. of Darlington co., S. C. Pop. 1590.

**Hollow**, tp. of Bladen co., N. C. Pop. 1243.

**Holloway** (THOMAS), b. in London in 1718, and d. at Coltishall, near Norwich, in 1827. He engraved the illustrations to the English translation of Lavater's *Physiognomy*, but his most celebrated work is his engravings of the cartoons of Raphael.

**Holloway's**, tp. of Person co., N. C. Pop. 1279.

**Hollow Creek**, post-tp., Lexington co., S. C. P. 1315.

**Hollow Poplar**, tp. of Yancey co., N. C. Pop. 382.

**Hollow Square**, tp. of Hale co., Ala. Pop. 3360.

**Hollowville**, or **Smoky Hollow**, post-v. of Claverack tp., Columbia co., N. Y. It has manufactures of woollens, candles, lumber, etc.

**Hollow-ware** includes cast and wrought iron domestic utensils. The casting of the best kinds of hollow-ware is followed by turning and annealing, and sometimes by enamelling, tinning, or japanning. Excellent wrought-iron ware is now produced by pressing, there being no joints left in the work. (See *HARDWARE*, by L. P. BROCKETT, A. M., M. D.)

**Holly**, the name of various shrubs and small trees, chiefly of the genus *Ilex* and order Aquifoliaceæ. They are mostly evergreens, with rich green leaves and red berries. The typical species is *I. Aquifolium*, the European holly, whose leaves are so highly prized for Christmas decoration. Its bark yields bird-lime, and has medicinal powers. The finest American species is the *I. opaca*, a small tree, used also in Christmas decoration, but its appearance is far inferior to that of the former species. The wood of both the above species is very hard and white, and is used by turners, inlayers, and carvers. *I. Cassine* and other species yield the "yaupon tea" of the Carolinas and the "black drink" of the Creek Indians. Paraguay tea (see *MATE*) is produced by certain South American hollies. The U. S. have some twelve or fourteen species of *Ilex*, mostly unimportant shrubs, some with deciduous leaves, besides one, the mountain holly, *Nemopanthes Canadensis*, of another genus closely allied. The sea-holly or sea-holm of Europe is the *Eryngium maritimum*.

**Holly**, tp. of Van Buren co., Ark. Pop. 153.

**Holly**, tp. and post-v. of Oakland co., Mich., at the crossing of the Flint and Père Marquette and the Detroit and Milwaukee R. Rs., 52 miles from Detroit. It has fine schools and churches, a high-school building which cost \$50,000, 7 hotels, manufactures of flour, castings, furniture, and other goods, and a large trade. Ice is extensively shipped from this vicinity, which is one of the most fertile and attractive in the State. A State insane asylum is to be opened in the vicinity. The village has 2 national banks, a weekly newspaper, railroad machine-shops, etc. Pop. 1429; of tp. 2457. HENRY JENKINS, ED. "REGISTER."

**Holly**, tp. of New Hanover co., N. C. Pop. 1016.

**Holly**, tp. of Webster co., W. Va. Pop. 612.

**Holly Grove**, tp. of Gates co., N. C. Pop. 1213.

**Hollyhock**, the name of certain biennial plants of the genus *Althæa* (*A. rosea*, *fififolia*, *Chinensis*), tall Old-World herbs, much cultivated in gardens for their flowers, of which there are many varieties, single and double. The



culture of these plants for forage purposes has been proposed. The stalks abound in a fibre which may be utilized as paper-stock.

**Holly Neck**, tp. of Nansemond co., Va. Pop. 3275.

**Holly Springs**, post-tp. of Dallas co., Ark. Pop. 636.

**Holly Springs**, post v., cap. of Marshall co., Miss., on the Mississippi Central R. R., 43 miles S. E. from Memphis, Tenn. It has 1 foundry, 1 hub and spoke factory, 3 wagon-factories, 3 potteries, 1 marble manufactory, 1 savings-bank, 2 newspapers, 2 hotels, 6 schools, 7 churches, and 42 stores. It ships annually 23,000 bales of cotton. Pop. 2406. CALHOUN & HOLLAND, Eds. "REPOINTER."

**Hol'lywood**, tp. of Carver co., Minn. Pop. 534.

**Hol'man City**, a v. of Paris tp., Oneida co., N. Y. Pop. 75.

**Holman** (JAMES), "the blind traveller," b. in England 1791; entered the royal navy 1798; commissioned a lieutenant 1807; invalided 1810; became blind 1812; was appointed a naval knight of Windsor, and in 1819 began to make his journeys, which extended to all parts of the world. He published some seven volumes of travels, and his books had at one time considerable currency. D. in London July 29, 1857.

**Holman** (JOSEPH GEORGE), b. at London 1764; was educated at Queen's College, Oxford; appeared as Romeo at Covent Garden 1784, and soon became a rival of Kemble on the British stage; came to the U. S.; was for some time manager of a theatre in Charleston, S. C.; was very successful for some years in the U. S. D. at Rockaway, L. I., of yellow fever, Aug. 24, 1817. Author of several comic operas and comedies.

**Holm'boe** (CHRISTOPHER ANDREAS), b. at Vang, Norway, in 1796; studied Oriental languages in Christiania and Paris, and became in 1822 professor at the University of Christiania. The most prominent of his writings are—*De prisene re monetaria Norvegia* (1841), *Sanskrit und Old-norsk* (1846), *Det Oldnorske Værdn* (1848), *Det norske Sprøgs væsentligste Ordforraad, sammenlignet med Sanskrit* (1852), *Norsk og Keltisk* (1854). As a member of various commissions he has exercised a great and beneficial influence on educational affairs in Norway.

**Holm'del**, tp. and post-v. of Monmouth co., N. J., 6 miles S. of Raritan Bay. Pop. 1415.

**Holmes**, county of Florida, bounded on the N. by Alabama. Area, about 390 square miles. Much of its surface is covered with heavy pine timber. It is traversed by the navigable Choctawhatchie River. Rice and cotton are the chief crops. Cap. Cerro Gordo. Pop. 1572.

**Holmes**, county in N. W. Central Mississippi. Area, 940 square miles. It is traversed by the navigable Yazoo River and the Mississippi Central R. R. Its surface is diversified, its soil productive. Cotton and corn are staple crops. Cap. Lexington. Pop. 19,370.

**Holmes**, county of N. E. Central Ohio. Area, 420 square miles. Its surface is rolling, the soil productive. Cattle, grain, wool, and flour are staples. Coal has been found. It is traversed by the Cleveland Mt. Vernon and Delaware R. R. Cap. Millersburg. Pop. 18,177.

**Holmes**, tp. of Mackinac co., Mich., bounded on the S. by Lake Huron. Pop. 938.

**Holmes**, tp. of Crawford co., O. Pop. 1572.

**Holmes** (ABEL), D. D., LL.D., b. at Woodstock, Conn., Dec. 24, 1763; graduated at Yale in 1783, and was a tutor there 1786-87; held Congregational pastorates at Midway, Ga., 1785-91, and at Cambridge, Mass., 1792-1832. He married a daughter of President Stiles, and after her death a daughter of Hon. Oliver Wendell. He published *Annals of America*, a work of permanent value (2 vols., 1805, enlarged ed. 1829); *Life of President Stiles* (1796); papers on Stephen Pannemius; on the Mohican Indians; biography of John Lothrop, and many others in the *Massachusetts Historical Collections*. He received the degree of D. D. from Edinburgh University. D. June 4, 1837. He was the father of Dr. Oliver Wendell Holmes.

**Holmes** (DAVID), son of Col. Joseph Holmes of Frederick co., Va.; was in Congress 1797-1809; governor of Mississippi Territory 1809-17; governor of the State of Mississippi 1817-19 and 1823-27; U. S. Senator 1820-23. D. near Winchester Aug. 20, 1832.

**Holmes** (GABRIEL), b. in Sampson co., N. C., in 1769; was educated at Harvard College; became a lawyer; State senator 1827; governor of North Carolina 1821-24; in Congress 1825-29; also general of militia, besides holding other public positions of honor. D. in Sampson co., N. C., Sept. 26, 1829.

**Holmes** (GEORGE FREDERICK), b. in British Guiana in 1820; educated in England at Durham University. When

eighteen years old he came to the U. S., and was a teacher in Virginia, Georgia, and South Carolina, and in 1842 was admitted to the bar of South Carolina by the legislature, although not naturalized. He was for a time assistant editor of the *Southern Quarterly Review*, and in 1845 accepted a professorship in Richmond College, Va. In 1846 he was chosen president of the University of Mississippi; in 1847 professor of history, political economy, and international law in William and Mary College, and in 1857 professor of history and literature in the University of Virginia. He is the author of a series of school books for the Southern States.

**Holmes** (ISAAC EDWARD), b. at Charleston, S. C., Apr. 6, 1796; graduated with honors at Yale 1815; became a lawyer of his native town 1818; was one of the founders of the South Carolina Association and a leader of the extreme States' Rights party; was an able and distinguished member of Congress 1839-50; resided in California 1850-61; strove to avert the civil war in 1861. D. at Charleston Feb. 24, 1867. Author of the *Reveries of George Tell-tale*, and, with R. J. Turnbull, of *Ceciliensis* (1826), a political work.

**Holmes** (JOHN), b. at Windsor, Vt., in 1799. While preparing for the Methodist ministry he became a Roman Catholic; afterwards studied in the Montreal Seminary; was a professor in Nicolet College; became a priest and home missionary. In 1828 he was appointed a professor, and afterwards principal, of the Quebec Seminary, and in 1836-37 was government commissioner to Europe and the U. S. to examine the normal schools. After 1838 he retired from public life. D. at Lorette, Quebec, in 1852. He published *Manuel abrégé de géographie* and *Conférences de Notre Dame de Québec* (1850).

**Holmes** (JOHN), b. at Kingston, Mass., Mar., 1773; graduated at Brown University 1796; removed in 1799 to what is now Maine, and became a prosperous lawyer of the town of Alfred; was very prominent in the convention which drew up the constitution of Maine 1820; was in Congress 1817-20; U. S. Senator 1820-27 and 1829-33; in the legislature 1829 and 1835-38; U. S. district attorney 1841-43; was distinguished for wit and eloquence. Author of *The Statesman*, or *Principles of Legislation and Law* (1810), etc. D. at Portland, Me., July 7, 1843.

**Holmes** (MARY J.), b. in Brookfield, Mass. Her maiden name was HAWES, and she is a niece of the late Joel Hawes, D. D. She was married to Mr. Daniel Holmes, a lawyer, then of Richmond, Ontario co., N. Y., and has since then resided in Versailles, Ky., and at Brockport, N. Y. She has written a large number of very popular novels, mostly of an unambitious or domestic character, and of excellent moral tendency.

**Holmes** (OLIVER WENDELL), M. D., a son of Dr. Abiel Holmes, b. at Cambridge, Mass., Aug. 29, 1809; graduated at Harvard in 1829; studied law for a time, and afterwards medicine, receiving his doctor's degree in 1836, after several years' attendance in the European hospitals. In 1833 he became professor of anatomy and physiology in Dartmouth, and in 1847 was called to the same chair in the Massachusetts Medical School, Boston. He is distinguished as an accurate anatomist, a skilful microscopist and auscultator, and a successful amateur photographer, but his widest fame is as a poet, wit, and man of letters. The first collected edition of his poems appeared in 1836. His Phi Beta Kappa poems, *Poetry* (1836), *Peperichore* (1843), *Urania* (1846), and *Astrea* (1850), gave him fresh laurels; and his *Autocrat of the Breakfast Table*, *Professor at the Breakfast Table*, and *Poet at the Breakfast Table*, all originally published in the *Atlantic Monthly*, were a series of brilliant prose papers, with occasional poems, nearly all in his happiest vein of mingled humor, pathos, healthy sentiment, and practical wisdom. His after-dinner poems and other short lyrics are among the best of their kind in the language. He has written also various medical addresses, papers, and pamphlets: *Currents and Counter-currents in Medical Science* (1861), *Elsie Venner*, a romance (1861), *Songs in Many Keys* (1861), *Scandals from the Atlantic* (1861), *The Goodman Angel* (1868), and *Mechanics in Thought and Words* (1870).

**Holmes** (THEOPHILUS HUNTER), b. in North Carolina in 1805; graduated at the U. S. Military Academy 1829; first lieutenant 7th Infantry 1831; captain 1838; brevet major for conduct at Monterey 1846; major 8th Infantry 1855; resigned in 1861; commanded a Confederate brigade in reserve at Manassas, and afterwards held command at Aquia; with the rank of lieutenant general he held (1862-64) a command in Arkansas, attacked Helena July 3, 1863, and was repelled with heavy loss. D. Mar. 31, 1864. He possessed a large amount of property in his native State.

**Holmesburg**, a v. of Philadelphia co., Pa., now within the limits of Philadelphia, on the Pennsylvania R. R.



It contains good public and private schools, 5 churches, public halls, a library, 1 newspaper, shovel and print works, 1 steam saw and planing mill, a grist-mill, 2 hotels. Principal occupation, agriculture and mechanical pursuits. Pop. about 1500. W. F. KNOTT, Ed. "GAZETTE."

**Holmes City**, post-tp. of Douglas co., Minn. P. 452.

**Holmesville**, post v. of Prairie tp., Holmes co., O., on the Cleveland Mt. Vernon and Delaware R. R., 6 miles N. of Millersburg. Pop. 209.

**Holm Oak**, or **Holly Oak** (*Quercus Ilex*, the *Ilex* of Roman authors), a beautiful evergreen oak tree of Southern Europe and Northern Africa, prized for its beauty, as well as for the great excellence and durability of its timber.

**Holoceph'ali** [from *ῥῆος*, "entire," and *κεφαλή*, "head"], an order of selachians distinguished by the confluence of the hyomandibular bone with the cranium; the coalescence of the maxillary and palatine elements with the skull; the development of a rudimentary operculum; and the existence of a single external gill-opening on each side behind the head. To this order belongs a single existing family (Chimeridae), represented by three living genera and numerous extinct forms. In all the living forms the body is elongated, and terminates in a slender fin. THEODORE GILL.

**Holofer'nes**. See JUDITH.

**Holopho'tal**. See LIGHTHOUSE ILLUMINATION, by PROF. J. HENRY, LL.D.

**Holoptych'ius** [Gr. *ῥῆος*, "all," and *πτυχή*, "wrinkle," alluding to the appearance of the scale], an extinct genus of lepidogonoid fishes with imbricated bony scales. There are numerous species found in Devonian and Carboniferous strata in both hemispheres. There are, however, marked differences between the Carboniferous and the Devonian species. Some of these fishes were of great size.

**Holos'tomi** [from *ῥῆος*, "complete," and *στόμα*, "mouth"], a group, and probably sub-order, of eels, but distinguished as an order by Prof. Cope, who has attributed to it the following characters: "Epiclavicle suspended to fourth vertebra, post-temporal wanting. Parietals in contact. Mouth bounded by the premaxillaries, which are in contact medially, and bounded behind by maxillary. Symplectic present; vertebrae unaltered; no pectoral fin. Third superior pharyngeal not smaller than fourth." In addition to these characters, the pectoral fins are absent, and the vertical fins quite rudimentary and reduced to mere folds of the integument; the anus is situated very far backward; the gill-openings are confluent in a single outlet under or near the throat; and the ovaries have oviducts. This group has been formed for the reception of two families of eel-like fishes confined to the tropical regions—viz. (1) Symbranchidae, represented in both the East Indies and America, and (2) Amphipnoide, confined to Bengal. THEO. GILL.

**Holothur'ians** [from *Holothuria*, one of the genera: Gr. *ῥῆος*, "whole," and *ὄρυον*, a "mouth," an "opening"], or **Holothuroi'dea**, an order of echinodermatous radiates, including the highest in rank of radiate animals, having a long, cylindroid, somewhat worm-like body, with no calcareous shell, and with a row of appendages around the mouth. Instead of a shell, there is a leathery rind, capable of much expansion and contraction, in which there are calcareous particles. There are several families, some of which have locomotive suckers. The trepang or *bêche de mer* (*Holothuria edulis*) and sea cucumber (*Pentacta frondosa*) of the North Atlantic are typical species. The individuals are bisexual. Some of the tropical kinds are very beautifully colored.

**Hol'stein**, a former duchy which belonged to Denmark, whose king, as duke of Holstein, was a member of the German confederation, but which in 1866 was annexed to Prussia, and now, together with Sleswick, forms a part of the North German confederation. It is situated between the Baltic and the German Ocean, and between the Elbe and the Eider, which separate it respectively from Hanover and Sleswick. Its western part is marshy, and so low that it must be protected from inundation by dykes, but it is very fertile and presents excellent grazing grounds; the central part is heathy and sandy; the eastern part fine soil fitted for agriculture. The rearing of cattle and the production of butter and cheese, together with agriculture, are the main branches of industry. Area, 3230 square miles. Pop. 592,182. Principal cities, Kiel and Altona. It now constitutes a portion of Sleswick-Holstein, a province of Prussia.

**Holste'nius** (LUCAS), b. at Hamburg in 1596; studied at Leyden; travelled in Italy and France; was converted to Catholicism; became librarian to the cardinal Barberini, and afterwards at the Vatican; and d. at Rome in 1661. He wrote a great number of *dissertationes* and *epistolae*, which have been published since his death.

**Hol'ston River** rises in Smyth co., Va., by two heads,

the N. and S. forks, which unite at Holston boatyard, near Kingsport, Tenn., and flows S. W. 200 miles to Kingston, Tenn., where it joins the Clinch and forms the Tennessee River. It is navigable for light-draft boats throughout, and for large steamers to Knoxville for nine months in the year. It is a beautiful stream, with no dangerous rapids. It is proposed to extend navigation by artificial means for some distance up its forks. Its affluents, the French Broad, the Little Tennessee, and the Watauga, are navigable to some extent.

**Holt**, county in the N. W. of Missouri, separated by the Missouri River, its S. W. boundary, from Kansas and Nebraska. Area, 470 square miles. Its surface is varied. Cattle, grain, wool, and lumber are the staple products. The county is traversed by the Council Bluffs and St. Joseph R. R. Cap. Oregon. Pop. 11,632.

**Holt**, county of Nebraska, bounded N. by Dakota. Area, 2515 square miles. Its N. border is washed by Keya Paya and Niobrara rivers. It is also traversed by the Elkhorn and other streams, and contains choice farming and grazing lands.

**Holt**, post-tp. of Taylor co., Ia. Pop. 356.

**Holt**, tp. of Fillmore co., Minn. Pop. 784.

**Holt** (Col. JOHN SAUNDERS), b. in Mobile, Ala., in 1826, and comes of an old family of Bedford co., Va.; was educated in New Orleans and at Centre College, Danville, Ky.; is a lawyer of Woodville, Miss.; served both in the Mexican and the civil wars; and has written three successful tales of Southern life—*The Life of Abraham Page, Esq.*, *What I Know about Ben Echols*, and *The Quines*.

**Holt** (Sir JOHN), b. at Thame, Oxfordshire, England, 1642; studied law and became a prominent advocate; in 1685 he was appointed recorder of London, administering the responsible duties of his office with much ability until the following year, when, by opposing a court measure, he became unpopular and was removed. Subsequently he held the office of sergeant-at-law. In the Convention Parliament which proclaimed William and Mary as king and queen he displayed such ability as to attract the notice of William (prince of Orange), who upon his accession to the throne (1689) appointed Holt lord chief-justice of the king's bench. Subsequently the king offered him the office of the great seal, but this he declined, and remained chief-justice until his death, which occurred at London in 1709. He was celebrated for his unbending firmness, strict integrity, and justice. As a jurist he was also very highly regarded.

**Holt** (JOSEPH), b. in Breckenridge co., Ky., Jan. 6, 1807; educated at St. Joseph's College, Bardstown, and at Centre College, Danville; in 1828 he entered upon the practice of law at Elizabethtown, Ky., removing to Louisville in 1832, and the following year was attorney for Jefferson circuit. In 1835 he removed to Port Gibson, Miss., where he practised his profession with great success until 1842, when he returned to Louisville. In 1857, Pres. Buchanan appointed him commissioner of patents, and in 1859 to a seat in his cabinet as postmaster-general. Upon the resignation of John B. Floyd (Dec., 1860), which Buchanan quietly accepted, Gen. Holt was appointed to succeed him as secretary of war, and during the eventful months which preceded as well as on the occasion of the inauguration of Pres. Lincoln, he actively co-operated with the general-in-chief in maintaining order and suppressing threatened traitorous outbursts at the capital. He subsequently made a report detailing the facts of the intended seizure of the capital. His next service was as a member of the commission appointed to investigate the military claims against the department of the West. In Sept., 1862, Pres. Lincoln selected him as judge-advocate-general of the army, with the rank of colonel, which he accepted, and upon the establishment of the bureau of military justice in June, 1864, was retained at its head with the same title, but with the increased rank of brigadier-general. In this capacity he has borne a conspicuous part in the various important courts-martial, courts of inquiry, and military commissions—notably that before which were arraigned the assassins of Pres. Lincoln. Retired Nov., 1875. G. C. SIMMONS.

**Hol'ton**, city, cap. of Jackson co., Kan., on the Kansas Central (narrow gauge) R. R., 56 miles W. of Leavenworth. It has 2 banks, 5 churches, a high school, 2 hotels, a steam flouring-mill, and 1 weekly newspaper. It is in an excellent fruit and stock region, has good timber, building-stone, and fine streams. Pop. 426.

F. A. ROOT, Ed. "EXPRESS AND NEWS."

**Holton** (SAMUEL), b. at Danvers, Mass., June 9, 1738; was a physician of his native town; a prominent colonial legislator and an ardent patriot, holding important public offices in his province; assisted in forming the Confederation 1777; was in Congress 1778-83, 1784-87, and 1793-95; judge of probate 1796-1815; twenty-seven years a State councillor,



and was for a time a justice of the common pleas; was also eminent as a practitioner. D. Jan. 2, 1816.

**Hölyty** (LUDWIG HEINRICH CHRISTOPH), b. at Mariensee, near Hanover, Dec. 21, 1748; studied theology at Göttingen, but was of a very delicate constitution, and d. at Hanover Sept. 1, 1776. After his death his lyrical poems were published by Voss and Stolberg in 1783, and attracted much attention on account of the sweet, elegiac feeling which pervades them and the delicate harmony of their form.

**Holtz'endorff, von** (FRANZ), b. at Vietmannsdorf, Prussia, Oct. 14, 1829; studied at Berlin, Heidelberg, and Bonn, and became in 1861 professor of jurisprudence at the University of Berlin. He wrote *Französische Rechtszustände* (1859), *Die Deportation als Strafmittel* (1859), *Das französische Strafrechtssystem* (1859), *Principien der Politik* (1869), *Encyclopädie der Rechtswissenschaft* (1870), *Handbuch des Deutschen Strafrechts* (1874).

**Holtzendorff** (KARL FRIEDERICH), b. at Berlin Aug. 17, 1764; entered the military service in 1778 under his father, who was an eminent general of artillery; became lieutenant in 1781; distinguished himself in Poland in 1794; was wounded at Halle in 1806; took part in the defence of Dantzig in 1807; and commanded the artillery of the army of Bülow in 1814, and of that of Blücher in 1815. D. at Berlin Sept. 29, 1828.

**Holtzmann** (ADOLF), b. at Carlsruhe May 2, 1810; studied theology at Berlin, Old German at Munich, Sanscrit at Paris, and was in 1852 appointed professor of German language and literature at the University of Heidelberg. His most prominent writings are—*Ueber den Umbau* (1847), *Ueber den Abbau* (1841), *Indische Sagen* (1843-45), *Elten und Germanen* (1855), *Nibelungenlied* (1855), *Klage* (1859).

**Holy Alliance**, a compact entered into at Paris Sept. 26, 1815, by the sovereigns of Russia, Austria, and Prussia, joined by most of the other European powers, and published Feb. 2, 1816. It for ever excluded all members of the Bonaparte family from any throne in Europe, expressed the intention of the contracting powers to live together in Christian harmony, and exhorted the people to faithful daily fulfilment of Christian duties. Thus they concealed the chain they had welded with which to restrain the progress of liberal ideas in Europe.

**Holy Coat of Treves**, a garment preserved in the cathedral of Treves, in Germany, which was declared by Pope Leo X. in 1514 to be the veritable seamless garment worn by Jesus Christ at his crucifixion, and for which the soldiers cast lots. This coat, it is alleged, was left at Treves by the empress Helena in the fourth century. No less than nine other holy coats have been exhibited, and in 1843, Pope Gregory XVI. pronounced that of Argenteuil in France to be the true one. The one at Treves was lost for a season, and rediscovered in 1196. It has been from time to time exhibited, when hundreds of thousands of pilgrims flock to see it, as in 1844. Among the consequences of this last exhibition was the secession of Johann Ronge and his numerous followers from the Church.

**Holy Communion**. See EUCCHARIST, by F. A. P. BARNARD.

**Holy Communion, Sisters of the**, a society of ladies of the Protestant Episcopal Church, founded in New York in 1815 by the Rev. Dr. W. A. Muhlenberg. They are not bound by vows, and do not wear a strictly uniform habit. They are devoted to the care of the sick in hospitals and to other charitable labors.

**Holy Cross, Congregation of the**, an association of regular clerks, founded by the Abbé Moreau in 1834. Their present rule was approved in 1856, in which year the Brotherhood of St. Joseph was merged into this congregation. They were introduced into the U. S. in 1842, and have now numerous establishments here. There is a congregation of Canons Regular of the Holy Cross (anciently called Crutched Friars in England), founded by Theobald de Celles 1211. They have a college at Watertown, Wis., and are numerous in continental Europe; called also Croisiers and Cross-bearers.

**Holy Cross, Sisterhood of the**, founded 1831 by the Abbé Moreau, at Mans, Belgium. Their rule was approved in 1857. There are two orders of "Daughters of the Cross" and one of "Sisters of the Cross," independent of the above.

**Holy Ghost, or Holy Spirit** [Heb. *Ruah Elohim* and *Ruah Jehovah*; Gr. *πνεῦμα ἁγίου*], the Spirit of God, of Christ, of the Lord, etc., is the third Person of the Trinity, whose existence, character, and offices are revealed in the Bible. Sax. *ghost*, Ger. *geist*, Dan. *and*, Heb. *ruah*, Greek *πνεῦμα*, Lat. *spiritus*, Eng. *spirit*, all originally mean

"wind," then "breath," then "life," then the self-conscious, intelligent, self-determined, thinking substance of God, angels, and man. The term *πνεῦμα ἁγίου*, "Holy Ghost," in Scripture and Christian theology, does not designate the spiritual substance common to the three Persons of the Godhead, but the third Person or Hypostasis existing in the unity of that substance. We propose here a condensed statement (I.) of the scriptural and Church doctrine as to his personality, divinity, procession, and offices; (II.) of the history of opinion on the subject; (III.) its literature.

I. SCRIPTURAL AND CHURCH DOCTRINE OF THE HOLY GHOST. 1. *His Personality*.—The attributes of personality are intelligence, will, individual subsistence; and in Scripture all of these are predicated of the Spirit. (1) He uses the pronoun "I," and the Father and Son use the pronouns "he" and "him," when speaking of him (Acts xiii. 2; John xv. 26 and xvi. 13, 14); "When he (*ἐκεῖνος*) shall come . . . he shall glorify me." (2) His functions all imply distinct personal subsistence: he "speaks," "searches," "selects," "reveals," "reproves," "testifies," "leads," "comforts," "distributes to every man as he wills," "knows the deep things of God," "is grieved," etc. (Acts xiii. 2; 1 Cor. ii. 10, 11 and xii. 11; 1 Tim. iv. 1). (3) All Christians profess personal allegiance to the Holy Spirit precisely as to Father and Son. They are baptized *εἰς τὸ ὄνομα*—into the name of the Father, and of the Son, and of the Holy Ghost (Matt. xxviii. 19). If the two former are Persons, the latter must be. Hence he is our Sanctifier and Comforter. (4) Blasphemy against the Holy Ghost, and the possibility of "resisting," "grieving," and "doing despite to" him, imply his personality (Matt. xii. 31, 32; Mark iii. 28, 29; Luke xii. 10; Acts vii. 51; Heb. x. 29; Eph. iv. 30). (5) This has been from the beginning the common faith of all historical churches. (See *Nicene and Athanasian Creeds*; *Thirty-nine Articles of Church of England*; *Articles of Methodist Episcopal Church*; *Westminster Conf. of Faith*, ch. 2, § 3; *Anglican Confession*, art. 1.)

2. *His Divinity*.—(1) He is called by the exclusive names of God. What Jehovah says in the Old Testament the New Testament writers ascribe to the Holy Ghost. (Cf. Isa. vi. 9 with Acts xviii. 25, and Jer. xxxi. 31-34 with Heb. x. 15; see Acts v. 3, 4.) (2) Divine attributes are predicated of him: (a) omnipresence (Ps. cxxxix. 7; 1 Cor. xii. 13); (b) omniscience (1 Cor. ii. 10, 11); (c) omnipotence (Luke i. 35; Rom. viii. 11). (3) Divine works are ascribed to him: (a) creation (Gen. i. 2; Job xxvi. 13; Ps. civ. 30); (b) inspiration (Heb. iii. 7; 2 Pet. i. 21); (c) miracles (1 Cor. xii. 9-11); (d) spiritual regeneration (John iii. 6; Tit. iii. 5). (4) Divine worship is to be paid to him (Matt. xxviii. 19; 2 Cor. xiii. 14; Matt. xii. 31, 32).

3. *The Procession of the Holy Ghost* is a technical phrase, originating in John xv. 26 ("the Spirit of truth which proceedeth from the Father"), and used by theologians to express the essential relations of the Holy Ghost to the other Persons of the Trinity. The teachings of Scripture and of the whole Church, Roman and Protestant, involve the following points: (1) There is but one God, and he is indivisible. Therefore there is but one indivisible substance which is God. (2) This one whole substance subsists eternally as three equal Persons, the entire substance subsisting as each Person concurrently. (3) The Scriptures reveal (so far forth) the nature and relations of each Person by their names and relative notions. The Father is always first, the Son second, and the Spirit third. The terms Father and Son express an eternal reciprocal relation. The Father eternally begets the Son. The Spirit is the infinite personal "Breath" of God, as the Son is his infinite personal "Word." He is the "Spirit of God" and "from God" (*ἐκ τοῦ Θεοῦ*, 1 Cor. ii. 12), and the "Spirit of the Father," "who proceedeth from the Father" (*ὁ ἀπὸ τοῦ πατρὸς ἐκπορεύεται*, John xv. 26). He is also the Spirit "of the Son" and "of Christ" (Rom. viii. 9; Gal. iv. 6). He is sent by and acts for the Father; so he is sent by and acts for the Son (John xvi. 7, 11). (4) Hence, the Athanasian Creed concludes *εἰς* 20 22, "the Father was made from none, nor created, nor begotten. The Son is from the Father alone, neither made nor created, but begotten. The Holy Ghost is from the Father and the Son, neither made nor created nor begotten, but proceeding." This the Church proposes not as an explanation, but simply as a statement of scriptural data. (See *PROCESSION*.)

The GENERATION of the Son is an eternal constitutional (non-volitional) act of the Father, whereby he communicates his whole divine essence to the Hypostasis of the Son, whereby the Son is the "express image of the Father's Person" and "the brightness of his glory." The PROCESSION or SPIRATION of the Holy Ghost is a like eternal act of the Father and of the Son, whereby they communicate their whole common substance to the Hypostasis of the Holy Ghost, whereby he becomes their consubstantial per-



sonal Breath. As these acts are eternal, they are neither past nor future, but present, without beginning or ending.

4. *His Offices in Nature.*—The "Spirit" or personal "Breath" is the Executive of the Godhead, as the "Son" or "Word" is the Revealer. The Spirit of God moved upon the face of Chaos and developed Cosmos (Gen. i. 2). Henceforth he is always represented as the author of order and beauty in the natural as of holiness in the moral world. He garnished the astronomical heavens (Job xvi. 13). He is the organizer and source of life to all provinces of vegetable and animal nature (Job xxxiii. 4; Ps. civ. 29, 30; Isa. xxxii. 14, 15), and of enlightenment to human intelligence in all arts and sciences (Job xxxii. 8 and xxxv. 11; Ex. xxxi. 2-4).

5. *His Offices in Redemption.*—Christ promised his disciples on the eve of his crucifixion that he would send them the Spirit of truth as another Comforter, *παράκλητος*, *Paraclete*, *Advocatus* (Patron, Counsel, Champion, Helper, etc.; also applied to Christ himself, 1 John ii. 1). Although he had been the divine agent effecting the salvation of men ever since Adam, it is said this Paraclete was not given until after the ascension and glorification of Christ (John vii. 39 and Acts ii. 32, 33); that is, he is now given with a universality, fulness, power, and clearness of manifestation infinitely surpassing that of the past. The present is the dispensation of the Spirit in contrast with the preceding preparatory dispensation of the Law. (1) The Spirit fashioned the body of Christ in the womb of the Virgin, enriched and supported his human soul, and co-operated with him in all the offices he performed in his estate of humiliation (Luke i. 35; Isa. xi. 1, 2; John i. 32 and iii. 34). (2) He inspired the writers of both the Old and the New Testaments as to thoughts and words (Mic. iii. 8; 1 Cor. ii. 10-13). (3) He teaches those who are spiritually minded the meaning of Scripture (1 Cor. ii. 14, 15), and applies to all the redemption purchased by Christ (John xvi. 13, 14). Hence he is called the "Spirit of grace" (Heb. x. 29), "of wisdom and understanding" (Isa. xi. 2), "of truth" (John xvi. 13), "of adoption" (Rom. viii. 15), "of prophecy" (Rev. xix. 10), "of promise" (Eph. i. 13), and "of glory" (Pet. iv. 14). He regenerates, sanctifies, and preserves the souls and raises the dead bodies of the saints (John iii. 6; Rom. xv. 16 and viii. 11). He is to the Church and to the individual Christian the immanent source of life—*τὸ ζωοποιόν*, the *Life-Giver*. (4) He is the bond of life and the organizing principle of the historic Church on earth (1 Cor. xii. 13), and Church teachers and rulers are properly only the organs of the Holy Ghost (2 Tim. i. 13, 14).

6. *Blasphemy against the Holy Ghost* (Matt. xii. 31, 32; Mark iii. 29, 30; Heb. vi. 4-6 and x. 26, 27; 1 John v. 16).—This appears to be an intelligent, deliberate, and malignant "speaking against," and rejection of, the Spirit of grace by one who has been under his special influence. It is never pardoned, because of its peculiar guilt, and because it is a definite and final rejection of Christ's salvation. (See SCHAFÉ, *Sin against the Holy Ghost* (1841).)

II. HISTORY OF OPINION. 1. *The State of Opinion in the Early Church, and the Definition of the Universal Church Doctrine by the Council of Constantinople*, A. D. 381.—The Christian Church from the beginning expressed its faith in the terms of the (so-called) Apostles' Creed, which acknowledges a Trinity of divine Persons. Nevertheless, the prevalent conceptions were very vague and variable (see testimony of GREGORY NAZIANZEN, *Orat. 31, De Spiritu sancto*, cap. 5), the majority regarding the Spirit as more decidedly subordinate to the Son than the Son to the Father. The complete statement of the final faith of the Church was introduced into the Nicene Creed by the Council of Constantinople (A. D. 381) in these words: "And I believe in the Holy Ghost, the Lord, the Giver of Life, who proceedeth from the Father and the Son [this phrase, "*filioque*," was added by the Council of Toledo (A. D. 589), and was accepted by the Latins and all Protestants, and rejected by the Greeks], who with the Father and Son is to be worshipped and glorified, who spake by the prophets." For the most detailed of the universally received definitions see the Athanasian Creed (A. D. 450). These Creeds, either in form or substance, have been adopted by all historical churches.

2. *Heretical Views.*—Some of the Gnostics considered the Holy Ghost and Christ two celestial *Æons*, generated to restore the disturbed harmony of the Pleroma. The Alogians and other ancient deniers of the divinity of Christ regarded the phrase Holy Ghost as another name for the single person of God. The Sabellians held that it designates one mode of divine operation and the phase of divine revelation peculiar to the present dispensation. The Arians and Semi-Arians regarded the Holy Ghost as the first and greatest creature of Christ, of superangelic but not divine perfection. After the Council of Nice these parties were

called *Macedonians*, *Pneumatomachi*, and *Tropici*. All modern Arians and Socinians interpret the phrase Holy Ghost as a designation of the energy of God manifested in action. De Wette says the Spirit is God operative in nature; Schleiermacher says he is God operative in the Church.

III. LITERATURE. — *Nicene and Athanasian Creeds*; HASE'S *Collection of Lutheran* and NIEMLYER'S *Collection of Calvinistic Confessions*; HAGENBACH'S *Hist. of Doctrines*; SHEED'S *Hist. of Christ. Doctrines*; NEANDER'S and SCHAFÉ'S *Histories of the Christian Church*; WATSON'S *Theo. Institutes*; HEFFALE'S *History of Councils*; OWEN'S *Discourse concerning the Holy Spirit*; JULIUS CH. HARE'S *Mission of the Comforter*; HANVELL'S *Hist. of the Three Creeds*; *The Paraclete*, anon.; PEARSON *On the Creed*; *American Quarterly Church Review*, Apr., 1868, Art. 5. A. A. HODGE.

**Holy Ghost, Orders of the** (the Roman Catholic). (1) An order, at first consisting of hospital knights of St. Augustine, was founded in 1178 by Guido of Montpellier, and in part removed to Rome in 1204, receiving the hospital of Sassia. Here they became in part canons regular, and after many vicissitudes the knightly branch of the order ceased in 1700 to exist, but the canons regular are not yet extinct. In 1254 the Hospitallers of the Holy Ghost, a secular branch of the above, were organized, containing both brethren and sisters. The latter, called White Sisters, are still numerous and active in benevolent works. With them became connected another sisterhood of the Holy Ghost, established in 1212. (2) Another congregation of canons of the Holy Ghost was confirmed in 1588. (3) A society of missionary priests of the Holy Ghost was founded in 1700, and is still active.

**Holyhead**, seaport town of North Wales, on an island of the same name as the town, forming the western part of Anglesea co., and connected with the main portion of Anglesea by a huge causeway and a bridge. The island is mainly a barren rock, but the town contains numerous fine buildings. It is a parliamentary borough. Pop. 18. Holyhead is most notable for the breakwater by which harbor accommodation is provided for the packet service between England and Ireland, and at the same time an important harbor of refuge is constituted. The successful bridging for military purposes of the Menai Straits by Stephenson's tubular bridge decided a mooted question as to the terminus of the great railway route between London and Dublin and choice of site for harbor in favor of Holyhead. The breakwater, commenced in 1847, was planned by the late J. M. Rendel. On his death, Mr. John Hawkshaw became the superintending engineer, under whom the work was finally completed in 1873. As originally planned, it was one mile in length, forming, in conjunction with islands, an almost close harbor of 267 acres. A subsequent extension of 2500 feet has added an area of 400 acres of "sheltered roadstead." It consists of 7,000,000 tons of stones thrown in "à pierre perdue," surmounted by a vertical wall starting from low-water line near the inner edge and rising 35½ feet above low water, three-fourths of its height being masked and protected by a long fore-shore of "rip-rap." Behind this wall, and 12 feet lower than its top, is a terrace or quay 40 feet wide. The average depth of water being 40 feet and tidal rise 18 feet, the stone mound has necessarily great dimensions, averaging 225 feet width at low water and (in 50 feet depth) 400 feet at base. The enormous quantities of stone (quartz rock from the neighboring Holyhead Mountain) required gave rise to some of the largest and most interesting quarrying operations ever undertaken. Shafts or "headings" of large dimensions were run into the rock, in which charges amounting sometimes to the enormous amount of ten tons of powder were exploded. The breakwater cost £1,500,000. (See article BREAKWATER, and *Engineering*, Sept. 26, 1873.)

**Holy Innocents.** See CHILDREMAN.

**Holy Island, or Lindisfarne**, an island (a peninsula at low tide) off the E. coast of England, in the county of Durham; lat. 55° 46' N., lon. 1° 47' W.; 3 nautical miles N. of the Farne Islands proper. Lindisfarne in 635 became a bishop's see, and was the episcopal seat of St. Cuthbert. In 900 the see was transferred to Durham. Holy Island is a favorite bathing-place, and its old castle and ruined abbey are interesting objects.

**Holy League**, a name applied to several alliances of European princes for war or defence. (1) That of 1511, between the pope, Julius II., Spain, and Venice, to expel the French from Italy. It lasted till the Truce of Orthes (1513). (2) That of Nuremberg (1538), between Charles V. and the Catholic princes of Germany against the League of Schmalkald. (3) That of 1571, of the pope, Venice, and Spain against the Turks. (4) The great league of the Guises, the French Parliament, the monks, Spain, and the pope against the Huguenots (1576). (See LEAGUE, THE.)



(5) That of 1609 between the pope and the Catholic states of Suabia and Bavaria. (6) That of 1684, Poland, Germany, and Venice, against the Turks.

**Holy Maid of Kent**, an epileptic maid-servant of an inn at Aldington, Kent, who in 1525 acquired a great reputation for sanctity and prophetic gifts. Her name was Elizabeth Barton. She became a nun of St. Sepulchre's, Canterbury, and her pretensions were favored by Archbishop Warham and Bishop Fisher. Presuming to denounce the judgments of Heaven against King Henry VIII. in case of his persistence in his suit for divorce from Catharine of Spain, she with five priests, her alleged accomplices, was attainted of high treason and beheaded, Apr. 21, 1534.

**Holy Names of Jesus and Mary, Sisters of the**, a Roman Catholic sisterhood, first established at Longueuil, near Montreal, in 1843, by Mmes. Durocher, Dufresne, and Céré. Their special work is the instruction of young ladies.

**Holyoke** (GEORGE JACOB), b. at Birmingham, England, Apr. 13, 1817; became a teacher of mathematics at the mechanics' institute of that city, and edited for many years *The Reasoner*, an organ of political and religious radicalism. Intellectually a positivist, and morally a utilitarian, he believes that there is a material state of the world in which it is impossible for man to be depraved and poor; and to produce this state is the aim of his reforms. He published in 1874, in London, a *History of Co-operation* (2 vols.).

**Holyoke**, city of Hampden co., Mass., on the Connecticut River R. R., and the terminus of the Holyoke and Westfield R. R. It has 9 churches, 2 national banks, 2 savings banks, 3 hotels, a public library, 1 semi weekly and 1 weekly newspaper, 28 schools and 1800 pupils, and a granite city-hall costing above \$370,000. It has an immense water-power, and contains 17 paper-mills, 8 cotton-mills, 4 woollen-mills, 1 wife-mill, 1 grist-mill, 1 reed-factory, 1 lumber manufactory, and 3 planing-mills. New waterworks have just been completed at a cost of \$250,000. It has a free bridge across the Connecticut River, connecting it with South Hadley. Pop. 10,733.

W. S. LOOMIS, ED. "TRANSCRIPT."

**Holyoke** (EDWARD AUGUSTUS), M. D., LL.D., a centenarian and eminent physician and surgeon of Salem, Mass., was a son of the Rev. Edward Holyoke (1689-1769), who was president of Harvard College. Dr. Holyoke was b. at Marblehead, Mass., Aug. 1, 1728, and graduated at Harvard in 1746. In 1749 he began his practice at Salem, where he remained actively engaged in his profession seventy-nine years. He was temperate in his habits, ate much fruit, walked habitually in his professional business, and took great care to have abundant sleep. D. at Salem, Mar. 31, 1829, aged one hundred years and eight months, retaining his faculties in a good degree to the last. (See his *Memoir*, 1829.)

**Holyoke, Mount**, a steep, narrow ridge of greenstone trap in Hampshire co., Mass., separating the towns of Hadley and Amherst on the N. from South Hadley and Granby on the S. It is 7 miles long, and terminates in Belchertown on the E. Its W. extremity is separated from Mount Tom by a cleft through which the Connecticut River flows. The name is appropriately limited to the W. extremity, where there is a hotel upon the summit, which is reached by a railway whose cars are drawn up by a stationary engine. The highest point is 1120 feet above the sea. Mount Holyoke is well timbered, and some parts formerly abounded in rattlesnakes, which are, however, becoming very rare.

**Holy Rood.** See TRUE CROSS.

**Holy Sepulchre**, the tomb in which our Lord lay. It was hewn out of a rock in a garden in the place of the crucifixion, just outside the walls of Jerusalem. In the opinion of many, the spot has not yet been identified, and never will be. The traditional site, fixed upon early in the fourth century, is a cave underneath the pile of buildings known as the Church of the Holy Sepulchre. The edifice, begun by Constantine in 326 and destroyed in 335, was destroyed by the Persians under Chosroes in 614; rebuilt after about sixteen years; destroyed again by Khalif Hakim, the Fatimite, in 1049; again rebuilt in 1048; enlarged and improved by the crusaders after 1099; suffered severely from fire in 1808; and in 1810, after extensive repairs, was consecrated anew. In Fergusson's opinion, the architecture of the edifice is "wholly of an age subsequent to that of the Crusades, and without a trace of the style of Constantine." It contains chapels for Greeks, Latins, and Armenians, with smaller apartments for Copts, Jacobites, and Maronites. The pretended miracle of the Holy Fire on Easter Eve each year is one of the greatest scandals in history. The identity of this traditional site, first disputed by

Korte, the German bookseller, in 1738, has been ably argued for by Williams (*Holy City*, 1845), and ably argued against by Robinson (*Biblical Researches*, 1841; *Later Researches*, 1846; *Bibliotheca Sacra*, 1846). Fergusson (*Ancient Topography of Jerusalem*, 1847) identifies the cave underneath the mosque of Omar with the holy sepulchre. Fisher How (1871) looks for it on the N. side of the city, just outside of the Damascus gate. Barclay (*City of the Great King*, 1858) and others look for it on the E. side of the city, just outside of St. Stephen's gate, either N. of it or S. of it.

R. D. HITCHCOCK.

**Holy Sepulchre, Orders of the.** (1) CANONS REGULAR AND CANONISSES OF (Augustinian), founded at Jerusalem in 1099 or 1114, spread throughout Europe. The canons ceased to exist in the seventeenth century, but there are still some nuns who live in seclusion and instruct children. (2) KNIGHTS OF THE HOLY SEPULCHRE, perhaps founded by Alexander III., and still found in small numbers. They are now appointed by the pope as guardian father, and by the patriarch of Jerusalem. An order of this name existed in England from 1174 to the seventeenth century. The Franciscans once had the sole right to confer this rank. At present the Latin patriarch of Jerusalem is grand master.

**Holy Spirit Plant, or Dove Plant**, the *Peristeria alata*, an orchideaceous plant of Central America, having white symmetrical floral envelopes, and the stamens and pistil united into a column which curiously resembles a bird with expanded wings. It is venerated in its native regions as the symbol of the Holy Dove, the form in which the Divine Spirit descended at the baptism of our Lord. The plant is not uncommon in cultivation.

**Holy Water**, in the Greek, Roman Catholic, and the various Oriental churches, water which has been consecrated by a priest and is used in religious ceremonies. Its use in churches is very ancient, and it is by many believed to be derived from a custom of the ancient Hebrews. In the Church of Rome it is composed of pure spring-water in which a little consecrated salt has been cast. The Greeks use pure water, and the faithful drink a portion of it at Epiphany and Christmas.

**Holy Week**, the last seven days of Lent, the week before Easter, popularly known in continental Europe as *Still Week*—often called *Passion Week*, but that name is also given to the week preceding it. It contains Palm Sunday, Spy Wednesday, Maundy or Holy Thursday, Good Friday, and Holy Saturday. It is a penitential season, in commemoration of our Lord's passion and death.

**Holywell**, town of Flintshire, North Wales. It received its name from the well of St. Winifred, which is said to be the most copious spring in England. In its vicinity are found the richest coal, lead, and copper mines in the country, and besides its manufactures of cotton and flannel Holywell has many establishments for lead and copper smelting. It is a rapidly growing town. Pop. 5235; with surroundings, 11,632.

**Homalop'idae** [from *ὁμαλός*, "flat," and *ὄψις*, "face"], a family of colubroid serpents with regular large plates on the head; plates on the abdomen uniserial, and behind biserial; and distinguished by the extension forward of the postorbital bones over the superciliary region, and the development of hypapophyses to the vertebrae as far backward as the anal region. This family, differentiated especially by the last-mentioned character, comprises a number of genera, among which are the North American ones *Tropidonotus*, *Thamnophis*, *Ninia*, *Storeria*, etc., *Haldia*, etc.

THEODORE GILL.

**Homalopter'idae** [from *ὁμαλός*, "flat," and *πτερόν*, "fin"], a family of eventognathous teleostcephalous fishes, characterized by the horizontal trend of the pectoral and ventral fins, the absence of an air-bladder, and the development of the pharyngeal teeth to the number of from ten to sixteen in a single series on each branch. The family includes two genera peculiar to the fresh waters of the East Indies, one of which (*Homalopterus*) has six barbels, and the other (*Psilopterus*) has none. The relations of the latter genus, however, are still uncertain, and require confirmation by anatomical investigations. THEODORE GILL.

**Homb'burg, or Homburg-vor-der-Höhe**, town of Central Germany, capital of the former huldgraviate of Hesse-Homburg. It is famous for its mineral springs and elegant bathing establishment, which, before the closing of the gambling-saloons, attracted more than 10,000 visitors annually. Pop. 8626.

**Home**, tp. of Nemaha co., Kan. Pop. 719.

**Home**, tp. of Montcalm co., Mich. Pop. 173.

**Home**, post-tp. of Brown co., Minn. Pop. 779.

**Home** (DAVID DE GLAS), b. near Edinburgh, Scotland,



Mar. 20, 1833; came in childhood to the U. S., and became distinguished as a spiritualistic medium, marvellous phenomena having, it is asserted, attended him from infancy. He has resided mainly in Europe since 1855; became a Roman Catholic in 1856; has been twice married, both his wives being Russian ladies of high birth; became secretary of the Spiritual Athenaeum, London, in 1866; is author of three volumes of an autobiographical character.

**Home** (Sir EVERARD), b. at Greenlaw Castle, Berwickshire, Scotland, May 6, 1756; studied medicine under John Hunter; practised in London 1790; was appointed surgeon to the court and professor of anatomy; created a baronet in 1813; and d. at Chelsea Aug. 31, 1832. His most prominent work is his *Lectures on Comparative Anatomy* (6 vols., 1814-28).

**Home** (HENRY). See KAMES, HENRY HOME.

**Home, or Hume** (JOHN), b. at Ancrum, Roxburghshire, Scotland, in 1722; studied theology at the University of Edinburgh; fought on the Hanoverian side in the rebellion of 1745; was appointed minister at Athelstaneford in 1746. In 1756 his tragedy of *Douglas* was produced at Edinburgh with great success, but the circumstance that it was written by a clergyman caused such a scandal that Home resigned his office in 1757. George III. gave him a pension and a sinecure office, and he continued to write tragedies—*Alonso*, *Alfred*, *Aquileta*, etc. He also wrote a *History of the Rebellion of 1745*, but his *Douglas* and the story connected with it have alone survived. D. in Edinburgh Sept. 5, 1808.

**Ho'melyn, Spotted Ray, or Sand Ray**, the *Rain miraletus*, a fish common in European seas. It is an abundant food-fish.

**Ho'mer**, post-v., county-seat of Banks co., Ga., 30 miles N. of Athens. Pop. 120.

**Homer**, city of Champaign co., Ill., on the Toledo Wabash and Western R. R., 20 miles S. W. of Danville, 273 miles S. W. of Toledo, O., and 89 miles E. of Springfield. It has 1 savings bank, 1 newspaper, 3 churches, 1 hotel, and 1 large flouring-mill. It is situated in a rich agricultural district, adapted to raising grain and fruit, which are annually shipped from this point in large quantities. P. 767. J. HARPER & SONS, PRBS. "PRESS."

**Homer**, tp. of Will co., Ill. Pop. 1279.

**Homer**, tp. of Benton co., Ia. Pop. 567.

**Homer**, tp. of Buchanan co., Ia. Pop. 581.

**Homer**, post-v., cap. of Claiborne parish, La., 50 miles from Shreveport. It has 2 institutions of learning, 3 churches, a large court-house, 2 newspapers, stores, shops, etc. Principal business, cotton-buying and merchandising. Pop. 80. D. B. HAYES, ED. "ADVOCATE."

**Homer**, post-v. and tp. of Calhoun co., Mich., on the Lake Shore and Michigan Southern and the Michigan Central R. Rs. It has an academy, 3 churches, large flouring-mills, a savings bank, 1 newspaper, 2 hotels, and a furnace. Pop. of v. 685; of tp. 1575.

W. A. LANE, ED. "INDEX."

**Homer**, tp. of Midland co., Mich. Pop. 247.

**Homer**, tp. and post-v. of Winona co., Minn. Pop. of v. 91; of tp. 837.

**Homer**, tp. and post-v. of Cortland co., N. Y., 27 miles S. of Syracuse, on the Syracuse Binghamton and New York R. R. Area, about 49 square miles. It contains an academy and graded school, 5 churches, a banking-house, 2 foundries, 4 dry-goods stores, 3 flouring-mills, 3 carriage and 1 firkin factory, an axe-factory, 1 newspaper, and 4 hotels, with a variety of smaller stores. Pop. of v. 2008; of tp. 3813. JOS. R. DIXON, ED. "REPUBLICAN."

**Homer**, post-v. of Burlington tp., Licking co., O., 3 miles W. from Utica. Pop. 226.

**Homer**, tp. of Medina co., O. Pop. 886.

**Homer**, tp. of Morgan co., O. Pop. 1690.

**Homer**, tp. of Potter co., Pa. Pop. 160.

**Homer**, post-v., county-seat of Angelina co., Tex., 90 miles from Marshall. Pop. 216.

**Homer**, the greatest of epic poets, and the earliest and most eminent author in the literature of Greece. He lived at so early a period that no certain record of its date has come down to us, and his birthplace is equally a matter of doubt. Herodotus places his birth about 850 years before Christ, and Aristotle makes him contemporary with the Ionian migration, about 140 years after the Trojan war. That it was many years after that war may be inferred from the frequent reference made by the poet to the superior size and strength of the warriors engaged in the siege of Troy, as a generation which had long before passed away. It is proverbially said that seven cities contended

for the honor of being Homer's birthplace, but, according to Suidas, the list might be nearly doubled. Two different traditions mentioned by Greek authors make him to have been born on the banks of the Meles, a little river, the windings of which are seen from the highlands overlooking Smyrna. It is inferred from the style and language of his poems that, at all events, he was born in some part of Asia Minor. One of the traditions concerning him is that he was blind, which is not improbable when we consider that blindness is generally accompanied with great tenacity of verbal memory—a quality essential to the minstrel who like Homer sang his poems to the sound of the harp. The tradition that in his later years he opened a school in the island of Chios might have had no other foundation than this, that after his time there existed in that island a fraternity called *Homeridae*, or Sons of Homer, who preserved among them his poems, and were, like him, minstrels by profession.

The fame of Homer rests upon his two great poems, the *Iliad* and *Odyssey*. Others have been ascribed to him—several hymns to the gods, for example—but though some of these were regarded by the ancients as genuine, they are now rejected as the productions of a later age. The common consent of the civilized world has placed his *Iliad* and *Odyssey* at an unapproachable height of poetic excellence. All the qualities which make the great poet are there—sublimity, fire, pathos, grace, knowledge of the human heart, the power of vividly representing action to the eye of the mind, and sweetness and majesty of numbers. The modern reader is sometimes oppressed or fatigued with the passages describing minutely and at length the bloody havoc which marked the path of Homer's warriors on the battlefield; but in that age, when all greatness consisted in military prowess, the Greek audiences may be supposed to have listened to them with enthusiasm. For the long speeches, also, made by the heroes of the *Iliad* when about to engage in combat, there must have been a reason which satisfied the listening crowd; for in that age, as there was no room for affectation, we may be sure there was no occasion for tediousness. The verses of Homer were addressed to the general mind; they were such as deeply to move from the highest to the lowest class a rude yet by nature a reflecting and highly endowed race of men.

Thus far in this article Homer has been spoken of as a single author, to whom the composition of both these poems has been truly ascribed. But about the time of the Christian era there were in Greece certain critics called Separatists, who maintained that the *Iliad* and the *Odyssey* were the work of different poets. The difference, however, between the style and treatment of the subject in the two poems is not greater than is observed between the *Paradise Lost* and *Paradise Regained* of Milton, and Longinus accounts for it with sufficient probability by supposing the *Iliad* to be the work of Homer's youth, and the *Odyssey* that of his declining years. But the personality of Homer as the author of these poems has been made in modern times the subject of a formidable attack. In 1795, F. A. Wolf, a German scholar of great learning and ingenuity, brought forward the theory that the Homeric poems were composed in portions, while the art of writing was little practised, by the different minstrels who sang them in the public assemblies, and afterward, when the art of writing became more general, collected and put together in the form and order which they now present. It was impossible, he urged, for one poet to compose and retain in memory works of such great length; but this is simply begging the question, for examples of recollection as remarkable as this are even now to be met with. A more plausible argument was founded on the discrepancies and inconsistencies in the narrative, which a careful analysis showed to be not infrequent. If these cannot be explained in any other way, the theory of Wolf must be accepted.

But there is this explanation. About the year 560 before Christ, Pisistratus, the tyrant of Athens, caused the different books of the Homeric poems to be collected and arranged in their proper order. In arranging the dispersed manuscripts chasms might occur, or portions might seem to want a proper connection. Here was both the opportunity and the temptation to interpolate, and the interpolation might be made without sufficient regard to the context. All manuscripts, especially of works so often transcribed as the Homeric poems in ancient times, are in danger of interpolation; and if we admit this, it is quite unnecessary to refer the different portions of the *Iliad* and *Odyssey* to different authors. Besides, the universal consent of antiquity in favor of the personality of Homer ought to count for something; and still more forcible is the consideration that the theory of Wolf would oblige us to suppose, what is hard to believe, that Greece could in any age produce a fraternity of men all of whom could write like Homer.



Notwithstanding the praise which has been bestowed upon the *Iliad* for the perfection of its plot, there are those who see in it only part of the narrative of the siege of Troy, without any proper conclusion or catastrophe. In his invocation the poet only promises to speak of the wrath of Achilles, and the calamities which it brought upon the Greeks as a consequence of the quarrel between him and Agamemnon. But he gives us much more than this. He relates the quarrel, the withdrawal of Achilles from the army, and the bloody successes of the Trojans while he indulges his anger. But in the nineteenth book Achilles and Agamemnon are reconciled, and then begin the disasters of the Trojans. Their soldiery is slaughtered, their champions are slain—Glaucus, Sarpedon, and finally Hector—and all Troy is in despair. The narrative breaks off at the most interesting moment of the siege. To those who take this view of the poem it seems not improbable that Pisisstratus, or those whom he employed to collect and edit the books forming the *Iliad*, might have failed to recover the concluding part of the original poem.

The editions of Homer are almost innumerable. His commentators have found an ample storehouse from which to obtain their notes in the work of Eustathius, bishop of Thessalonica. The translations of the Homeric poems into all the languages of civilized Europe have been numerous, and are still multiplying. WILLIAM CULLEN BRYANT.

**Homer** (WINSTON). See APPENDIX.

**Homerville**, post-v., county-seat of Clinch co., Ga., on the Atlantic and Gulf R. R., 122 miles S. W. of Savannah.

**Homes** (HENRY AUGUSTUS), LL.D., b. at Boston, Mass., Mar. 10, 1812; graduated at Amherst in 1830; was ordained in 1835 at Paris as a missionary of the *Eglise Reformée* to Turkey; served as a missionary of the American Board at Constantinople 1836-50; was assistant dragoman in the American legation to the Porte 1850-53; became in 1854 librarian of the State Library, Albany, N. Y.

**Home'stead**, post-v. of Iowa co., Ia., on the Chicago Rock Island and Pacific R. R., 20 miles W. of Iowa City.

**Homestead**, post-tp. of Benzie co., Mich. Pop. 163.

**Homestead Legislation in the United States.**

It is hardly necessary to remind the reader that in a large proportion of the States the English common law forms the basis of the body of the laws by which they are respectively governed. Among the dogmas of the common law which were adopted here with few or no limitations were those by which the relations of husband and wife were regulated in respect to the effect of marriage upon the property of the wife. It was a practical disfranchisement on her part, clothing the husband with the right of possession and enjoyment of her real estate, and of property in her personality, and merging her individuality of action or control over whatever she possessed at marriage in that of her husband.

Another principle borrowed, in part at least, from the laws of England, was from the first adopted in the colonial and provincial governments in this country; and that was the right of creditors to seize upon and appropriate the goods and estates of their debtors in satisfaction of their debts. Nor was there, in this respect, any distinction made between what a debtor had inherited or acquired by his own industry, and what had come to him from his wife by virtue of his marital rights. As a natural consequence, it not unfrequently occurred that wives found themselves stripped of all their possessions by the folly or misconduct of their husbands, and reduced to penury without any fault of their own, and rendered powerless to do anything to retrieve their fortunes by the incapacity which the law itself had imposed upon them.

That such a state of things should have been tolerated by intelligent men and women for one or two hundred years serves to illustrate how strong an influence the laws of a people exert over their ideas of legal and moral duty; and the change in the character of these laws which has been made chiefly within the last fifty years is to be ascribed to the progressive spirit of liberal legislation which has distinguished the century in which we live. In no way has it been more marked than in its tendency to restore to women a just and equal share in the management of property; and where, if married, they could not with propriety be entrusted with the control of a husband's business, they should not be subjected to become passive sufferers, together with their children, with no chance of relief, if by misfortune or otherwise his means of affording them a comfortable support were cut off, by placing beyond his control, and that of his creditors, a modicum of property to serve the immediate and pressing wants of his family. This has been extensively carried out by provisions for securing, to some extent, the enjoyment of a home and shelter for the family under the name of a *homestead*, which was to be held exempt from the ordinary incidents of ownership, the right

of free alienation by its owner, and a liability to be seized upon and sold for the payment of his debts.

It is proposed in the present article to examine the laws of the different States upon this subject of homestead exemption, which in some form have been incorporated into the legislation of at least thirty-two of them, and in at least fifteen of them the principle aimed at by these laws has been more or less fully declared in their constitutions of government.\*

In pursuing this inquiry it is often not a little difficult to ascertain the precise limits within which the several States have confined the application of the principle which pervades these laws, since no aid is to be found in construing their statutes upon the subject by a reference to the rules of the common law. Nor can the legislation of one State throw light upon that of another, since the policy indicated by the one differs essentially from that of another. Thus, in some of these all that seems to be aimed at is to exempt the smallest pittance which can serve to relieve immediate distress for a brief period, while in others the purpose is to secure to every one who can command the means a comfortable competence, although it be at the expense of his less fortunate creditors. In Arkansas, for example, \$5000 in real and \$2000 in personal estate are exempted from levy; and in Georgia \$2000 in real estate and \$1000 in personal chattels. And this, as calculated by a writer in the 19 *Am. Law Reg.* 149, if shared by every family in the latter State to the amount of \$2000, would exceed the total value of the lands within its limits by some \$400,000,000.

So radical a change in what had been deemed the common-law rights of creditors of the States naturally led them to question the validity of these laws in the light of the Constitution of the U. S., which forbids State legislatures to enact laws which shall impair the obligation of contracts, the ground being that so far as existing contracts at the time of the passage of the law were concerned, it took from the creditor what he had previously had, his claim upon the debtor's property as a means of satisfying his debt. In Wisconsin it was contended that it was an unconstitutional act to declare a deed of a husband invalid unless executed also by his wife, but this objection was not sustained by the court. The homestead laws of South Carolina were declared constitutional. So were those of North Carolina, although in the latter they expressly extended the exemption to debts contracted before the adoption of her constitution, which contains the provision. A like doctrine was held in Alabama, Louisiana, Georgia, and Mississippi. But in Nevada a statute declaring any mortgage or abandonment of a homestead for securing a debt of the owner invalid was declared unconstitutional. In Virginia a law exempting homesteads from debts contracted before the passage of the act was held to be in violation of the Constitution of the U. S.; and a like decision in respect to the laws of Georgia, so far as they extended the exemption to cases of judgments recovered before the statute was passed, was recently adopted by the Supreme Court of the U. S. In several of the States questions of this kind are obviated by limiting the exemption to debts which are contracted after the right of homestead in the debtor has attached to the estate, while in others it does not extend to debts contracted before the passage of the act. And it may be mentioned, in passing, that in applying these statutes of homestead exemption, different courts adopt different rules as to the degree of strictness with which they should be construed. Being in derogation of common-law rights, some of these courts restrict them to the precise language of the act; while others, regarding them as remedial in their character, have had reference to what they regarded as the spirit and intent of the law in ascertaining the meaning to be attached to such language.

One purpose seems, obviously, to be aimed at by these laws, however construed; and that is, to secure to every man who has a family, and has provided a home for them, the enjoyment of this home free from any right or power in his creditors to deprive him thereof by seizing upon the same for the purpose of satisfying their debts. And the propriety of these local laws is so far recognized in legislating by Congress for the whole Union that the U. S. bankrupt law exempts from its effect such property as, in the place of domicile of the bankrupt, is by law exempted from levy and sale under execution; and this provision has been held to be constitutional by the Supreme Court of the U. S.

In carrying out this principle of securing for the family what the head of it has provided as a home, the statutes of the various States differ essentially in the limits which

\* The States in which there are no laws upon the subject are Connecticut, Delaware, Oregon, Rhode Island, and West Virginia. Those in whose constitutions provisions for such laws are made are Alabama, Arkansas, California, Florida, Georgia, Indiana, Kansas, Michigan, Minnesota, Nevada, North Carolina, South Carolina, Texas, Virginia, and Wisconsin.



they prescribe to the power of the owner to convey it away or abandon it, or at his pleasure deprive his family of what the law intended to guard for them. In some of the States it is left to the owner to decide to what extent this protection shall be enjoyed. In a large proportion of these, however, the wife is so far clothed with power over the homestead estate that it is not competent for the husband to convey, mortgage, or abandon the same for any purpose or effect affecting her, unless she voluntarily joins in the act.

Another singular diversity in the laws of the different States upon this subject is observable in the different kinds of interests or estates which they create or assume to exist in the house and land which are held by virtue of this right of homestead. In some, this interest is regarded as a life estate; in others it descends to children; in some it is of the nature of an estate in the husband, and afterward in his widow and children, with a reversion in himself which may be reached by creditors; in others the entire homestead is put out of the reach of creditors in any form so long as the exemption continues. But they seem to agree in this, that the exemption of a homestead, as such, continues no longer than there is a wife or widow, and children under the age of twenty-one years, to enjoy it, or if no wife or widow, there are children under age residing upon the premises. But what becomes of the estate when there is neither wife, widow, nor minor children alive to share it, seems to be left to be settled by its analogy to the common law applicable to reversionary interests in land.

If, now, we pass from these general considerations of homestead laws as a system to their respective provisions in more specific detail, it may be remarked that with very few exceptions the exemption does not extend to taxes or indebtedness for the purchase-money of the estate; and in a majority of cases, it is believed, this is also true of mechanics' liens upon the same. And it may be further stated that in many, if not most, of the States the exemption continues no longer than the homestead is occupied as a residence by the family of the owner, and when abandoned by them it at once becomes subject to be levied upon by his creditors.

In treating of the subject more at length, it will be necessary to consider—(1) what amounts of real estate, in value or otherwise, are exempted as homesteads by the statutes of the several States. (2) How far a homestead right, when ascertained, avails in favor of a debtor or his wife and children, and how far the agency of such wife is requisite in releasing, abandoning, or aliening the same. In Alabama the exemption is of 80 acres of land, with a dwelling-house, if without a city, town, or village; if within it, a lot and dwelling-house, not exceeding \$2000. In Arkansas, Florida, Kansas, Louisiana, Nebraska, and Missouri, 160 acres of land, with buildings, are exempt if situate outside of a city, town, or village, except that in Louisiana, when taken with certain enumerated articles of personal property, the total shall not exceed \$2000 in value, and in Missouri the land must not exceed \$1500 in value. But if the homestead be taken in a city, town, or village, the limit in Arkansas is that the house and lot must not exceed \$5000; in Florida it is half an acre; in Kansas it is one acre; in Missouri, if it be in a city of 40,000 inhabitants, it is limited to 18 square rods, not exceeding \$3000 in value, and in one of a less number of inhabitants it may extend to 30 square rods, not exceeding \$1500 in value; and in Nebraska a homestead in a city, town, etc. is limited to two lots, or a single lot not exceeding 20 acres. The exemption in California extends to a lot of land and dwelling-house, not exceeding \$5000 in value; the law is the same in Nevada. The amount in value of homestead exemption in Georgia is \$2000; in Virginia it is to the same amount, and may be taken by a debtor in either real or personal estate. In Illinois, Kentucky, New Jersey, New York, North Carolina, South Carolina, and Tennessee the exemption to each debtor is of lands and buildings not exceeding \$1000 in value. In Indiana it may be in value \$300, real or personal as the debtor may elect. In Maryland it is but \$100, with the same right of election in the debtor. In Iowa the debtor may claim one or more lots, not exceeding half an acre in a city or town, with a house thereon, or 40 acres of land outside of a town or city, not exceeding in value \$500, together with a shop or building owned by him and used by him in his business, not exceeding in value \$300. The exemption in Maine is of land and a dwelling thereon, not exceeding in value \$500; and the same is the law of New Hampshire, Ohio, and Vermont, while in Pennsylvania it is limited to \$300 in value, and in Massachusetts to \$800. In Michigan 40 acres of agricultural land and a dwelling-house are exempted, or, what is equal, to a lot in a city or town with a dwelling-house, not exceeding in value \$1500. It may not, however, include two tenements, although together they do not exceed that

sum in value. In Minnesota the exemption is of a city lot and dwelling-house, or 80 acres of land with a dwelling-house outside of a city, irrespective of the value of the same. In Mississippi it covers 240 acres of land and a dwelling-house if outside of a city or town, irrespective of their value, or if in a city a proper homestead, together with personal property enough to make a total of \$2000 in value. In Texas 200 acres of agricultural land are exempt without regard to value, or instead of it a city homestead of the value of \$2000; while in Wisconsin the exemption is of 40 acres of agricultural land, or a quarter of an acre within a city or village, with the houses thereon, without respect to the value of the same.

In treating of the topics embraced in the second part of this inquiry, it may be proper to remark that there are various modes of setting apart a debtor's homestead from his other estate, the laws of some of the States requiring it to be done by a formal declaration of the debtor and a recording of the same; those of other States providing for setting it out by the officer holding an execution against the debtor which he is about to levy upon his estate, upon his claiming the same. So provision is made in most of the States for determining by appraisement any questions as to the value of the part claimed as homestead if creditors are dissatisfied upon the point, and for moreover disposing of the entire homestead if it is so connected with other parts of the debtor's estate that it cannot be severed therefrom, and paying to the debtor the value of what had been exempted in money, to be invested in a new homestead. But the forms by which these purposes are to be accomplished are so varied that it would occupy too much space to attempt to give them in detail. In most cases, it may be added, where the debtor has not set apart a homestead during his life, it is done by the ordinary or judge of probate in favor of his widow and children upon her application; and in several of the States, if the debtor neglects or declines to claim or have set apart a homestead, his wife may interpose and cause it to be done in his lifetime. In some of the States, as will appear, the widow takes both dower and homestead out of her husband's estate; in others she can claim but one. In some of the States ownership on the part of the debtor of the homestead claimed is required; in others a lease or a right of possession by contract is sufficient. In some the exemption applies to estates held in severalty alone; in others it includes estates held in common. The exemption in most of the States is from "forced sale," which in some of them means any sale under and by virtue of a legal process, including the foreclosure of a mortgage by a sale of the premises.

Taking up the several States in their order, the exemption in Alabama is to one who owns the estate and is the head of a family, and at his death it is continued to his children during their minority, and if he have no children it comes to his widow. Nor can a husband mortgage or convey the homestead unless the wife join in such conveyance. But it is not required that it should be occupied by the one in whose favor the exemption is claimed in order to hold it.

In Arkansas it is to every householder, whether male or female, who is the head of a family, and extends to lands held in common. After the debtor's death the exemption continues in favor of the widow and children of the owner so long as they continue to occupy the homestead.

In California the exemption is in favor of "heads of families," but not to unmarried persons, unless they have the charge of minor children of brothers and the like. And if the debtor's wife dies without children, he may no longer claim it. If he dies leaving a widow, she becomes entitled to it for the benefit of herself and children; and this is set out to her by the judge of probate if it had not been done during the life of the husband. This selection may be made by the owner or his wife, by a declaration in writing which is to be recorded; and when so selected the husband and wife become joint tenants of it. A homestead may be claimed of lands held by possession only or held in common. The husband has charge and exercises protection of the homestead, but he cannot convey it without the consent of the wife if he have one. Upon the death of the husband or wife the estate vests absolutely in the survivor, exempt from any debt contracted before that event. If the debtor dies leaving a widow and children, one-half of the estate goes to her, and one-half to the children. So essential is the joining of the wife with her husband in a deed in giving it validity, that it would not otherwise operate even as an estoppel against him.

In Florida the exemption is in favor of the head of a family, and when he or she dies it descends to the issue of the owner, if any, and if there be no child, but the owner leaves a widow, it goes to her, unless he disposes of it by will, which he may do. If there is neither widow nor children, the estate may be sold for the payment of debts.



The homestead law of Georgia is in some respects peculiar. The exemption is in favor of heads of families and of trustees and guardians of minor children, excluding bachelors living alone. If the estate of the debtor exceeds in value the amount of the exemption, he must, in order to secure it, set it out, or if he fails to do so his wife or her next friend may have it done for him. Nor can a husband defeat his wife's homestead right by conveying it or removing from it unless he acquire a new one. Such exemption does not extend to judgments recovered in actions of tort. If a widow have no children, she cannot claim a homestead. The homestead does not affect her claim to dower, which must be first set out, and then the homestead, if any, after deducting the dower; and this the minor children take, subject to the claim of dower, but free from the claims of the father's creditors, and hold it in connection with the widow till she is married or dies. If, however, the estate of the father is solvent, the children take the estate independent of any homestead right, subject only to the dower of the widow. A homestead can only be conveyed by the joint deed of the husband and wife, done with the approbation of the ordinary. But if the debtor is declared a bankrupt before his homestead is set out, it so far divests him of his estate that he cannot afterwards avail himself of the exemption.

The provision in Illinois is made for householders with families, and does not extend, as in some of the States, to houses standing upon another's land. The benefit of it enures to the widow of a debtor during her life, and to her children until they are of the age of twenty-one years if they occupy the premises. The husband, however, is the only one who can assert this right, but in so doing he acts, in some sense, as a trustee for his wife and children. No conveyance or mortgage of it can be valid unless it be by deed signed by the wife, in which the right of homestead is expressly released, and the same is acknowledged by her. If the husband abandon the premises, his deed will have the effect to create a lien upon the estate for whatever may be its value beyond that of the homestead right. And if both husband and wife abandon the estate, their deed will effectually convey it, although not executed so as to expressly release it. If, however, he ceases to occupy the estate, but leaves it in possession of his wife and children, it has not this effect, and otherwise his homestead is thereby lost, as it is if he ceases to have a family. And a widow cannot defeat the rights of her minor children after the husband's death by abandoning possession of the homestead. The statute of exemption extends to judgments in actions *ex delicto*, as well as *ex contractu*. It matters not whether the debtor owns his land in fee, for life, or for years, or simply holds it under a contract for a deed. But the exemption does not attach until the same is in his actual occupation. This homestead right is not an estate; it is distinct from dower, and does not merge in it, and the widow may have both. If a wife is divorced for his fault, she may claim a homestead right in the premises if she continues to occupy them. Creating an exemption of a homestead does not affect any debts contracted before that takes effect. If a husband convey the estate, but the wife do not join in the deed, the grantee cannot disturb the occupant in the enjoyment of the estate so long as the homestead right continues; but such purchaser, or a creditor who shall levy upon the same, may claim the premises when the homestead right ceases. And in such case, if the widow of the debtor abandon the premises after his death, the husband's deed takes full effect and cuts off the rights of the children, but her surrender would not give present effect to a sale under a levy of an execution.

In Indiana the homestead exemption is in favor of "a resident householder," which may include a wife if she owns the land and is herself a debtor. If the debtor neglects to make claim of this right when his land is levied on, he thereby waives it. The owner cannot convey or mortgage the homestead without his wife joining in the deed and acknowledging it; but though she do not join in a mortgage, if it be made by him it would not be competent for him to set up a homestead right to avoid it. At her husband's death the widow becomes entitled to the enjoyment of the homestead estate independent of any provision made for her by her husband by way of devise.

The subject of homestead has led to considerable legislation in Iowa, and to somewhat numerous decisions of her courts. It exists there in favor of "a family," which includes a widow or widower, though without children. It is incident to occupation, and the right does not attach until an occupation begins, nor even then so as to affect a debt contracted prior to that time if that were the only property the debtor then had. It is broad enough to cover a shop or other building connected with the homestead in which the debtor carries on his business. The debtor may select the homestead, and have the same recorded, and if he fail

to do this, it may be done by his wife. A debtor may make his homestead liable for a debt if when he contracts it he agrees that it shall not be exempt as to such debt. And a judgment may attach as a lien upon the homestead when it shall cease to be held as such, but a conveyance in the mean time would defeat it. But a mortgage or conveyance made by the husband alone would be void. On the death of either husband or wife the property goes to the survivor, and descends to the issue of whichever of these was the owner, unless he or she may have devised the same. The right of a widow, as such, vests in her at marriage if her husband then owns the estate, and by virtue of it she may occupy the estate during her life, whether she marries again or not, and at her death the estate goes to the heirs of the owner. If the estate belongs to the wife, and he survives her, he takes it as her successor, although they have no children, and the owner may devise the estate subject to the homestead right. The husband has such a control over the subject of the homestead right that he may, at his election, change his residence, and if he abandon the estate or gains a new homestead, the original homestead right is lost. Such would be the effect if the widow abandons the estate; and if she sells the homestead, the husband's heirs may come in and divide it among themselves; she cannot claim both homestead and dower, and if she claims dower, she waives the homestead.

In Kansas the exemption is in favor of the family of the owner as a residence, and it will be held exempt from the time he acquires his title if he begins to occupy it within a reasonable time thereafter. If it is levied on, the debtor or his wife may make claim for the homestead of the officer. A judgment forms no lien upon the debtor's homestead, either in respect to his present or prospective interest therein. The husband and wife have to join to convey the estate, and their joint deed would take effect as against any deed or mortgage made either by the husband or wife alone.

In Kentucky the law exempts a homestead in favor of a *bona fide* housekeeper, whether it be of one sex or the other. It is set out by the officer having an execution against the debtor if he claims the same. After his or her death it goes to the survivor with his or her children, to occupy until the youngest child is of age. Nor will any abandonment of it by a parent affect the rights of the children. Accepting a homestead by a widow does not affect her right to dower, except that the value of the homestead is taken into account in setting off the dower. The estate may be sold subject to the homestead right, but no mortgage, waiver, or release of the homestead, as such, has any validity, unless it be executed by the husband and wife and recorded.

The law of homestead in Louisiana is very brief. It secures it to such as own *bona fide* residences, and have families or persons dependent upon them. And if a wife die, leaving an estate and a husband and children, he cannot claim homestead out of the estate as against her creditors.

In Maine the exemption is in favor of a householder in actual possession, who shall file in the registry of deeds a description of what he claims as a homestead. But it does not extend to debts contracted before such claim and description is filed in the register's office. After the owner's death his widow may occupy the premises during her widowhood, and her children during their minority; and during this time it is exempt from the debts of the deceased, but no longer.

In Massachusetts householders having families and actually occupying premises may claim homesteads out of the same, but it only takes effect when they shall have begun to occupy the same, and does not affect any liens or mortgages thereon then existing. To make an effectual claim of such exemption there must be a declaration to that effect in the deed conveying the premises, or it must be made by the owner, and a record of the same duly entered. The reversionary right of the debtor after the expiration of the homestead right is subject to his debts, but a levy upon the homestead interest is void, even if done by the consent of the wife. The exemption is as much in his favor as hers. And if he convey the land, even with covenants of warranty, it would not estop him from claiming a homestead right out of it then existing in favor of his wife and children. A mortgage or conveyance by a husband, however, will carry the reversion after the right of homestead has been satisfied, although his wife does not join in the deed; and in order to convey the homestead right there must be words in the deed expressly carrying that right by name, and the husband and wife must join in the same. The right does not attach to lands held in common, nor does a declaration of homestead become of any avail till the owner has a house thereon which he occupies. At the owner's death his widow, if he have one, has a right to continue to occupy the homestead, nor can he do anything by his will



which can curtail this right. The homestead, like her dower, is set out to her in the same manner, and she is entitled to both. This right of hers continues during her widowhood, and to any minor child who occupies the same until twenty-one years of age; and it is the subject of sale by her and the guardians of the minor children. This homestead right is regarded as an estate of freehold, first in the husband, afterwards in the widow and children until the youngest is of age. And the interest of the minor children after her death may be sold by their guardian by license of court; but neither the widow nor children can convey their respective interests, except with the consent of the other. If a husband dies leaving only adult heirs, she may claim the homestead as well as her dower, although there are no debts to be satisfied. No abandonment of a homestead after the right has once attached can effect a claim to the same until a new one shall have been gained.

In Michigan, while the exemption is in favor of the owner and occupant of an estate, no formal declaration of homestead is required until some creditor is about to levy upon his land, and then it may be done orally. It may be claimed in a merely equitable as well as a legal estate. And if it be the estate of the wife, and is occupied by both, it may have the properties of a homestead. If the owner be married, he cannot waive or defeat the homestead right, and a mortgage or conveyance of the premises in order to be good must be signed by the wife; a deed by the husband alone would not be sufficient, though made by her consent orally expressed. After his death his widow is entitled to the rents and profits of the estate, which she takes in connection with his minor children, but to that end they must be in occupation of the premises.

In Minnesota the exemption is in favor of a debtor, his widow, and minor children, but continues only so long as the premises are owned and occupied as such. It does not require any formal declaration of claim of homestead beyond the notice which the debtor may give to the officer when levying upon the same. The owner cannot convey it if he have a wife unless she joins with him in the conveyance, unless it be in mortgage to secure the purchase-money or a lien for work on the premises. It may be lost by abandoning the premises, and the husband may forfeit it by conveying the premises to his wife to defraud his creditors. A judgment against the debtor becomes a lien on the land, and may be enforced by levy as soon as it ceases to be occupied as a homestead, though the owner may convey it or temporarily abandon it without subjecting it to a creditor's process. After the owner's death his widow is entitled to it so long as she remains unmarried and continues to occupy it; and the children are also entitled to the premises until twenty-one years of age, if they occupy them.

The laws of Mississippi secure homesteads to heads of families without any formal act on the part of the debtor, who to avail himself of it must be in occupation of the premises. The husband selects the homestead, and may change it at his pleasure. But merely leaving it, while his wife and children continue to occupy it, is not held to be an abandonment. He may sell one homestead for the purpose of reinvesting the proceeds in a new one, and have a year in which to do it; so he may sell it or any part of it free from any judgment lien. After the debtor's death his widow and children take it by descent, and after her death the children hold it by descent until they are twenty-one years of age. But this does not interfere with her right of dower in the premises. During his life the wife has no vested right in the premises; so with the children. The estate is impressed with the character of homestead only while and so long as the debtor is in occupation of it, except that if the widow is not in a condition to carry on the estate, she may let it to a tenant to occupy in her stead.

Every householder and head of a family in Missouri may claim a homestead, and this right extends to household estates. If a creditor levies upon his debtor's estate, the latter may claim his homestead, and hold it exempt from all debts and liabilities. At the debtor's death the estate goes to his widow, and to his children until they are of age, and if not set out in his lifetime, the same is set out to her by the judge of probate. She may then have her dower set out in the same estate, unless the homestead covers one-third of its value; if it does, she cannot claim that and dower also.

There is little detail in the law of homestead in Nebraska. It is limited to owners, occupants, and residents as heads of families, and descends to heirs at law or goes to devisees. It is exempt from sale so long as it is owned by the debtor. If a creditor levies upon the land, the debtor gives notice to the officer of what he claims as his homestead. The debtor by joining with his wife may mortgage the homestead. The exemption does not extend to the liabilities of an attorney for moneys collected by him.

The common provision in favor of heads of families who occupy the premises in which a homestead is claimed is adopted in New Hampshire, and the part so claimed may be selected when an officer levies an execution upon the debtor's estate. It still would be liable for debts contracted before the homestead is set out. It can only be waived or released by a deed of husband and wife, if she be alive, or if dead and there are minor children, by assent of the judge of probate. If a levy is made upon the estate, the husband or his wife or her next friend may claim the homestead, and the officer is thereupon required to set it off by metes and bounds. If no such claim is made, the creditor who causes the levy to be made, takes the estate in common with the homestead right, and the same may then be set out by process of partition. If such partition cannot be made, and the homestead is sold with the rest of the estate, the amount of the exemption is to be paid into a savings bank, to be drawn out upon the joint order of the husband and wife, if she is living; otherwise, of the husband and the guardian of the children. A husband can convey the estate subject to the homestead right in the wife and children, and his covenants would estop him. But the husband and wife might, nevertheless, recover the land thus conveyed during her lifetime, and after his death she and her children might recover it. But the wife and children could not recover the land during the life of the husband. If the husband conveys his estate without his wife's joining in the deed before a homestead has been set out, she may have the homestead set out in the same even during his lifetime. The estate of homestead is a conditional life estate. When it is set out it is wholly exempt from levy, and this extends to the reversionary interest there is after the homestead right is determined. If the wife survive, and the husband dies seised of the estate, the judge of probate sets out her homestead in the same, in the same manner as dower is set out. Otherwise, she may have partition against the grantee of the estate, and have her homestead set out to her. Her right, however, is inchoate until the homestead has been set out to her in one of the forms above mentioned. This right is that of possession of the estate during life, and a right in the children during their minority. Nor can the husband change or affect this by any disposition of it in his last will and testament, so long as the widow or minor children continue to occupy the premises. Leasing homestead land is not an abandonment of the right, but upon acquiring a new homestead the prior one is lost.

In Nevada a homestead is selected by a husband and wife, or either of them, or any one who is the head of a family, and is done by a declaration in writing, which is recorded. Upon the death of either husband or wife the homestead is set apart for the survivor and their children; and if the tenant of the homestead have a wife, they together hold the same as joint tenants. He cannot convey, mortgage, or lease the premises without the concurrence of his wife, if he have one, unless she is insane. In that case it may be done by order of court, and the proceeds invested for her benefit. If, because the homestead is not separable from the rest of the debtor's estate, it is levied upon and sold, the money is deposited with the court, and can only be drawn by the order of the husband and wife. Nor can there be an abandonment of a homestead otherwise than by a written declaration signed, acknowledged, and recorded by both husband and wife, if there be one.

The exemption in New Jersey is in favor of a householder of what is occupied by him as a residence. It may be claimed either by the deed conveying the estate, or by a written declaration of the owner of such estate, duly recorded. When thus ascertained, it cannot be conveyed or leased for a longer term than one year, unless the wife, if there be one, joins in such deed or lease, and the same is conveyed for its full value, and the proceeds thereof are invested in a new homestead.

New York, by its law, exempts a homestead in favor of a householder for the purposes of a residence, and the dedication of premises to that purpose must be contained in the deed conveying the same to the claimant, or by a written notice and declaration on his part that it is to be held as such; and this must be recorded. The exemption does not extend to claims for torts. It is for the benefit of the debtor's widow and children till the youngest is of age, if they continue to occupy the same. But the debtor may release the homestead by any of the ordinary modes of conveyance; but though he is the owner of the estate to most purposes, it remains exempt from his debts until his death, and then for the benefit of his widow and family of minor children if they shall continue to occupy the same. A judgment is, nevertheless, so far a lien upon the debtor's estate that as soon as the homestead interest is determined it may be levied upon the land. A temporary cessation to occupy the premises does not defeat the right of homestead therein.



A homestead exemption in North Carolina is in favor of an owner and occupant of an estate and his widow, if he leaves one, and continues during coverture, and afterwards during her widowhood and the minority of her children, if she have any. If she have no children, the widow takes it in her own right. But actual residence and occupancy are indispensable conditions to the claim of a homestead exemption. It is a determinable fee, but there is an interest in the owner answering to a reversion, though it is not the subject of levy for his debts. If when the husband dies he leaves no debts, no homestead can be set out, because the object of such exemption is to protect it from creditors. Homestead does not interfere with the widow's right of dower. The exemption does not extend to claims for torts done. No conveyance of a homestead can be of any validity if the owner has a wife unless she join with her husband in the deed and its acknowledgment. If the homestead is not set out to the husband during his life, the widow, or his children under twenty-one years, may have it set out to her or them. And among the kinds of interests in which it may be claimed are included equities of redemption of mortgaged estates.

The right of homestead in Ohio extends to leasehold estates and buildings standing upon another's land. If a creditor levies upon the land of his debtor, he may apply to the officer holding the execution and have his homestead set off by appraisers. If this is not done during the life of the debtor, his widow may have it done in her favor after his decease. It thus ensures to her benefit, or, if she be dead, to her minor children residing on the premises. A temporary leasing or removing from the estate does not work a forfeiture of the right; nor can a mortgage of a homestead be valid or effectual unless the wife join in it, so as to affect her right or that of the family.

Before a homestead exemption can attach to any premises in Pennsylvania the owner must have elected to hold the same as his homestead. And if when a levy is made upon a debtor's estate he neglects to make claim for such exemption, it is deemed an entire waiver of it on his part. He may also render the same liable to levy if, when he contracts a debt, he expressly agrees as to that debt to waive the right of homestead. After the death of the debtor his widow takes it for herself and children; and if she have none, she takes it absolutely to herself, and can convey it as her own by her own deed. But if she do not claim her homestead within a reasonable time after her husband's death, she will be held to have waived it. The bankrupt law does not reach a debtor's homestead estate.

The exemption in South Carolina is in favor of the head of a family; and if a creditor is about to levy upon the estate of such a person who claims his homestead of the officer, the latter sets it off to him. But if he neglects then to claim his homestead, he is taken to have waived it. If it is not done in the life of the debtor, it will be set off to his widow by commissioners. When thus set off it reverts to the widow and the debtor's minor children until her death or marriage and until the youngest child is of age. If the husband and wife both die leaving children, whether minors or not, they will hold the premises exempt from debts, just as their parents held. But there still is a reversion after the homestead estate is determined, which is the subject of sale or devise by the owner. But sale of an intestate's estate by order of the judge of probate does not cut off the widow's right of homestead. No waiver of the right of homestead by the head of a family will have the effect of defeating the same.

As in most of the States already mentioned, the exemption in Tennessee is in favor of the head of a family. The mode of claiming it is by a writing signed, sealed, and recorded, and the same is set out by appraisers. It cannot then be conveyed or mortgaged except by a joint deed of husband and wife, if he have one. But if he cease to occupy it, it becomes liable to be levied on by his creditors. At his death it goes to his widow during life or till she is married, when it goes to his minor children. She cannot claim dower as well as homestead if the value of the latter is as much as \$1000. If her homestead is not of that value, she may have enough out of the estate in the form of dower to make it equal to that sum.

The exemption in Texas is to "a family," and by the "forced sale" to which this applies, is meant any process of court or manner prescribed by law. If the owner have a wife, he cannot convey the estate except by her consent expressed by joining in and acknowledging a deed of the premises. But if he sell the land, and then he and his wife abandon the estate, the sale becomes valid. So if he sell his homestead and then acquire a new one, the sale becomes valid; and if he gain a new one, his former one becomes liable for his debts. If he contracts to sell his homestead, the court will not enforce the conveyance so long as his wife continues to occupy the premises; but if she abandon

them the contract may be enforced. And if the debtor abandons the homestead, it becomes liable for his debts. By abandonment is meant the leaving the estate with an intent not to return to claim the exemption. If the debtor have no wife, though he may have children, the homestead may be conveyed by him or be levied upon for his debts. And whether children can take a homestead after their father's death depends upon his leaving a widow to take it in his stead. Even then, if she had left her husband in his lifetime without good cause, and had remained separate till his death, her right would be lost. If, on the contrary, the husband remove from the homestead, and thus abandons her and his children, she would be remitted to her right of homestead, and may resume possession thereof. And a married woman is competent to appear and litigate her rights in court. Homestead may be claimed in lands held in common. A sale of the homestead by the husband alone, if the wife do not join with him in making the conveyance, is a nullity; but if he convey it fraudulently to keep it from his creditors, and he then abandons possession, it becomes liable to levy by his creditors. If the owner die leaving a widow and children, the children cannot have partition thereof so long as she lives; and if the court grant her a divorce with the custody of the children, she may claim the homestead to her own use.

In Vermont the exemption is in favor of a housekeeper who is the actual occupant of the same himself. It is subject to any of the owner's debts which he owed at the time of acquiring the homestead. If he acquire a new homestead, it defeats the prior one. The husband cannot impair his wife's right to the homestead by conveying it unless she joins in the conveyance. But the purchaser under such a deed may hold the premises during the coverture. The right of the wife is to enjoy the premises after the husband's death, but this right does not vest any title in her; it is only a kind of lien in her favor upon her husband's estate. She may enforce this after his death if he shall have conveyed it in his lifetime without her joining in the deed. It is to be set out to him by the judge of probate, and passes at once to the widow and children in the way of descent. It is, however, to be held by them as one entire thing, so that those who are not in possession can claim no rents out of the property. It is independent of her right of dower, and belongs to her in fee, and at her death goes to her heirs. It may, moreover, be set out to her in the same lands which have already been assigned to her as her dower; and where both are claimed, the value of the homestead is to be deducted from that of the dower; and if the homestead is equal to one-third of the estate, she can claim no dower. If she gives a deed of her homestead estate, she does not thereby affect her right of dower. A homestead may be set out in an equitable as well as a legal estate, and in incumbered as well as unincumbered premises. If the husband conveys the homestead in the lifetime of his wife, it would not have the effect to disturb the occupancy of the household and family so long as they continue to retain such actual occupancy.

It is a housekeeper and head of a family who may claim a homestead in Virginia, and the exemption may cover real or personal estate, at the election of the debtor. It is claimed either by inserting a clause to that effect in the deed conveying the estate to the debtor, or by a declaration of the owner describing what he claims, which is done by a deed duly recorded. It may be claimed in a legal or an equitable estate, and it may be claimed and selected at the time of a levy made upon it. The debtor when contracting a debt may waive the exemption as to that specific debt, and thereby render the estate liable for the same. After the death of the owner, if the homestead has not been set out, it may be done so at the request of the widow or the children of the deceased, and she will be entitled to his homestead during her widowhood, in connection with the children, until the youngest shall have arrived at majority. And the same would be the effect if she were divorced from her husband; she would take it as if he were dead.

A married or unmarried man may claim a homestead exemption in Wisconsin if he has a family dependent upon him; but it does not include estates held in common, though it would cover a house standing upon another's land. The debtor selects his homestead, and notifies the officer when making a levy upon his estate, who sets it out by metes and bounds. In order to convey it the wife must join with the debtor in a deed which she must acknowledge. Nor would a voluntary conveyance of a homestead by husband and wife render the same liable to be levied on for his debts, although made for the purpose of defrauding his creditors. A temporary leasing or absence from the estate does not affect the owner's right of homestead in the same. Upon the death of the owner the homestead descends to the widow during her widowhood, and to her children until they are of age. A wife does not lose her right in the



homestead by abandoning it if she is driven from it by her husband; nor would a husband and wife be taken to have abandoned a homestead by taking in a son to occupy it with them and carry on the estate. If the wife is insane the court may order the estate to be sold, and direct how the proceeds shall be invested. And if when the debtor dies the estate be under a mortgage or other lien, and the same is sold for more than enough to pay this charge, the judge may order enough of such surplus to be invested in a homestead for the family, and may, to that end, order \$500 to be thus invested in a new homestead. (For a reference to the provisions of the laws of the U. S. concerning the rights of individual settlers to acquire public lands in the character of "heads of families," see *LAND LAWS OF THE U. S.*; also *TERRITORIES.*) **EMORY WASHBURN.**

**Homicide** [*Lat. homicidium, from homo, "a man," and cado, to "kill"*], the killing of one human being by another. The word *homicide* is the most comprehensive designation employed in law to denote the causing of a person's death by human agency, and has reference to every mode by which such an act may be committed, whether it be innocent or criminal. There is no resulting implication, therefore, from the mere use of this generic appellation, that the act to which it is applied constitutes a legal offence or is attended with any legal responsibility. Homicide, at common law, is divided into three classes—justifiable, excusable, and felonious. In the ancient history of English jurisprudence there was an essential distinction between justifiable homicide and that termed excusable, since the former was regarded as involving no imputation of guilt whatever, while the latter did partake, in some slight degree, of criminality. As a consequence of this distinction, acts of justifiable homicide received no punishment, while those which were deemed excusable merely were attended by a forfeiture of the offender's goods. But at a very early period the imposition of this or any penalty for acts which were either attributable to pure accident or were done in necessary self-defence was felt to be a sentence of unjust severity, and the person charged with the offence escaped the consequences by being held entitled to a writ of pardon and restitution as a matter of course and right, or the judges, in order to relieve him of the expense of suing out the writ, would permit or direct a verdict of acquittal. Any practical diversity between the two kinds of homicide therefore became virtually obsolete, since both were adjudged equally undeserving of punishment. The old names, however, were retained, and a difference was still asserted to exist between them, because excusable homicide did involve some trivial element of heinousness, though too slight to merit any legal penalty. But the distinction, if maintained at all, is too vague and shadowy to be of any importance, and all kinds of homicide not felonious are better termed defensible or innocent. As, however, the old designations are still employed in English law and in some of the American States, they will be retained for the sake of convenience in this article. Felonious homicide is the killing of a human creature without justification or excuse, and is divided into manslaughter and murder. These two subjects will be examined under their respective titles, so that acts of a defensible nature will alone be considered here. (See *MURDER, MANSLAUGHTER.*)

**I. Justifiable Homicide.**—This is of various kinds. (1) Where the proper officer executes a criminal in strict conformity with his sentence. Such an act is not only not wrongful, but is obligatory upon the officer as a legal duty. It is, however, necessary that the officer should follow the sentence precisely, otherwise the act may amount to murder. (2) Where an officer of justice (or other person acting in his aid), in the proper performance of a legal act which he is required to perform, kills a person who resists or prevents him from executing it. An officer who has authority to arrest and imprison may repel force by force in the attempted discharge of his duty, even to the extent of killing his assailant if he cannot otherwise take the person whom he intends to arrest into custody, or it is necessary for self-protection. So, if a person charged with a felony escapes after arrest or flees to avoid an arrest, the officer is justified in killing him if it be impossible to effect his capture. It is a further rule that a private individual may justify a homicide necessarily committed in preventing the escape of one who has actually committed a felony. There will be no such justification, however, if the alleged crime be merely a misdemeanor. (See *CRIME, FELONY.*) Jailers may prevent the escape of prisoners by killing them if it be necessary. But in all such cases killing must only be resorted to as the last alternative, without which the performance of the officer's duty cannot be accomplished. (3) Where the prevention of a forcible and atrocious crime renders the homicide necessary. Whenever any offence of a felonious nature is attempted, such as murder, robbery,

burglary, arson, rape, etc., either the person whose life or property is endangered, or any one who has knowledge of the intended crime, may use every effort to prevent its commission, and causing the death of the offender is justifiable if the imminent danger cannot otherwise be averted. Nor is it essential to his justification to show that the crime would actually have been perpetrated if the act of homicide had not been performed. For a person under such circumstances is warranted in acting upon a natural and reasonable presumption, and if there be sufficient indications of a felonious design and of an immediate purpose to carry it into execution, he may conclude that there is actual premeditation, and use the same means for his protection as would, if such were really the case, be allowable. Therefore, if an empty pistol be pointed at any one who believes, and has reason to believe, it to be loaded, and a threat is made to fire it immediately, the person who supposes his life to be in danger may kill his assailant with impunity. But if he knew the weapon to be unloaded, he would not be justified in such an action. Under no circumstances can the homicide be committed if the crime can be averted by less severe precautions, or unless the necessity continue to the time when the felon is killed. Hence, if the killing occur after a seizure of the wrongdoer has been effected and he has been properly secured, it will be murder. (4) Killing of the enemy during time of war in the actual prosecution of hostilities is, of course, justifiable on the ground of military necessity.

**II. Excusable Homicide.**—This is of two kinds: (1) By misadventure, or accident. This is, however, innocent only when the person committing the homicide is engaged in a lawful act, without any intention of inflicting injury upon another, and without any failure to use proper precautions to prevent danger. If the act is unlawful, the homicide will be felonious. If the head of a hatchet which a person is using, and which he has reason to believe is firmly fastened, flies off and kills a bystander, or if a wagoner drives over and kills a person lying on the road upon a dark night, the homicide is accidental and excusable. The degree of care and prudence to be exercised is variable under different conditions. The use of poisons or dangerous weapons would require much greater precaution than the employment of articles not in themselves liable to occasion injury, as, for instance, the common utensils in every-day use. The lawful act which results in a person's death may be the administering of reasonable and moderate correction by a parent or school-teacher or other person occupying a position of similar authority. But the homicide is only innocent in such a case when the bounds of a proper restraint upon the severity of the punishment are not exceeded. In like manner, if several persons should engage amicably in athletic sports, and by some unfortunate mischance one of them should be killed, he who occasioned the death would be innocent. (2) Homicide in self-defence, or in protection of one's property or his wife, child, parent, or servant. But under this head are not included cases of defence against felonious crimes, which have been already considered, but only against any other modes of attack or injury which may be attempted, as in cases of common assault or trespass, where there is no intention to commit a felony. The distinction is of considerable importance, on account of the difference in the nature of the legal obligation which is imposed upon the person against whom an offence is perpetrated to seek to avoid the commission of homicide. When an attack is made with intent to kill, or any other felony is attempted, the person whose life or property is endangered is under no duty to seek to avoid the threatened injury by availing himself of every practicable means of escape, but he may stand his ground, use every possible means of defence, and kill the wrongdoer if a reasonable and necessary precaution requires such an act. But when the attempted injury is not felonious, homicide cannot be committed in defence unless all available measures are first adopted to escape from or avert the danger. Therefore, if a simple assault be committed, though the person assailed may protect himself by blows, he must, as the old phrase expresses it, "retreat to the wall," or forbear as long as is consistent with safety before he ventures to kill his assailant. In the defence of property retreat is not necessary in order that the homicide may be justified, since that would be a yielding of the property without attempting protection; but the wrongdoer must first be requested to leave a house or to refrain from interfering with goods before preventive measures can be adopted, and even then the trespasser cannot be killed unless he persists so strenuously in effecting his purpose that such a course is rendered necessary. Only a reasonable degree of force can be used against an intruder if that will prove sufficient. A felony is so heinous an offence that the laws regard the destruction of life no disproportionate penalty if the wrongful act be per-



sisted in; but offences of any less degree ought not to entail so fearful a punishment unless they can, by no practicable means, be otherwise averted. In the U. S. crimes are generally defined by statute, and the principles relating to homicide have therefore received various modifications. Very essential alterations, however, have rarely been made. The distinction between justifiable and excusable homicide has in some States been discarded, but the same classes of offences which were formerly included under these respective designations have usually, to the same extent, been declared innocent.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Homiletics**, following the etymology of the term (*ὁμιλία*; see **HOMILY**), denotes the science and the art of preaching. It is that part of practical theology which relates to the composition and delivery of sermons. It is the technical synonym of "sacred rhetoric." The latter term denotes the application of rhetorical canons to religious discourse. There are not two kinds of rhetoric, as there are not two kinds of logic. Homiletics relate to the application of the universal laws of conviction and persuasion to the utterances of the pulpit. These laws have their origin in the constitution of our intellectual and moral nature. Homiletics, therefore, are not supposed to treat of the philosophy of rhetoric in general; but, presupposing some knowledge of this, it undertakes to show the method in which rhetoric may successfully be employed in the restricted province of the Christian preacher. As preaching is admitted to be a divine appointment, as it is acknowledged to be the chief human instrumentality by which revealed truth is to be lodged in the convictions of men, no subject deserves more careful study than sacred rhetoric. Homiletics naturally recognize two general divisions—(1) **THE MATTER**. (2) **THE MANNER** of preaching. Ancient writers on rhetoric, particularly Quintilian and Cicero, make much of *invention*. The material of the preacher is to be found in the word of God. This is what defines his office in distinction not only from the secular orator, the advocate at the bar, but from even the ethical lecturer. His official occupation is to interpret, proclaim, and enforce the contents of revelation. It belongs therefore to the department of sacred rhetoric to teach the best method of evolving the truths contained in the sacred volume for popular impression. It aims to elucidate the different kinds of preaching, such as expository, textual, and topical, giving the history and examples of each, and the rules by which each should be conducted. The chief object of homiletics relates to the *manner* of preaching, including in this general term the structure of the discourse and its enunciation. Truth depends for its power very much on the mode of its presentation. The order of thoughts may be so confused that the thoughts themselves lose half their force. Arguments and motives depend as much upon their disposition as their intrinsic weight. Sacred rhetoric looks to the *arrangement* of material in sermons, the statement of propositions, the different kinds of proof by which they are sustained, such as those drawn from the authority of the Scriptures, the reason, consciousness, experience, the conscience, and processes of reasoning, especially those exemplified by Christ and his apostles. The methods of producing persuasion, as well as conviction, of exciting emotion, moving the affections, all founded in the laws of our nature, belong also to the province of homiletics. Style, language, elocution, management of the voice, the carriage of the person, manner, gesticulation, different modes of preparing for the pulpit, different modes of delivery, with or without the manuscript, memoriter or extemporaneous, all these and many other particulars, are included in this general designation of homiletical instruction. Treatises on homiletics are numerous in all languages, ancient and modern. Augustine in his *Doctrina Christiana* treated the subject systematically. The German, French, and English tongues are rich in this species of literature. That would be a large catalogue which should include only the names of authors on the art of preaching who are distinguished and renowned, such as Bossuet, Fénelon, Maury, Claude, Schott, Reinhard, Therman, Campbell, and Vinet. The U. S. have given many very valuable contributions to this department of authorship. All religious denominations appear to vie with each other in the attention given to the art of preaching. All the theological seminaries of this country give great prominence to homiletics in the curriculum of ministerial education. All treatises on sacred rhetoric, ancient and modern, regard self-conviction as the secret of all persuasive and earnest speech. Personal experience, deepened and vivified by the Spirit of God, is universally regarded as the prime force in sacred oratory, without which everything else is of little avail. "I believe, therefore do I speak." "Out of the abundance of the heart the mouth speaketh."

WILLIAM ADAMS.

**Homily** [Gr. *ὁμιλία*; Fr. *homilie*], a simple religious discourse. The distinction between the *homily* and the *sermon*, as made by writers on sacred rhetoric, is, that the former is less elaborate, with less of method and disposition after rhetorical rules than the latter. A technical sense attaches to the word in history which is not strictly observed in ordinary usage. The French observe nice distinctions between homilies, conferences, discourses, and sermons. By "homilies," in modern English use, we should understand that description of sermons which has more of exposition than rhetorical system. So many are the forms of pastoral instruction in the present day, so frequent the occasions when ministers address the people, on the Sabbath, during the week, in churches, in lecture rooms, in Bible classes, and Sabbath schools, that the old distinction between the homily and the sermon is nearly obliterated. Historically, homilies were designed to supply the deficiencies of an ignorant clergy and an ignorant people. When philosophical and rhetorical method had greatly vitiated pulpit discourse, making it scholastic, subtle, and cold, the homily was intended to provide a simpler mode of conveying religious instruction. In the Roman Church at that period, when few of the clergy were capable of making discourses for themselves, collections of homilies, consisting of compilations from the Fathers, were authorized for their use. (See NEANDER, *Ch. Hist.* iii. 174, concerning the *Homiliarium* of Charlemagne.) Similar collections were prepared, at the Reformation, in the English Church by Craumer and Jewell. Their use in the Church was authorized (see 35th Article) as a means of religious instruction at a time of imperfect education. The language of the Article enjoining their use requires them to be "read in churches by the ministers, diligently and distinctly, that they may be understood by the people." The first volume of the *Homilies* was published in the reign of Edward VI.; the second volume was published in the reign of Elizabeth. The substance of these English *Homilies* is generally accepted as good and wholesome doctrine, but very considerable differences of opinion (see *Bishop Burnet*) have long existed as to the authority attached to their contents as parts of the constitution of the Anglican Church.

WILLIAM ADAMS.

**Hominidæ** [from *homo*, -inis, "man," and the patronymic termination -idæ], a family established for the reception of man, in contradistinction to the other families of Primates. In contrast with those other families, man is distinguished (1) by his habitually erect form (except in infancy), the fore limbs being withdrawn completely from the locomotive series and transferred to the cephalic; (2) the foot has the inner toe produced and developed as a "great toe," and this is in the same plane with the others; (3) the hair is scant, except upon the top of the head, but it varies in extent of development on other parts of the body according to the race as well as to the individual; (4) the teeth form an uninterrupted series in each jaw (there being no diastemata, or interruptions, for the reception of enlarged canines in the opposite jaws); and (5) they are in number 32, of which each side of each jaw has two incisors (I. 2), one canine (C. 1), two premolars (P. M. 2), which succeed two deciduous molars, and three permanent and later developed molars (M. 3); furthermore, (6) a bony external auditory meatus is developed, and at the bottom of this is a membrum tympani; (7) the nose has its median septum thin and narrow, and the nostrils are correspondingly approximated. In the first four mentioned characters man contrasts with all the other members of his sub-order, but in the last three mentioned (5-7) he agrees with the apes and monkeys of the Old World, in contradistinction with the monkeys of the New World. In his organization generally man agrees closely with the higher apes (Simiidae), and this similarity extends to the brain as well as to the other parts of the organization. The brain differs chiefly in size and the development of the gyri and sulci of the cerebrum. The extent of agreement is expressed by the association of man with the monkeys of the Old World in one group, opposed to the monkeys of the New World, and the combination of all these in a major group (sub-order Anthropoiden), contrasted with the lemurs (Lemuridae), Tarsidae and aye aye (Daubentonidae or Chirovoridae), which are combined in a corresponding sub-order (sub-order Prosimiæ). Such are the characters which distinguish man as a member of the animal kingdom, and which have induced naturalists to adopt the classification thus sketched; but it is to be remembered that in this case no attention is given to psychological characters, or to those other endowments which distinguish man so trenchantly from all the other members of the animal kingdom, to which in his purely physiological nature he belongs. These important characters more fitly belong to another province, and will be treated under the title MAN, by PROF. M. B. ANDERSON, LL.D. THEODORE GILL.



**Homœopathy** [Gr. *ὁμοιος*, "like," and *πάθειν*, "to be affected"], a method or system of medical treatment based upon the peculiar principle that the therapeutic or curative properties of drugs and other medicinal agents are represented by their morbid effects upon the healthy. Hence the name, in contradistinction to allopathy (*adversimile suffering*), by which term the homœopaths designate the ordinary methods of practice. This system was first propounded by Dr. SAMUEL HAHNEMANN (which see) about the end of the last century, and although greeted at first with little favor from the medical profession generally, has gradually gained in popular estimation, and obtained acceptance with considerable numbers of reputable physicians, not only in Germany, where it originated, but in most other countries of the Old and New World. It is not claimed that Hahnemann was the first to observe or promulgate the therapeutic principles upon which his system is founded. Indications of its recognition as a rule of occasional though rare applicability in the treatment of the sick are found in the medical literature of the past; and even the Greek equivalent of the fundamental maxim, *similia similibus curantur*, has been discovered in writings attributed to Hippocrates. But it is admitted that Hahnemann was the first to adopt it as a general law in the practice of medicine.

The alleged discovery of the real importance of this supposed relation between the disease-exciting and the disease-curing powers of drugs, and the gradual development of the homœopathic system, are briefly, but perhaps sufficiently, described in the article on HAHNEMANN, to which the reader is referred. The following propositions, it is believed, comprise the essential points of the homœopathic doctrine, as held and taught by the best and most recent authorities of the school: (1) That the cure of disease is most easily and completely effected by medicines that are themselves capable of producing in a healthy person morbid conditions analogous to those of the disease; and the more exact the similarity, the greater probability of a favorable result. (2) Consequently, the most certain way of ascertaining the therapeutic value of medicinal agents is by repeated and carefully conducted trials of them, singly, upon persons in ordinary health. (3) That in order to secure the best results medicines should not be administered to the sick in combination, but singly and in the simplest preparations. (4) That remedies prescribed according to the homœopathic method may be, and in fact generally require to be, administered in smaller and more attenuated doses than are necessary to produce their characteristic effects upon the healthy. The practical application of these rules to the treatment of diseases necessitates the individualization of each particular case. To be strictly homœopathic a medicine should correspond not only to the general pathological state, but also to the peculiar symptoms of the patient.

In order to furnish remedies for the great variety of possible morbid conditions, the work of "proving" drugs—as the administration of them to persons in health for the purpose of observing their effects is technically called—which was begun by Hahnemann, has been diligently followed up by his disciples ever since. The homœopathic materia medica consists of the collected and collated results of the "proving" of a large number of drugs, many of which, however, require further verification. These experiments are conducted partly by individuals and partly by numerous associations formed for the purpose. Homœopaths condemn the commixture of several medicines in one prescription. When two or more remedies are required, they are usually given in alternation, and at considerable intervals. They have always avoided, as unnecessary and injurious, the use of bloodletting, drastic purgatives, mercurial salivation, blisters, and indeed all the so-called "heroic" expedients so generally relied on a generation since. Particular attention is paid, however, to diet, exercise, bodily habits, and all other sanitary and hygienic helps.

Upon the question of the proper dose, homœopathic practitioners are, as yet, by no means agreed among themselves. While all assent to the general statement contained in the fourth of the above propositions, the extent to which the dilution or attenuation of medicines may be advantageously carried is still a moot point, in regard to which the school is somewhat divided in opinion and practice. But although there are representatives of either extreme who profess to use exclusively in their practice "high" or "low" dilutions respectively, it is probable that the greater number of physicians consider the question of the dose quite subordinate in importance to the choice of the remedy, and that further experience is necessary to settle the range of greatest efficiency for each drug.

Before the publication of Hahnemann's *Materia Medica Pura* (1811 seq.) the practical application of the new law of cure was necessarily limited to prescribing the very few

drugs of whose effects upon the healthy organism some scanty particulars were known. Such facts were too few and uncertain to answer the requirements of the art; consequently, the systematic proving of even the best known remedies was a necessity. The above-named work (in 6 vols.), containing the ascertained pathogenetic effects of some 60 drugs, was the first fruit of this necessity. As now the means of testing the truth of the homœopathic principle became accessible, the doctrine, and the practice based upon it, began to spread more rapidly, and soon obtained the support of a number of well-known medical men of Germany. Its progress, however, was much impeded by the state laws, which restricted the right of preparing and dispensing medicines to the apothecaries, who, being naturally opposed to a practice calculated to interfere materially with their ancient franchise, did not hesitate to invoke the aid of the law to harass its adherents. Gradually, however, these and other restrictive laws affecting the medical profession were relaxed in favor of the new school. The court-physicians in several German states were among the early disciples of Hahnemann, and were doubtless instrumental in promoting a more liberal policy. Hahnemann himself was appointed physician and state councillor to the duke of Anhalt-Coethen. Dr. Rau, physician to the duke of Hesse-Darmstadt, Dr. Mullenbein, physician to the duke of Brunswick, Dr. Grieslich, surgeon to the grand duke of Baden, and several others who held similar official and intimate relations to the ruling powers, were retained in their positions, notwithstanding their adoption of homœopathy. From Germany the new medical doctrine extended itself to other parts of the Continent, so that before 1840 homœopathy had its professional representatives and its lay patrons in nearly every considerable town in Europe. Homœopathy was introduced into England about 1828 by Dr. Quin, physician to the king of Belgium. Not long after Scotland and Ireland were also invaded by pioneers of the same school. In all these countries the system has made considerable progress.

The earliest practitioner of homœopathy in the U. S. was Dr. Hans B. Gram, an American by birth, though by parentage and education a Dane, who after many years' absence returned in 1825 and established himself in New York. His first attempts to attract the attention of the profession to the scientific claims of the system of which he was the pioneer were unsuccessful, but before his death, in 1840, it had made decided progress in the metropolis, and gained a foothold in Philadelphia, Boston, and other cities. In 1844 was formed a national association of physicians under the name of the American Institute of Homœopathy, with about 50 members. This society now has a membership of over 1000. The whole number of avowed homœopathic physicians in the U. S. is variously estimated at from 3000 to 5000. State and county societies have been established by law in most of the States. In New York, Philadelphia, Cleveland, Cincinnati, Chicago, St. Louis, and Boston are fully-equipped medical colleges, in which the therapeutics of the new school are taught in connection with the usual branches of medical instruction. Hospitals, infirmaries, and dispensaries have been founded in many cities and large towns for the benefit of the sick poor who desire homœopathic treatment. At Middletown, N. Y., a homœopathic insane asylum has been erected by the State, and is in successful operation.

The literature of the new school is already remarkable for its extent, comprising expository, controversial, journalistic, and practical publications in almost every department of medical science. The works of Hahnemann alone form a considerable collection, while some of his disciples have also been prolific writers. The *Organon* has appeared in numerous editions and in various languages. A collection of Hahnemann's *Lesser Writings*, edited by Dr. Dudgeon of London, has also attained a large circulation. As early as 1822 was founded at Leipzig the first periodical of this school, the *Archiv für die Homœopathische Heilkunst*, which continued for many years the leading exponent of the system in Germany. In 1830 the *Bibliothèque Homœopathique* was commenced at Geneva, Switzerland. In 1834 the publication of the *Archives de la Médecine Homœopathique* was begun in Paris. About the same time *The American Journal of Homœopathy*, by Drs. J. F. Gray and A. Gerald Hull, appeared in New York—the pioneer of the homœopathic periodical literature of this country. The *British Journal of Homœopathy* (London) was founded in 1843. The following are the principal publications of this class in the U. S. in 1875: *North American Journal of Homœopathy*, quarterly, New York; *U. S. Medical Investigator*, bi-monthly, Chicago; *American Observer*, monthly, Detroit; *Hahnemannian*, monthly, Philadelphia; *Am. Journal of Mat. Med.*, monthly, Philadelphia; *New England Medical Gazette*, monthly, Boston; *Medical and Surgical Reporter*, monthly, Cleveland. H. D. PAINE.



**Homogeneousness**, or **Homogeneity** [Gr. *ὁμός*, "same," and *γενής*, "kind?"]. An algebraical expression is called *homogeneous* when all its terms are of like "degree"—i. e. products of the same number of literal factors. Were these the symbols of abstract numbers only, the term would be nearly destitute of important signification. But the principle of *homogeneousness* applies to equations expressive of relations between symbols for physical magnitudes (as well as abstract numbers), and these physical magnitudes of various kinds, incommensurable with each other, are only made commensurable and susceptible of mathematical relations by simulation to abstract numbers through the agency of, for each, some arbitrary unit. Thus, we measure time by days or hours; linear extension by miles or feet, etc., or meters, etc. units, so-called, of wholly arbitrary selection—while those of one kind (e. g. the hour) are wholly incommensurable with those of another kind (e. g. the meter), except that each is a unit and represented by the abstract number one. An equation expressing a relation between physical magnitudes should be true whatever be the arbitrary unit taken for each; and, indeed, failure to bear this test is a conclusive evidence of error. But a change of arbitrary unit will evidently cause a change in the numerical value by which each particular magnitude is expressed. Thus, if  $f, f', l, l', t, t'$ , etc. symbolize, respectively, *forces*, *lengths*, and *times*, and  $n, n', n''$ , etc. *abstract numbers*, and we diminish the unit for each in the ratio of  $\frac{1}{n}, \frac{1}{n'}$ , etc., these physical magnitudes will then

be expressed by  $nf, nf', n'l, n'l'$ , etc., and the relation expressed by  $F(f, f', \dots, l, l', \dots, t, t', \dots) = 0$ , should become, truthfully,  $F(nf, nf', \dots, n'l, n'l', \dots, n't, n't', \dots) = 0$ , in which  $F$  denotes any function of the magnitudes.

*Literal homogeneousness* in general secures the existence of this condition; unless, indeed, there be unit symbols which involve in themselves the repetition of an inferior unit in different senses (e. g. a unit of *surface* and of *volume* involve in themselves the repetition of the linear unit *two* and *three* times, repeatedly, in different *directions*), in which case their symbols will by the change supposed above involve the numbers  $n, n'$ , etc. in higher powers. Thus, a unit of surface  $s$  would become  $n'^2s$ , etc., and its symbol is to be ranked as *itself* of that degree to which it involves the inferior unit.

The principle of *homogeneousness* demands that, whatever be the character of the unit symbols, the relation expressed by the above equations, if true for one form, shall be true for the other, whatever be the value of the arbitrary numbers  $n, n'$ , etc. Important *a priori* conclusions may sometimes be deduced. Thus, if a force  $f'$  is to be expressed in terms of *but one* other force  $f$  and symbols of other kinds of physical magnitudes, it is required by the above principle that the expression shall be of the form  $f' = Nf$ , in which  $N$  contains *only* symbols of the other kinds of magnitudes which do not vary with the unit of force, and  $f$  enters as a factor of the first degree.

J. G. BARNARD.

**Homology** [Gr. *ὁμολογία*, "agreement"], in philosophical anatomy, the essential structural correspondence of different parts of the same organism, or of different organisms. Thus, the arm of a man, the fore leg of an ox, the wing of a bird, and the pectoral fin of a fish are homologous parts. So, in the same animal, the foot is the homologous of the hand, because it is formed on the same type.

**Homology**, a term expressing a principle in the chemistry of organic compounds of high importance and significance, first introduced by the illustrious Gerhardt.\* A series of homologues, or *homologous series*, constitutes what, in a classification of carbon compounds, might be called a family or genus, of which the individual compounds are the species. Such a classification is a *natural one*.

A homologous series is formed by additions to an elementary molecule or group of such which constitutes a nucleus or *homologous radical*—of successive equivalents of a certain molecular group of hydrogen and carbon atoms represented by  $H^2C$ . This group,  $H^2C$ , we may, for convenience, call the *homologen*. Whether such a compound is capable of existing in an isolated form is unknown. Methylene, or methene, which has not been yet obtained, would have this empirical formula, but it is not probable that the homologen  $H^2C$  is itself methylene.

\* The discovery of the principle of *homology* is generally given to Gerhardt, who developed and established it, but Dr. J. Schiel of St. Louis first announced in the *Monatsh.* (July, 1842) the arrangement of organic compounds in what he called "progressive series," corresponding to series of homologues. See Dr. Schiel's recantation in the *Am. Jour. of Science*, July, 1864. The principle of homology was also extended to mineralogy by T. Storry Hunt in the *Am. Jour. of Science*, Sept., 1854, ten years before Tschermak, to whom it has been attributed. (See SYLLABUS, CHEMISTRY AND CLASSIFICATION OF.)

Examples of Homologous Series (confined to known compounds).

Genetic Name.	Presumptive or Saturated Series of the Marsh Gas Series.	Monoatomic Alcohols.	Aldehydes of the Lactyl Series.	Monoatomic Fatty Acids.	Hydrocarbons of the "Aliphatic" Series.	Hydrocarbons of the "Aromatic" Series.	
Empirical Formula.	$C_nH_{2n+2}$	$C_nH_{2n+2}O$	$C_nH_{2n}O$	$C_nH_{2n}O_2$	$C_nH_{2n+2}$	$C_nH_{2n-6}$	
Paraffinoid or Nuclear Molecular Radical.	$H^2C$	$H^2O$	$O$	A Compound locally.	Carbon.	$C$	
Homologous Formula.	$H^2C + nH^2C$	$H^2O + nH^2O$	$O + nH^2C$	$C^2 + nH^2C$	$C + nH^2C$	$H^2C + nH^2C$	
1 Marsh-gas.	$C^1H^4$	Wood-spirit.	$C^1H^4O$	Formic acid.	$C^1H^2O_2$	Ethylene olefiant gas.	$C^2H^4$
2 Ethane-gas.	$C^2H^6$	Spirit of wine.	$C^2H^6O$	Acetic acid.	$C^2H^4O_2$	Propylene.	$C^3H^6$
3 Propane.	$C^3H^8$	Propyl alcohol.	$C^3H^8O$	Propionic acid.	$C^3H^6O_2$	Butylene.	$C^4H^8$
4 Butane.	$C^4H^{10}$	Butyl alcohol.	$C^4H^{10}O$	Butyric acid.	$C^4H^8O_2$	Valerylene.	$C^5H^{10}$
5 Pentane.	$C^5H^{12}$	Pentyl alcohol.	$C^5H^{12}O$	Valeric acid.	$C^5H^{10}O_2$	Diallylene.	$C^6H^{12}$
6 Hexane.	$C^6H^{14}$	Caproic alcohol.	$C^6H^{14}O$	Capronic acid.	$C^6H^{12}O_2$	Heptylene.	$C^7H^{14}$
7 Heptane.	$C^7H^{16}$	Heptyl alcohol.	$C^7H^{16}O$	Caprylic acid.	$C^7H^{14}O_2$	Octylene.	$C^8H^{16}$
8 Octane.	$C^8H^{18}$	Capryl alcohol.	$C^8H^{18}O$	Pelargonic acid.	$C^8H^{16}O_2$	Nonylene.	$C^9H^{18}$
9 Nonane.	$C^9H^{20}$	Nonyl alcohol.	$C^9H^{20}O$	Capric acid.	$C^9H^{18}O_2$	Decylene.	$C^{10}H^{20}$
10 Decane.	$C^{10}H^{22}$	Cetyl alcohol.	$C^{10}H^{22}O$	Capric acid.	$C^{10}H^{20}O_2$	Paraffylene.	$C^{12}H^{24}$
etc., etc.				etc., etc.			



In the extended table of examples of homologous series herewith presented the formulæ we have designated "homologenic" convey simply the theory which must be directly deduced from the facts of homology. It will be observed that the first four series given are strictly parallel in every way, the series found in each horizontal line being what Hofmann has called "isologous" series, or those based upon the same number of carbon equivalents. These series may be believed to have the same molecular derivation, in the sense of being compounds of the same elementary molecule, with different other elements and molecular groups. Like the latter, the members of these series of isologues are altogether without chemical or physical resemblances and relations among each other. On the contrary, the homologues in each of the vertical columns have strong chemical similarities and analogies one with another, and frequently occur in admixture in products of both natural and artificial chemical processes, being then often difficult to isolate individually. They present a regular and perfect gradation, or progression in degree, of physical relations and properties, from top to bottom of the column, in correspondence with the increasing number of  $H^2C$  groups combined in the molecule. Thus, the volatility constantly decreases, and the degree of fusion constantly increases, from the top to the bottom of each series.

The most remarkable fact of this kind about homologues was discovered by Kopp—namely, that generally each successive addition of  $H^2C$  corresponds to a definite increase of atomic volume of 22 units; which argues that if the homologue is susceptible of isolation, it will be found to possess this specific atomic volume.

In the last two series of homologues given in the table it will be seen that there is not the complete parallelism and isology with the first four that is presented by the latter between each other. Homologous series are not therefore all parallel for the same number of homologue groups. The admission of the theory of homology seems to compel the admission of the existence in each series of homologues of a fundamental or basal molecule, or group of such; which we have called here the radical of the series. The "organic radicals" of the earlier organic chemists were but a series of homologues based upon one atom of hydrogen as their homologenic radical. Thus,  $H + H^2C = H^3C$  (methyl),  $H + 2H^2C = H^5C^2$  (ethyl), and so on. Ammonia,  $NH^3$ , constitutes also the radical of the beautiful series of homologues discovered by Adolphe Wurtz, the compound ammoniac, or—

Monamines	
$NH^3 + nH^2C$	
Methylamine.....	$C^1H^2, NH^3$
Ethylamine.....	$C^2H^4, NH^3$
Propylamine.....	$C^3H^6, NH^3$
Butylamine.....	$C^4H^8, NH^3$
Amylamine.....	$C^5H^{10}, NH^3$
Hexylamine.....	$C^6H^{12}, NH^3$
Heptylamine.....	$C^7H^{14}, NH^3$
Octylamine.....	$C^8H^{16}, NH^3$
Nonylamine.....	$C^9H^{18}, NH^3$

Very many other such nuclear radicals appear to exist, containing multiple atoms or molecular groups of carbon, and of carbon and oxygen, such as it is difficult, on our ordinarily accepted views, to believe to be capable of existing. The following table illustrates two series of highly important substances, with their constitution and structure on the homologic theory; and this table will serve also to show how this theory enables us to predict the existence and composition of compounds yet unknown. Thus, it may be deduced from the first column that coal-gas may be expected to be found to contain two gaseous compounds as yet unknown,  $C^4H^2$  and  $C^5H^4$ . The aromatic aldehydes also, of which the benzoic, toluic, and cinnic aldehydes are known, are based upon a homologue radical  $C^6O$  (possibly  $C^3, CO$ ).

Generic Names.	Coal-Tar, or "Aromatic" Hydrocarbons	"Aromatic" Acids
Homologenic Radicals.	$C^3$	$C^6O$ or $C^3, CO^2$
Homologenic Formulæ.	$C^3 + nH^2C$	$C^6O^2 + nH^2C$
Series.....	(Unknown)..... $C^4H^2$ (Unknown)..... $C^5H^4$ (Unknown)..... $C^5H^4$ (Unknown)..... $C^6H^6$ Benzene..... $C^6H^6$ Benzoic acid..... $C^7H^6O^2$ Toluene..... $C^7H^8$ Toluic "..... $C^8H^8O^2$ Xylene..... $C^8H^{10}$ Xylic "..... $C^9H^{10}O^2$ Cumene..... $C^9H^{12}$ Cymic "..... $C^{10}H^{12}O^2$ Cymene..... $C^{10}H^{14}$ Cymic "..... $C^{11}H^{14}O^2$ Laurene..... $C^{11}H^{16}$	

The monatomic phenols, including common phenol, cresol, xylenol, thymol, etc., constitute a series of the radical  $C^6O$ . The apparent existence, in combination at least, of such curious molecular groups will serve to suggest the importance of the further pursuit of the somewhat neglected study of homology.

HENRY WURTZ.

**Homotaxis** [Gr. *ὁμός*, "same," and *τάξις*, "arrangement"], a word introduced into use by Prof. Huxley to express an idea in geology remotely analogous to that expressed by homology in zoology. It had been tacitly assumed in geological reasoning that a stratum or a formation was throughout its horizontal extent of contemporaneous origin. The impossibility of this had long been apprehended by the more philosophic geologists, as Edward Forbes, De la Beche, and others, and Prof. Huxley finally gave clear expression to the contradiction by applying the term homotaxis to signify similarity of position in a series of rocks, apart from any question as to contemporaneity or sequence of origin of the parts of the series. (See Huxley, *Annir. Addr. to the Geol. Soc.* for 1862; *Quart. Journ. of Geol. Soc.*, vol. xviii., and *Essays and Reviews*, Eng. ed., 1871, p. 202.)

**Homs**, or **Hums**, the *Emesa* of Strabo and Pliny, town of Syria, in the valley of the Orontes, 1 mile E. of the river and about 60 miles N. E. of Baalbek. It was the birthplace of the Roman emperors Elagabalus (218-222) and his cousin, Alexander Severus (222-235), and was noted for its splendid temple of the Sun, in which these youths were sharing between them the office of high priest when (in 218) the former was chosen Augustus and the latter was made Cæsar. The modern town is well built, of black basalt, with which also most of the streets are paved. It is surrounded by a wall of no great strength, but which suffices to keep off the prowling Bedouin. Nothing ancient is now found there except some ruins and Greek inscriptions. It is a place of considerable trade, and has a population of about 200,000, including 7000 Greek Christians and some 200 Jacobites.

R. D. HITCHCOCK.

**Ho'nan** ("south of the river"), province of China proper, comprising the lowland S. of Hoang-Ho, between lat. 32° and 37° N., and between lon. 110° and 116° E. Area, 65,114 square miles. Pop. 23,037,171. Cap. Kai-Fung.

**Hon'da**, town of Colombia, in the department of Cundinamarca, on the Magdalena. Its climate, though hot, is not unhealthy. It is the natural dépôt of the commercial produce of the very fertile province. But its streets are unfit for carriages and trucks; goods must be transported to the warehouses by carriers, and consequently its commerce is steadily decreasing. It had formerly 10,000 inhabitants.

**Hondt**, the name of a celebrated family of Flemish engravers. The founder of the family, JOSSE HONDt, b. at Wackene, in Flanders, in 1546, and d. in London Feb. 16, 1611; spent a large part of his life in England, where he sought refuge from the religious persecutions of the Spaniards. He was celebrated as an engraver of maps.—Of his sons, HENRY DE HONDt, THE ELDER, b. at Ghent in 1573, and d. at the Hague in 1610; HENRY DE HONDt, THE YOUNGER, b. in London about 1581, and d. at Amsterdam about 1650; and WILLIAM HONDt, b. at the Hague in 1601, and d. at Dantzic. A series of portraits by Henry de Hondt the Elder of 144 artists, mostly Flemish, and of Melanchthon, Bugenhagen, Wyoliffe, Savonarola, Calvin, and Knox, are widely known; so are those by Henry de Hondt the Younger of Queen Elizabeth and William of Orange, and a view of the Hague.—ABRAHAM HONDt, b. at Rotterdam in 1638, and d. in London in 1691, also belonged to the family. He acquired a great name as a painter of animals.

**Honduras**, a republic of Central America, is situated between lat. 13° 10' and 16° 5' N., and bounded by the Caribbean Sea, Nicaragua, the Bay of Fonseca, San Salvador, and Guatemala. Area, about 50,000 square miles. The Caribbean coast is low and marshy E. of lon. 85°, lined with extensive salt-water lagoons, such as Laguna de Cartago and Laguna de Cartine; W. of lon. 85° it is higher, often rocky, and lined with islands, among which are the Bay Islands, belonging to the jurisdiction of Jamaica. The following rivers are found here: Segovia, also called Coco, Oro, or Wanks, about 350 miles long, but navigable only for canoes on account of rapids, forms the boundary between Honduras and Nicaragua; the Patuca, navigable for small steamers, receives the Guayape, famous for its rich gold-washings; the Ulua, with 9 feet of water on the bar traversing its mouth, and navigable for steamers and small craft up to its junction with the Santiago, 70 miles from its mouth. The principal ports along this coast are Omoa, Trujillo, and Puerto Cortes, formerly Puerto Caballos—all commodious and safe. The Pacific coast, along the Bay of Fonseca, is also low, even inundated at spring tides, but



it presents several fine harbors, among which is Amapala. The Choluteca, which flows into the Bay of Fonseca, is navigable for light craft for a considerable distance from its mouth. The interior is high, but much diversified by mountain-ranges, plateaus, terraces, and valleys. The Sierra Madre enters the country from the W., and separates at Merendon into two branches, of which one runs eastward under the name of Espiritu Santo and Grita, and ends in the Onoa Mountains; and the other runs S. and S. E., forming the Selaque Mountains, whose highest peak rises 10,000 feet; the Pucá, Santa Barbara, Sulaco, and Chili mountains. The climate is hot, along the coasts very unhealthy, and everywhere very capricious. April, May, and June are the hottest, November, December, and January the coolest, months. The rainy season is generally ushered in with violent hurricanes and thunderstorms. The soil is exceedingly fertile. The valleys and lowlands are covered with an exuberant tropical vegetation, and on the plateaus all the finest fruits and plants of the temperate zone succeed. The sugar-cane is indigenous; excellent tobacco is produced; coffee, cotton, and cochineal succeed well, but are very little cultivated. Immense forests cover the mountains, and yield excellent timber, fine cabinet woods, especially mahogany, gums, drugs, and dyestuffs. The wealth of the country, however, consists in its mines. Gold, silver, copper, coal, and excellent marble are found in many localities and in great quantities, but very few mines are worked. None of the rich resources are duly utilized, and the reasons are the total lack of roads, the unsettled state of society, the want of sufficient capital, and the comparatively small amount of energy which the inhabitants display. The principal occupation is cattle-raising, and even this is done in a sluggish and careless way. The number of inhabitants is about 400,000, of whom about 150,000 are Indians, 200,000 mestizoes, 6000 negroes, and the rest whites of Spanish descent. The religion is Roman Catholic, but there is very little public education. The government is republican; the executive power is vested in a president elected for four years; the legislative, in a senate and a chamber of deputies. The finances are in great disorder. The foreign debt amounted in 1872 to about \$30,000,000—loans which were raised for the construction of an interoceanic railway. The value of the annual exportation of bullion, indigo, cattle, timber, hides, tobacco, etc. is estimated at \$1,230,000. Cotton and silk fabrics are imported from England; cutlery and machinery from the U. S. Cap. Comayagua, with 18,000 inhabitants.

**Honduras, British.** See BAHAMA.

**Honduras, Bay of,** a large inlet of the Caribbean Sea, between Yucatan, Guatemala, and Honduras. It receives many streams, among which Belize and Montagua are the largest, and contains many islands.

**Hone,** a name given to a stone of fine grain used for giving a fine edge to steel blades. Hones are usually of much finer grain than ordinary whetstones and grindstones. They are made of several kinds of stone, often of Palæozoic age. Various greenstones, siliceo-argillaceous slates, etc. are used. One of the very best hone stones now used is the novaculite of Arkansas, of Carboniferous age. There are also excellent oil-stones from Turkey, Austria, Siberia, England, Wales, and Scotland. For many purposes the Turkey stone is considered the best.

**Hone (WILLIAM),** b. at Barth in 1779. His first attempts in the literary field were unsuccessful, but in 1817 he met a great hit by his pamphlets, illustrated by George Cruikshank. One of them, a parody on the *Book of Common Prayer*, brought him before the courts. He was acquitted, however, and a public subscription was made for him. He became a preacher to a congregation of dissenters, and d. at Tottenham Nov. 6, 1842, in straitened circumstances. The most prominent of his writings are: *The Every Day Book, The Table Book, The Year Book, The Political House that Jack Built, and A Shop of Shop* (1846).

**Honea Path,** post tp. of Anderson co., S. C., on the Greenville and Columbia R. R., 35 miles from Greenville. Pop. 1926.

**Honeoye',** post-v. of Richmond tp., Ontario co., N. Y., at the outlet of Honeoye Lake, 8½ miles from Lyons, on the Erie R. R.

**Honeoye Falls,** post-v. of Monroe co., N. Y., 16 miles S. of Rochester, on the New York Central and Hudson R. R. It contains a union school, 6 churches, a bank, a printing-office, 1 newspaper and news-room, a circulating library, 2 flouring-mills, 1 plaster-mill, 1 sash and blind, a stove and heading shop, a woollen, pump, and axe-handle factory, 2 wagon-shops, foundry and machine-shops, 2 cooper-shops, 1 Masonic lodge, stores, etc. The surrounding country is well adapted for agriculture. Pop. 224.

S. F. JOY, Ed. "HONEY-FALLS FREE PRESS."

**Honeoye Lake,** in the tps. of Richmond and Canadice, Ontario co., N. Y., discharges its waters by the Honeoye outlet into Genesee River. The lake is 5 miles long, 1 mile in breadth, and surrounded by high hills.

**Honesdale,** post-b., cap. of Wayne co., Pa., 160 miles N. E. of Harrisburg, on the Delaware and Hudson Canal, Delaware and Hudson and the Honesdale branch of the Erie R. R., was incorporated as a borough 1831; made the county seat 1842. It contains a fine graded school, 9 churches, finely shaded streets, gas and water works, 2 banks, 2 weekly newspapers, a public library, handsome public grounds, manufactories of glass, axes, and edge tools, woollen goods, pottery, leather, boots and shoes, lumber, canal-boats, and steam-engines. The "Stourbridge Lion," the first locomotive made in America, made its trial-trip from this place in 1828. Large quantities of coal are shipped during the summer by the canal, and more than 500,000 tons are stored on the docks through the winter, awaiting shipment in the spring. Pop. 2654.

THOMAS J. HAM, Ed. "WAYNE CO. HERALD."

**Honey,** the saccharine material collected from flowers by several kinds of insects for the food of themselves and progeny, especially by the honey-bee (*Apis mellifica*). In bee-honey there have been reported as present four kinds of sugar—common cane-sugar, or sucrose; glucose (dextrose), or fruit-sugar; lævulose, or inverted sugar (which turns the plane of polarization to the left, or inverts the action of glucose); the fourth being a sugar stated by Soubeiran to be laevo-rotatory to a degree three times as great as lævulose, but which is little known. There are other substances present, among them an acid ferment, which gradually changes the cane-sugar into a mixture of dextrose and lævulose, so that the clear, limpid fresh honey from the comb often becomes granular and opaque, from the crystallizing out of the less soluble glucose. Wasp-honey (of *Polybia apicipennis*) gives large crystals of ordinary sucrose, and Mexican ant-honey yielded to C. M. Wetherill an uncrystallizable sugar of composition  $C_{12}H_{20}O_{14}$ . Honey varies in aroma and flavor with the flowers from which it has been collected; clover honey, buckwheat honey, and wild honey being readily distinguishable in this respect; and some cases are on record of poisonous qualities derived from the like source. Honey is said to be now much adulterated with glycerine, and even imitated, as a whole, by combining the latter product with other materials, and flavoring with appropriate essential oils.

H. WERTZ.

**Honey-Ant.** See ANT.

**Honeybrook,** post-v. and tp. of Chester co., Pa. It has a national bank. Pop. 1967.

**Honey-Buzzard,** a name given in England to *Pernis apivorus*, a chiefly insectivorous bird of the falcon family, differing from other birds of the family in its food, and in having the space between its eyes and bill completely feathered. *Pernis cristatus*, the crested honey buzzard, is an Asiatic bird. Bees, wasps, and honey are sought by them.

**Honeycomb,** tp. of Marshall co., Ala. Pop. 247.

**Honeycomb Moth,** or **Bee Moth** (*Galleria cecina* and *G. allecra*), are small lepidopterous insects of the Pyralide, or snout-moth family. The larvæ spin silken galleries in beehives, running between the layers of honeycomb, upon which the young insects feed. The moth lays her eggs at evening, while the bees are at rest. It appears that neither moth nor larvæ are ever stung by the bees. The moth is a most formidable enemy to the bees. Quite a number of kinds of moth-traps are employed, and some are very useful in destroying these pests.

**Honey Creek,** tp. of Adams co., Ill. Pop. 1495.

**Honey Creek,** tp. of Crawford co., Ill. Pop. 1868.

**Honey Creek,** post-v. of Fall Creek tp., Henry co., Ind. Pop. 100.

**Honey Creek,** tp. of Howard co., Ind. Pop. 772.

**Honey Creek,** tp. of Vigo co., Ind. Pop. 1510.

**Honey Creek,** tp. of White co., Ind. Pop. 611.

**Honey Creek,** tp. of Delaware co., Ia. Pop. 1088.

**Honey Creek,** tp. of Iowa co., Ia. Pop. 1081.

**Honey Creek,** tp. of Sauk co., Wis. Pop. 1180.

**Honey Cut,** tp. of Mason co., Mo. Pop. 198.

**Honeycutt's,** tp. of Sampson co., N. C. Pop. 1284.

**Honey-dew,** a sweet substance of uncertain origin found on many kinds of plants and trees.

**Honey-Eaters,** a large American family of passerine birds, akin in habits, food, and other characteristics to the humming-birds of the New World, though of larger size. They are also closely connected with the sun birds (Promeropidae), the humming-birds of the Old-World tropical lands. The honey-eaters are mostly very beauti-



ful. A few are good songsters. The name honey-eaters is given to some of the sun-birds, and even to other birds which are, or are believed to be, fond of honey.

**Honey Grove**, post-v. of Fannin co., Tex., 18 miles from Bonham. Pop. 382.

**Honey-Guide**, a name given to certain birds of the genus *Indicator* and of the cuckoo family, found in Africa, Borneo, and India, and named from their curious instinct which prompts them to guide the hunter to a hive of wild bees—a feat which it often, but by no means infallibly, accomplishes.

**Honey Locust**, the *Gleditsia triacanthos*, a large and well-known leguminous tree of the U. S. It takes its name from its long pods filled when ripe with a sweet substance. The tree has stout, often triple thorns, and is used as a hedge-plant. The wood is coarser than that of the common locust (*Robinia Pseudacacia*), but is not much inferior to it. (See *GLEDITSIA*.)

**Hon'eyuckle**, the popular name of many shrubs, erect or twining, of the genera *Lonicera*, *Diosvillea*, etc., and of the order Caprifoliaceæ. Many of them are common in cultivation, being prized for the fragrance and beauty of their flowers. The U. S. have several species, a few of which are seen in cultivation. Most of the finest ones are from Northern Asia or Europe. They have been much improved by cultivation. Many other plants, azaleas, aquilegias, etc., are locally known as honeysuckles.

**Honfleur**, town of France, in the department of Calvados, on the left bank of the Seine, 7 miles S. E. of Havre. It is busily engaged in fisheries, and carries on a lively trade in eggs and fruits with England. Pop. 9,553.

**Hong**, a Chinese word meaning a "row" or "series," was first applied to the European warehouses in the Chinese ports, then to whole blocks of such houses, and at last to the entire factory.

**Hong-Kiang** ("red river"), or **Si-Kiang** ("west river"), a large navigable stream of Southern China, enters the China Sea through several mouths, of which that at which Canton is situated is generally called *Choo Kiang* ("pearl river").

**Hong-Kong** ("red harbor"), an island off the southeastern coast of China, at the mouth of the Canton River, 75 miles S. E. of Canton. This island, whose area is 29 square miles, was ceded to Great Britain in 1842, and together with a small strip of the opposite mainland, the peninsula of Kooloon, which was ceded in 1861, and from which it is separated by a narrow strait, it forms a most flourishing colony. The island itself is rocky and bare, not able to grow so much as would feed its inhabitants one day, but on its northern side it presents a fine harbor, deep and safe, and here is built the city of Victoria, in lat. 22° 16' N., lon. 114° 8' E., which in a few years has become a place of the greatest commercial importance. Steamers from Bombay, Calcutta, San Francisco, Canton, Macao, and Singapore go and come daily, and thousands of sailing-vessels, especially Chinese junks, throng the harbor. In 1869 the total tonnage of vessels entering was 2,525,498; in 1872 it amounted to 3,777,676. The principal articles of importation are cotton goods, opium, and ships' supplies, whose value is estimated at £4,000,000. The principal article of exportation is tea, estimated at £2,000,000. The transfer of passengers also forms an important item in the business of the place. The city stretches for about 3 miles along the bay, from the foot of the hills to the edge of the water, and contains several fine thoroughfares, with large and elegant houses of brick and stone, and surrounded with beautiful gardens belonging to the merchants, and with a number of stately public buildings—the cathedral, the governor's house, the bishop's palace, the exchange, the jail, the hospital, etc. Beautiful public gardens have been laid out, and good free schools for the lower Chinese population established. A strong police force, consisting of Indian Sepoys, is kept, but in spite of the generous expenditure of the colony, its revenues bring annually a surplus. Pop. in 1872, 121,985, of whom 4931 were Europeans, 1490 Indians, and 115,564 Chinese, of whom about 13,000 live on boats in the harbor.

**Hon'iton**, town of England, Devonshire, on the left bank of the Otter. The celebrated Honiton lace received its name from this place, though at present it is manufactured in many other places. Pop. 3470.

**Honolulu**, capital of the Hawaiian Islands and the residence of the king, is situated on the southern side of the island of Oahu, in lat. 21° 18' N., lon. 157° 55' W. Its harbor is formed by a deep and spacious basin in the coral reef which surrounds the island. It is safe at all seasons, and lined with substantial and commodious wharves. In 1872 it was visited by 47 whalers and 138 merchant vessels, of which 22 were Hawaiian and 86 American. The

steamers from San Francisco to Melbourne touch regularly at Honolulu. The city itself is situated among beautiful tropical surroundings, and enjoys an equable and healthy climate, the heat ranging between 60° and 87° F. Among its public buildings the most remarkable are the king's palace, the parliament-house, the Roman Catholic cathedral, the treasury, the post-office, etc. It has 1 Anglican and 2 American churches, 2 hospitals, and a number of good schools. It has a theatre, 5 printing establishments, a bank, billiard-rooms, fine stores, etc., and its trade is quite considerable. The value of its importations amounted in 1872 to \$1,583,583, and of its exportations to \$1,343,585. Pop. 14,852.

**Hono'ria** (JUSTA GRATA), a daughter of Constantius III. and Galla Placidia, and a sister to Valentinian III., b. at Constantinople in 418 A. D., lived after the death of Honorius in 424 and the usurpation of Joannes in Rome, at the court of Valentinian III. By a secret mission she invited Attila, king of the Huns, to come to Italy and marry her, and sent him her ring; but Attila took no notice of the invitation. Having become pregnant by her steward, Eugenius, she was sent to Constantinople, but returned to Rome after the death of Theodosius II. in 450. She now again invited Attila, and this time he saw fit to accept the invitation. He claimed her as his betrothed bride, together with her part of the empire; and as his claims were disregarded by Valentinian III., he invaded Gaul. What became of Honoria is not known. Gibbon says that she was condemned to perpetual imprisonment, but he does not state his authority.

**Honorius**, Roman emperor from 395 to 423, b. at Constantinople Sept. 9, 384, and d. at Ravenna Aug. 27, 423. At the death of Theodosius the Great (395) the Roman empire was divided between his two sons, Arcadius and Honorius. Honorius received the western part—Italy, Africa, Spain, Gaul, Brittany, and Illyria—with Ravenna for his residence; and as he was only eleven years old, he was placed under the guardianship of Stilicho. Stilicho was a vigorous and successful ruler, but when he was treacherously killed at Ravenna (408) the barbarian tribes poured in over the frontiers and rebellion arose in all the provinces. Brittany was entirely given up; Gaul was overrun by Gothic and German invaders; Africa made itself independent under Heraclian; and Italy was thrice plundered, and Rome besieged and taken by Alaric. The weak and indolent emperor could do nothing, and when one of his generals succeeded in defending the empire, he became suspicious and had him killed. After Stilicho followed Constantius. During the reign of Honorius a general persecution was raised against paganism.

**Hono'rius I.**, POPE, a Campanian, became pope in 625, and d. in 638. Special interest has arisen in this pope since the promulgation of the doctrine of papal infallibility from the fact that the letters of Honorius are conceived to teach, *ex cathedra*, the Monothelite heresy, so called, for which heresy he was anathematized by the third Council General of Constantinople, and afterwards was officially pronounced a heretic by Leo II.—HONORIUS II., ANTIPOPE, bishop of Parina, was elected in 1061, and deposed in 1064. D. in 1072.—HONORIUS II., POPE, was chosen in 1124, and d. Feb. 11, 1130.—HONORIUS III. (*Craqueo Savelli*), a Roman, succeeded Innocent III. in 1216, and after a disturbed pontificate d. Mar. 18, 1227.—HONORIUS IV. (*Giuliano Savelli*) became cardinal-deacon in 1261, became pope in 1285, and d. Apr. 3, 1287.

**Hon'ors of War**, stipulated terms granted to a vanquished enemy, by which he is permitted to march out of a town, from a camp or line of intrenchments, with all the insignia of military etiquette. In another sense they signify the compliment paid to distinguished personages, military, etc., when they appear before any armed body of men, or such as are given to the remains of a deceased officer. The circumstances attending the latter vary in different countries, while respecting the former almost everything depends upon the general granting the capitulation. In some cases the troops of a besieged garrison are permitted to march out with drums beating, colors flying, etc.; in others, they are required to lay down their arms at a named spot, and then depart; while in still other cases they are required to march back to their works, after having been permitted to march out either silently or with drums beating, and pile their arms in front of their works. In our own late civil war at the first surrender (Apr. 14, 1861), that of Fort Sumter, Gen. Anderson, commanding, was allowed to march out of the fort with colors flying and drums beating, bringing away company and private property, and paying a salute of fifty guns to his flag. At the surrender of the army of Northern Virginia (Apr. 9, 1865) the terms required the officers to give their individual paroles not to take up arms against the U. S. until properly



exchanged, and each company or regimental commander to sign a like parole for the men of his command: the arms, artillery, and public property to be packed and stacked, and turned over to officers appointed to receive them; officers, however, were permitted to retain their side-arms, private horses, and baggage. Upon compliance with these terms each officer and man was allowed to return to his home, not to be disturbed by the U. S. authorities "so long as he observed his parole and the laws in force where he may reside." The surrender of the army of Gen. Johnston was received Apr. 26, 1865, on the same basis.

**Hontheim, von** (JOHAN NICOLAUS), b. at Treves Jan. 27, 1701; studied jurisprudence at Louvain and Leyden; became ecclesiastical counsellor to the consistory of Treves in 1728, professor of civil law in 1732, and suffragan of the see of Treves in 1748. In 1788 he resigned his offices and retired to Montquentin, where he d. Sept. 2, 1790. Author of *Historia Trevensis* (3 vols., 1750) and *De Statu Ecclesie* (1763), the latter attacking the Roman Catholic Church, for which he was persecuted, and he retracted in 1778; but his ideas had taken root. (See FEBRONIANISM.)

**Honvéd**, the Hungarian militia. The name was first used in 1848, when in order to combat the Austrian supremacy the Hungarian Diet called out about 200,000 men, who were interspersed among the regular soldiers. This militia was called *Honvédség*. Afterwards, when after the defeat of 1866 the Austro-Hungarian government increased the army according to the principle of universal military duty, and likewise established an Hungarian militia, the name was retained from regard to the national feeling of Hungary. It was determined by the law of Dec. 5, 1868, that the honvéd should aid the regular army in times of war. It should not be employed, however, outside the country, unless with the consent of the Hungarian Diet. It should be composed of men who had served their time in the reserve of volunteers, and of men who had made no military service on account of the fulness of the cadres. At present (1875) the honvéd, thus organized, consists of 206,707 men—namely 60 men of the Hungarian crown-guard; 124 battalions of infantry, comprising 187,812 men; 40 squadrons of cavalry, comprising 14,338 men; and 4497 artilleryists. The officers who drill and command this army are taken from the regular army. A. NIEMANN.

**Hoo'bly**, town of British India, in the presidency of Bombay, is poorly built, but carries on an important trade in cotton. Pop. about 15,000.

**Hood**, county of N. Central Texas. Area, 614 square miles. It is traversed by the Brazos River. It is finely diversified, fertile, well watered and timbered, has a good climate, abundant water-power, and excellent building-stone. Live-stock, corn, cotton, and wool are staple products. Cap. Granbury. Pop. 2585.

**Hood**, the name of two noted English admirals, sons of a rector of Bath. The elder brother, SAMUEL, b. Dec. 12, 1724, became admiral in 1780, Irish baron in 1782, English viscount in 1796, and d. Jan. 27, 1816. He fought with great valor against the French during the North American war of independence, and again in the war of 1793, when he commanded in the Mediterranean, took Toulon, which, however, he had to give up again, and expelled the French from Corsica.—The younger brother, ALEXANDER, b. in 1727, became admiral in 1782, Irish baron in 1794, British peer in 1796, viscount in 1800, and d. May 3, 1814. He commanded under Lord Howe at Gibraltar and in the Channel in 1794, and gained in 1795 a victory over a French fleet off L'Orient, which he attacked, though he was inferior in number to the enemy.

**Hood** (JOHN BELL), b. at Owingsville, Bath co., Ky., June 29, 1831; graduated from the U. S. Military Academy, and appointed brevet second lieutenant of infantry July, 1853; transferred to the cavalry as second lieutenant 1855, and promoted to be first lieutenant 1858. Lieut. Hood was actively engaged on frontier duty until 1861, when he entered the Confederate army, serving in every position from first lieutenant to that of commander-in-chief of an army with the rank of lieutenant-general, serving throughout the Virginia Peninsular campaign, at the second battle of Bull Run, at Antietam, at Gettysburg, and at Chickamauga, where he lost a leg; in 1864 he succeeded Gen. Johnston in command of the army resisting Gen. Sherman's invasion of Georgia; met the Union forces in battle at Franklin Nov. 30, 1864, and at Nashville Dec. 15-16, soon after which he was relieved by Gen. Richard Taylor. After the war he settled in New Orleans. D. Aug. 30, 1879. G. C. SIMMONS.

**Hood** (ROBIN), the hero of a great number of the most popular among the old English ballads, was an outlaw and a robber who lived in the beginning of the fourteenth century in the depths of Sherwood Forest, Nottinghamshire, and Barnsdale Forest, Yorkshire, with a company of sim-

ilar fellows—some say 100—and among them Little John and Friar Tuck, not to forget the Maid Marian. Although a robber by profession, he had some gallant and magnanimous qualities, which won for him not only the admiration, but even the affection, of the lower classes. He was the best archer in the world, his arrow never missing the aim. He was brave; a fight with four knights and a victory over two was a small matter with him. He was not cruel; he never killed people when it was not necessary. He was rather jovial and good-hearted, and what he took from the rich he often gave to the poor. Nevertheless, if he had been nothing but a simple robber, he would never have attained that romantic glory which attached very early to his name. It is probable, therefore, that he was driven into this kind of life by some political circumstances which naturally made him the knight of the lower classes; and Mr. Hunter finds it likely that he was one of those yeomen who under Edward II. joined the rebellion of the earl of Lancaster, but failed and were ruined. According to tradition, he was bled to death by a nun and buried in Kirkstons Park, Yorkshire. He is first mentioned in the *Vision of Piers Ploughman*, written between 1355 and 1365, and next in the *Scotichronicon*, written between 1377 and 1384. In 1495, Wynkyn de Worde published a long poem under the title *Lytle Geste of Robyn Hood*, which seems to be a combination of several ballads. In the sixteenth century rustic sports and masqueradings were celebrated in many places under the name of "Robin Hood games." In 1795, Ritson published a collection of all the ballads and historical anecdotes referring to Robin Hood; which collection was considerably enlarged in 1847 by J. M. Gutch. At one time most modern critics agreed in considering Robin Hood as a mythical creation, representative of the general relation between the Anglo-Saxon population and the Norman-French barons in the twelfth and thirteenth centuries, but without any individual and concrete historical foundation. A German mythologist, Adalbert Kuhn, even went so far as to identify the poor robber with the old pagan god Woden (*Hood*—*Wood*—*Woden*). But in 1842, Rev. Joseph Hunter published in London a learned and ingenious pamphlet on the subject, and although many of the details of his researches are nothing more than hints and suggestions, yet the whole goes far to establish an historical basis for the tradition.

**Hood** (THOMAS), b. in London May 23, 1799. His father, who was a bookseller, d. in 1811, up to which time the son had received but a very unprofitable preparatory education; in 1812, however, his mother placed him at a day school, where, under the care of a good teacher, he made rapid progress, and gained his first fee for literary labor in revising a new edition of *Paul et Virginie*. From school he entered a counting-house, but his health failing, he was sent to Dundee, where he continued his reading and contributed various pieces to the local publications. Returning to London in two years with improved health, he entered the service of his uncle to learn the art of engraving, in which he acquired some skill, which was of value to him in his subsequent career. In 1821 the *London Magazine* fell into the hands of some friends, and Hood became sub-editor. In this position he formed the acquaintance of all the leading literary men of the time, and with Charles Lamb an intimacy sprang up which lasted during the latter's life. In this society his own powers developed, and his first separate publication, *Odes and Addresses*, soon appeared, being, however, the joint work of himself and J. H. Reynolds. *Whims and Oddities* appeared in 1826, followed by *National Tales* 1827, *Poem of the Matsumura Fairies*, *Heaven and London*, *Upon the Continent*, and *Other Poems*. In 1829 the *Comic Annual* was issued, and continued nine years. For a year he edited *The Gem*, in which appeared his poem entitled *Edwin Aram's Dream*. In 1831 he occupied Lake House, near Wansford, where he wrote his novel *Tynley Hall*. In 1838 *Hood's Own* was started, a monthly publication consisting chiefly of extracts from the *Comic Annual* series, with new contributions. His health still being delicate, he went to the Continent, where he remained for several years, and from Belgium published his *Up the Rhine*, in 1841, as he says in the preface, on the groundwork of *Hansley and Gretchen*. On his return to England he became editor of the *New Monthly Magazine*, from which he retired in 1844. In 1844 *Hood's Magazine* was started, to which he furnished most of the best work until near his death. A short time before his death, while on a boat at sea, which he never left alive, he contributed to *Punch* those touching verses which have rendered him more immortal—"The Song of a Shirt," "Bridge of Sighs," and "The Lay of a Laborer." A short time before his death a government pension of £100 was accorded to him by Sir Robert Peel, and continued to his widow after his death, which occurred in London May 3, 1845.



**Hood** (THOMAS), son of the above, b. at Ware-head, Essex, Jan. 19, 1835; educated at Oxford; his first literary work, *Poor and Paired Poachers*, appeared in 1854-55, followed by numerous books for juveniles; he was also the author of several bright novels and a number of successful farces and humorous poems. In 1860 he was appointed editor of *Punch*, a comic periodical and the most successful rival to *Punch*; was a good designer, and illustrated his father's comic verses, "Precocious Peggy," etc. D. in London Nov. 20, 1874.

**Hooded Seal**, the *Cystophora cristata*, a seal of the North Atlantic coasts, is about eight feet long, and is characterized by a cartilaginous inflated hood or crest, which in the adult male is of considerable size. It may be a reservoir of air for the service of the animal when diving. It is a formidable biter, but is hunted for its fur and oil. When surprised by the hunter it sheds copious tears.

**Hoof**, the horny shell which covers the foot, or the separate digits of the foot, of certain herbivorous (or mostly herbivorous) mammals. It is the homologue of finger and toe nails of the claws of other vertebrates. It is, histologically, composed of the agglutinated and dried cell-walls of epithelium, with a small proportion of intercellular substance and of cell-contents. Chemically, it consists chiefly of an albuminoid substance, of uncertain composition, provisionally called keratin. The hoofs of beef-cattle are extensively used in making buttons, combs, and ornamental articles. Horse-hoofs are used in making prussiate of potash and in case-hardening iron.

**Hooghly**, town of British India, the capital of the district of Hooghly, in the presidency of Bengal, on the left bank of the Hooghly. It has a college in which both English and Asiatic literature is taught, and which was founded by a native. Pop. 12,000.

**Hooghly River** is the westernmost outlet of the Ganges, formed in lat. 24° 25' N. and lon. 88° 22' E. by the confluence of the Bhagirathi and the Jellinghly, two branches of the Ganges, and considered as the proper mouth of this river. It is about 200 miles long, 10 miles broad at its entrance into the Bay of Bengal, and although its mouth and shores are encumbered by mud-shoals, it is navigable for the largest vessels, its draught being 17 feet up to Calcutta. During the S. W. monsoon the Bore (which see) appears here, and generally the tide is felt 17 miles above Calcutta. Its waters are considered holy by the natives.

**Hoogstraten, von** (SAMUEL), b. at Dort in 1627; belonged to a family of painters; received instruction from Rembrandt; travelled in Germany, Italy, and England; and d. in his native city in 1678. He painted history, portraits, flowers, and animals, but became most celebrated as a painter of still life.

**Hook** (THOMAS EDWARD), b. in London Sept. 22, 1798; at Harrow he appears to have been careless and inattentive to his proper studies; he was, however, extremely precocious, and displayed at a very early age remarkable aptitude in making verses and arranging them to music. In 1805 his first farce was produced, *The Soldier's Return*, a comic opera in two acts, which met with great success, and was speedily followed by numerous farces and melodramas. But it was his own life at this time which attracted public attention toward him. His practical jokes were of the boldest kind, while his brilliant conversational powers, his remarkable talent for punning and improvisation, his convivial disposition, soon made him a favorite in aristocratic society and gained him the friendship of the prince regent, who in 1812 secured for him the appointment of accountant-general and treasurer of Mauritius. In 1818 irregularities were discovered in his accounts, and he was returned to England in arrest, but no grounds for a criminal charge existing, he was soon liberated. In 1820 he assumed the editorship of the new journal, *John Bull*, which at once reached, and for some time maintained, a large circulation. The board of audit declared him in 1823 a debtor to the Crown in the sum of £12,000, and he was again arrested, and confined for nearly two years. Although no portion of the missing funds was ever traced to Hook, and it was believed the guilty parties were among his subordinates, the government never abated its claim, and at the death of Hook the small sum realized from the sale of his effects was claimed by the Crown. In 1824 the first series of *Sayings and Doings* appeared, followed by the second in 1825, and third in 1825; *Morrell* was published in 1826; *The Parson's Daughter* in 1826, etc.; in 1826 he became editor of the *New Monthly Magazine*; in sixteen years he published some 38 volumes. Hook retained his position in society to the last, but his high living, habit of gambling, and forced mental labor overtaxed his powers, and he died deeply in debt at Fulham Aug. 24, 1841.

**Hook** (WALTER FARQUHAR), D. D., F. R. S., dean of

Chichester, b. in 1798, and educated at Winchester and Oxford; was appointed in 1827 chaplain in ordinary to the king; was long incumbent of Leeds, where he accomplished much in the erection of churches, school-houses, chapels, parsonages, etc. His *Church Dictionary*, *Ecclesiastical Biography*, *Lives of the Archbishops of Canterbury*, and his numerous published sermons, pamphlets on education, etc., are all valuable. D. at London, Eng., Oct. 21, 1875.

**Hooke** (NATHANIEL), b. in Ireland about 1690; lost his fortune in the South Sea Bubble; was engaged by the duchess of Marlborough in arranging her memoirs; and d. July 19, 1763. He was a friend of Pope, and wrote *The Roman History from the Building of Rome to the Fall of the Commonwealth* (4 vols., 1757-71), which was much read in its time.

**Hooke** (ROBERT), b. at Freshwater, in the Isle of Wight, July 18, 1635. He was intended for the Church, but his instructors drew him to the study of mathematics, astronomy, and mechanics. In 1664 he became professor of geometry at Gresham College, London; in 1666 was appointed city surveyor, on account of a plan he presented for the rebuilding of London after the Great Fire, though the plan was not followed; in 1677 was made secretary of the Royal Society. D. in London Mar. 3, 1703. While a young man the art of flying was the subject of his inventive speculations; he afterwards accused Huygens of having stolen his invention of regulating the balance of a watch by a spiral spring, and laid claim to the first discovery of the principle of gravitation against Newton. The most prominent of his writings are *Micrographia* (1665) and *Lectiones Mathematicae* (1678-79).

**Hook'er**, tp. of Laclede co., Mo. Pop. 1114.

**Hooker** (EDWARD), U. S. N., b. Dec. 25, 1822, at Farmington, Conn., entered the navy as an acting master July 19, 1861; was promoted to acting volunteer lieutenant "for gallantry in action" in 1862, and became an acting volunteer lieutenant-commander in 1865; was commissioned as a lieutenant-commander in the navy in 1868; served in the North Atlantic squadron during 1861 and 1862, and commanded a division of vessels in the Potomac flotilla for the remainder of the civil war; was severely wounded in a boat expedition (Oct. 5, 1861), and behaved with distinguished bravery; is mentioned in the official reports of Rear-admiral Lee and Commanders Murray, Parker, and Renshaw as a "brave, cool, and able officer." Lieut.-commander Hooker is descended from Rev. Thomas Hooker, who landed at Plymouth, Mass., in 1630, and afterward led the colony which settled at Hartford, Conn. Many of the name took an active part in the early Indian wars, and Col. Noah Hooker, the grandfather of Lieut.-commander Hooker, was an officer of some distinction in the army of the Revolution.

FOXHALL A. PARKER.

**Hooker** (JOSEPH), b. at Hadley, Mass., Nov. 13, 1814; graduated at West Point, and entered the army as second lieutenant of artillery July 1, 1837; after a campaign in Florida against the Seminoles, he served on frontier and garrison duty till 1846, and 1846-48 in the war with Mexico on the staff of Gens. Persifer Smith, Hamer, and Butler; in 1847 appointed assistant adjutant-general, serving as such in Pillow's division; brevetted captain, major, and lieutenant-colonel for gallantry at Monterey, the National Bridge, and Chapultepec. In Feb., 1853, he resigned from the army, and engaged in farming in California, where for two years previous he had served; also engaged as superintendent of military roads in Oregon. On the outbreak of the civil war (1861) he tendered his services to the government, and was appointed (May 17, 1861) brigadier-general of volunteers, serving in the defenses of Washington and on the lower Potomac until Mar., 1862, when he was assigned to the command of a division of the 3d corps, Army of the Potomac; in the Virginia Peninsular campaign, 1862, was engaged in the siege of Yorktown, April-May; battle of Williamsburg, May 5, where his division bore the brunt of the battle nearly all day; at Fair Oaks (second day), Frazier's Farm, and Malvern Hill. Hooker was now promoted to be major-general of volunteers, to date from the battle of Williamsburg, continuing in command of a division and engaged at the battle of Manassas, Aug. 29-30, and Chantilly, Sept. 1; appointed to command the 1st corps Sept. 6, 1862, he displayed great bravery at South Mountain and Antietam, being severely wounded at the latter battle, and disabled until November, when he returned to the field, having in the mean time (Sept. 20) been appointed brigadier-general in the regular army, and on Burnside's succession to the command of the Army of the Potomac was assigned to command the centre grand division (3d and 5th corps) in the new organization of that army, and held this command at the battle of Fredericksburg, Dec. 13, 1862. In Jan., 1863, Hooker succeeded Burnside in command of the Army of the Poto-



mac, and in May following fought the battle of Chancellorsville, where, though outnumbering the enemy, he decided after two days' fighting to return to the N. bank of the Rappahannock. At the time of the invasion of Pennsylvania by the Confederate army the Army of the Potomac, following, had reached the vicinity of Frederick, Md., when, owing to the refusal of Gen. Halleck to place the troops at Harper's Ferry at the disposal of Hooker, the latter requested to be (June 27), and was, relieved from command of the army the next morning. For the skill and energy by which he first covered Washington and Baltimore from the meditated blow of the advancing enemy Gen. Hooker received the thanks of Congress. In Sept., 1863, he was assigned to the command of the 20th army corps (Army of the Cumberland), and was distinguished at the capture of Lookout Mountain, battle of Missionary Ridge (Nov. 21-25), pursuit of the Confederate army, and the action of Ringgold, Ga., Nov. 27, 1863. In the invasion of Georgia by the army of Gen. Sherman, Hooker led his corps in the almost constant fighting up to and including the siege of Atlanta, until July 30, 1864, when on a question of command he was relieved at his own request. He subsequently commanded northern department, department of the East, and that of the Lakes; brevetted maj.-gen. U. S. A. for gallantry at Chattanooga, and Oct., 1868, retired upon full rank of maj. gen. D. Oct. 31, 1879. G. C. SIMMONS.

**Hooker (JOSEPH DALTON)**, M. D., D. C. L., LL.D., C. B., F. R. S., a son of Sir W. J. Hooker, b. in 1817; went in 1839 as botanist to the Erebus Antarctic expedition; was 1847-51 engaged in an expedition to the Himalayas; became in 1855 assistant director, and in 1865 director, of the Kew Gardens; explored in 1871 Morocco and the Great Atlas Mountains; is a member of many learned societies. Author of *Flora Antarctica* (1841-47), *Cryptogamia Antarctica* (1847), *Rhododendrons of the Sikkim Himalaya* (1849-51), *Flora of New Zealand* (1852-54), *Himalayan Journals* (1854), *Sikkim-Himalaya Plants* (1855), *Flora Tasmania* (1855), *The Student's Flora* (1870), with G. Bentham, *Genera Plantarum* publishing in 1875, and other valuable works and many scientific papers.

**Hooker (RICHARD)**, b. near Exeter about 1554; studied at Oxford, and took orders in 1581. Shortly after he married rather unhappily, and held ecclesiastical offices in Drayton Beauchamp, Temple, Boscombe and Bishopsbourne, where he d. Nov. 2, 1600. His colleague in Temple was Travers, one of the most zealous Puritans in the times of Elizabeth, and between him and Hooker a sharp controversy arose, which occasioned the famous work of the latter, the *Lines of Ecclesiastical Polity*. The four first books were published in 1594; the fifth followed in 1597; the remaining three were posthumous. The work is a defence of the Church of England and Church establishments in general, and its learning and style are generally praised, even by such as hold opposite views.

**Hooker (THOMAS)**, b. at Markfield, Leicestershire, England, in 1586; studied theology at Cambridge; preached in London, but left England in 1630, persecuted for non-conformity. After preaching in Delft and Rotterdam, he came to America in 1633, and settled at Newtown (now Cambridge), Mass., whence in 1636 he removed with 100 others to the present Hartford, Conn. He and Stone were the first ministers at the church here, and his influence was very large. D. here July 7, 1647. His principal work is *A Survey of the Summe of Church Discipline*, written in connection with John Cotton. Some of his sermons were published in England. A selection of his works and a memoir of his life were published by the Rev. E. W. Hooker (Boston, 1849).

**Hooker (Sir WILLIAM JACKSON)**, D. C. L., F. R. S., b. at Norwich, Eng., in 1785; became in youth a zealous botanist; travelled abroad in his favorite pursuit 1806-14; became regius professor of botany at Glasgow 1820; edited the *Botanical Magazine* (1828-31); the *London Journal of Botany* (1834-51); was knighted 1836; became director of Kew Gardens 1841; d. at Kew Aug. 12, 1865. Author of *Tour in Ireland* (1811), *British Journal Botany* (1816), *Miscologia Botanea* (with Taylor, 1818), *Flora Sibirica* (1821), *Exotic Flora* 3 vols., 1822-27, *Flora Filicina* (with Greville, 1826-37), *James Plantarum* (10 vols., 1836-54), *Flora Boracel Americana* (1829-40), *British Flora* (1830), *Genera of Ferns* (1838-42), *Species Filicum* (1840-53), and many other botanical works.

**Hooker (WORTHINGTON)**, A. M., M. D., b. at Springfield, Mass., Mar. 3, 1806; graduated at Yale in 1825; received his medical degree at Harvard in 1829; practised at Norwich and New Haven, Conn., and was professor of the theory and practice of medicine in Yale College 1852-67. He was the author of a series of scientific books for the young, and of a number of professional works which gave him a wide reputation as a physician and scholar. D. at New Haven, Conn., Nov. 6, 1867.

**Hook'erton**, tp. and post-v. of Greene co., N. C., 82 miles S. E. of Raleigh, on Moccasin River. Pop. of v. 163; of tp. 1286.

**Hooks and Eyes**, for fastening garments upon the person, have been worn for ages. Some forms of the Roman *fibulae* or clasps are essentially the same as our modern hooks and eyes, which are at present made with great rapidity entirely by machinery.

**Hook'sett**, post-tp. of Merrimack co., N. H., on Merrimack River and on the Boston Nashua and Concord R. R., at the junction of the Suncook Valley R. R., 8 miles below Concord. It has manufactures of brick, lumber, and cambrics. Pop. 1330.

**Hook-Squid**, a name given to certain cephalopods of the genera *Ophioteuthis* and *Euplateuthis*, mostly as far as known, of small size, but much dreaded for their long hooked tentacles and suckers and their voracious habits. There are nearly twenty known species, mostly found in warm seas only. *O. Bartschi* ranges through most seas, warm and cold.

**Hooks'town**, post-b. of Greene tp., Beaver co., Pa. Pop. 259.

**Hooper (JOHN)**, b. in Somersetshire about 1195; studied theology at Oxford, but having adopted the views of the German Reformers, he was compelled to leave Oxford, and went to Switzerland. On the accession of Edward VI. in 1547, he returned to England, preached with great success in London, and was in 1550 appointed bishop of Gloucester. In the beginning of the reign of Mary, in 1553, he was imprisoned, and as he refused to retract, he was condemned as a heretic and burned at the stake at Gloucester, Feb. 9, 1555. He wrote several works, among which was *Tucker Lectures on the Creed* (1611); also several interesting letters from him have been discovered, and published by Rev. C. Nexinson (Cambridge, 1822).

**Hooper (JOHNSON J.)** was b. and bred in North Carolina, but early became a lawyer and an able Whig journalist of Alabama. He was (1849-63) solicitor of the ninth Alabama circuit, and in 1861 secretary of the Provisional Congress of the Confederate States. His principal works are *Widow English's Husband* (1841) and the *Advantages of Simon Suggs*, the last an exceedingly popular book. Mr. Hooper was a man of convivial habits, and late in life became a Roman Catholic. D. in 1863.

**Hooper (LUCE)**, b. at Newburyport, Mass., Feb. 4, 1816; removed at fifteen, with her father, to Brooklyn, N. Y., where she wrote poems for the *Long Island Star*. D. Aug. 1, 1841. Among her works were *Scenes from Real Life* (1840), *Domestic Happiness*, a prize essay (1840), *Lady's Book of Flowers* (1845). Her *Works*, with a memoir by John Keese, appeared in 1842, and *Complete Poetical Works* in 1848.

**Hooper (SAMUEL)**, M. A., b. at Marblehead, Mass., Feb. 3, 1808. His father was engaged in the European and West India trade, and the son as his agent visited Russia, Spain, and the West Indies. In 1833 he became a partner in the mercantile house of Bryant, Sturgis & Co., of Boston, who traded largely on the Pacific coast and in China, sending their vessels to California for hides, to the N. W. coast for furs, and to China for teas and silks. About 1842 he became a member of the firm of William Appleton & Co., who were also engaged in the China trade. Mr. Hooper also was largely interested in the iron business, and devoted much attention to questions of finance and currency. In 1851 he was chosen a member of the Massachusetts house of representatives, where he served three years, when he declined a re-election; in 1857 he was chosen a member of the State senate. In 1861 he was elected to Congress to fill a vacancy, and was re-elected at each successive biennial election, and was a member of Congress at the time of his death, at Washington, Feb. 13, 1875. He served on the committees of ways and means, of banking and currency, and of the war debts of the loyal States, and to his efforts was in no small degree due the success of the national loan of Apr., 1861, and of the national banking system. He wrote two pamphlets on the currency question, which are notable for broad and comprehensive views. He was the founder of the School of Mines in Howard University, from which in 1866 he received the degree of master of arts.

**Hooper (WILLIAM)**, a signer of the Declaration of Independence, b. at Boston, Mass., June 17, 1742; graduated at Harvard in 1760; studied law under James Otis; removed in 1767 to North Carolina, where he held many important public positions, serving in the old Congress 1774-77. D. at Hillsborough, N. C., Oct. 1, 1790.

**Hooper's Creek**, tp. of Henderson co., N. C. P. 755.

**Hooper's Island**, tp. of Dorchester co., Md., const.



ing chiefly of a long narrow peninsula between Hong River and Chesapeake Bay. Pop. 760.

**Hoope'ston**, post-v. of Vermilion co., Ill., 104 miles S. of Chicago, on the Chicago Danville and Vincennes and the Lafayette Bloomington and Mississippi R. R. It has a seminary, several churches, a bank, a newspaper, elevators, public halls, 4 hotels, stores, etc. Principal occupation, merchandising and trafficking in grain. Pop. about 1200.

SEAVEY & WALLACE, Eds. "CHRONICLE."

**Hooping Cough.** See WHOOPING COUGH.

**Hoop'oe** (so named from its note), the *Upupa epops*, a slender billed bird of Europe, Asia, and Africa, and of the family Upupidae. It feeds on insects, and is the subject of many popular superstitions, being regarded as ominous of evil. It is in reality a very harmless and even useful bird. It is quite small, but very elegant in appearance. Other species are described, none of them American.

**Hoorn**, town of the Netherlands, in the province of North Holland, on the Zuyder-Zee. Its fortifications have been transformed into promenades, and now it has importance only as a trading and manufacturing place. It has considerable shipbuilding and a naval college. Pop. 9,000.

**Hoo'sac River** rises in Lanesboro', Berkshire co., Mass., flows N. and N. W., traverses the S. W. angle of Vermont and Rensselaer and Washington cos., N. Y., affording abundant water-power, which is extensively utilized. It is called *Hoosick* in New York.

**Hoosac Tunnel.** The Hoosac Tunnel is in the north-western part of the State of Massachusetts, and is contained within the limits of the towns of Florida and Adams in Berkshire co. It is on the railroad route from Boston, Mass., via Greenfield, to Troy, N. Y. The distance from Boston to the E. portal is 137 miles, and thence to Troy 54 miles. That part of the route in Massachusetts, W. of Greenfield, which embraces the Hoosac Tunnel, is called the Troy and Greenfield R. R. Experimental work was first commenced in 1851, but no actual tunnelling until 1856. In 1862 the State took possession, and has since prosecuted the work. The tunnel is a little more than 4½ miles long, and is made large enough for the passage of two lines of railway trains. It reaches through the Hoosac Mountain, which is the summit-range that extends southward into Massachusetts from the Green Mountains of Vermont. The greater part of the rock penetrated is a micaceous schist, exhibiting, however, widely variant conditions and characteristics in different portions of the length. A working-shaft 1028 feet deep, which has been sunk near the centre of its length, will be the only one kept open for the purpose of aiding in the ventilation of the tunnel. The work of excavating since 1866 has been greatly expedited by the application of machine-drills. These have been driven by pneumatic power, and in this, and also in availing of the force of percussion in drilling, they resemble those which were employed in the Mont Cenis Tunnel, and are believed to be of superior advantage and efficiency. Near the E. end constructions were made to utilize the flow of the Deerfield River for driving the compressors. At the other points of supply compression of air has been obtained entirely by steam-power. The cost of the tunnel and 39 miles of adjoining railroad, including the accumulation of interest, has been about \$13,000,000. The Hoosac Tunnel route between Boston and Troy, consisting of Fitchburg and Troy and Boston R. Rs., is now (1880) in full operation through this tunnel.

BENJAMIN D. FROST.

**Hoo'sick**, post-tp. of Rensselaer co., N. Y. It is traversed by the Hoosick River, and is on the Troy and Boston and Troy and Bennington R. Rs., 30 miles from Troy. The township has extensive water-power and several manufacturing villages. Lime and slate are procured here. The so-called battle of Bennington (Aug. 16, 1777) was fought in this town. Pop. 5728.

**Hoosick Falls**, post-v. of Rensselaer co., N. Y., 26 miles N. N. E. of Troy, on the Troy and Boston R. R. It contains a graded school, 6 churches, a large mowing-machine factory employing 800 hands, malleable iron-works, 1 newspaper, a steam saw-mill, and other manufactories, and 2 hotels, stores, etc. Pop. about 4000.

J. H. LIVINGSTON, Ed. "RENSSELAER CO. STANDARD."

**Hoo'sier Prair'ie**, tp. of Clay co., Ill. Pop. 1179.

**Hop Bottom**, post-v. of Susquehanna co., Pa., on the Delaware Lackawanna and Western R. R., 27 miles N. by W. of Scranton.

**Hop-culture.** Hops (which see) grow wild in most parts of the Northern U. S. and Europe. There is but one botanical species—namely, *Humulus Lupulus*—but this is broken into varieties by cultivation. The plant belongs to the nettle family (Urticaceæ), and like the hemp is dioecious. It is a climbing vine with harsh foliage and rough stems,

twining with the sun—that is, from left to right. In its wild state it clammers up the stems of shrubs and copse-wood, and reaches high up among the limbs of lofty trees. The root is perennial, but the stems die in winter. Plantations of hops are not profitable S. of lat. 40.

The soil of a hop-yard should be made deep and rich; good corn or wheat ground will serve. It should be dry at all seasons, deeply and thoroughly worked, and subsoiling is a great advantage. It should be on sunny and elevated ground, where it may have the influence of the sun and air, and be exposed neither to high winds nor to early frosts. The confined atmosphere of valleys or close proximity to woods induces disease and favors parasitic insects. Though there are several varieties of hops, possessing diversities of flavor and appearance, the market seems to favor no particular kind as such. Hence, growers select varieties which in their own localities enjoy a reputation as yielding most or suffering least from rust and insects. The best known varieties are the "grape hop," which has large clusters, easily picked, the "English cluster," a free-fruited, golden-yellow variety, with reddish stems, and the "Pompey hop," a rank grower, having medium-sized clusters of long green, quadrangular fruit, of very marked appearance, but said to be liable to rust and mildew.

Hops are cultivated in hills set 7½ to 8 feet apart. The roots do not fill the ground until the end of the second or third year. The first year, therefore, any crop may be raised to fill the soil which will not interfere with the cultivation. The land being manured and ploughed in autumn, and left rough, is ploughed again in the spring, and marked off—best by furrows 8 feet apart each way. Stakes are set at the intersection of the lines to mark the hills. Cuttings ("sets") are obtained from some established and healthy yard. They are the shoots which come from the crown of the plant, and are removed at the annual pruning, cut in lengths containing two joints or four eyes, and sold by the bushel. They should be fresh, and may be kept in the cellar or in the ground until wanted. Two to four bushels are required to plant an acre. Three or four sets are placed equally distant near the centre of the hill, just below the surface, their tops inclining together. As soon as convenient poles 6 or 8 feet high, like common bean-poles, are set. If the soil is rich, the sets vigorous, and planted early, a fair crop may be gathered the first year. In all hop-yards there must be some male hops, in order that the blossoms may become fruitful. The number required is about one hill in 60 or 80. The male sets are therefore kept separate, and every seventh or eighth hill each way is set with male hops and distinctly marked. The ground is cultivated the first year in connection with the accompanying crop, and kept free from weeds, especially from grass. At the close of the season one or two forkfuls of coarse manure are thrown upon each hill, not only as a fertilizer, but to protect the plants through the winter. Autumn is the best time to cut poles for setting the next spring. These may be 16 to 25 feet in length, and of some durable timber. In hop-growing regions young trees fit for poles have long since been exhausted, and poles are brought great distances at heavy cost. This has given rise to certain patented systems of training which are more or less in vogue. One of the simplest is to set light sawed poles to stand about 8 feet high, one to each hill, and connect them at their tops by tarred hempen twine. The vines are trained upon these cords, except those of the male hills, which run upon lofty poles, that their pollen may be scattered. The picking is much simpler and easier than picking from poles, and numerous advantages are claimed, such as freedom from disease and insects. The system has obvious and important merits.

In the spring of the second and subsequent years the earth is drawn away from the hills, the plants exposed, the crowns cut back to the new sprouts, taking usually an inch or two from the crowns. The poles, which are preferably 18 feet long, are pointed, and holes being made with an appropriately shaped crowbar, two and sometimes more are set to each hill, 15 to 18 inches apart and bending or inclining slightly away from each other, yet not so as to come near to the poles of other hills. The largest and strongest poles are set in the direction of the highest winds and around the outside. Ordinary corn-cultivators are generally used for hoeing hops, the ground being thoroughly ploughed at least once early in each year. As soon as the vines are two feet long they must be trained to the poles, selecting two strong ones for each pole, and cutting the rest away. The vines are tied to the poles with bast-matting, old yarn, or cheap strings, and should be looked to frequently until all cling well to the poles, it being necessary for some vines to use a light ladder or steps. Hop-vines are very brittle in the morning or evening, but may be handled when the sun is hot. They must always be wound about the poles with the course of the sun. Tillage in the hop-



yard continues until they bloom, and then, on account of some prejudice, it is discontinued usually until this is past and the hops are set. It is best to cultivate or stir the ground as often as the weeds start, and enough to keep it open and porous.

Hops are usually ripe enough to pick by the last week in August, and the harvest continues several weeks. The hop is known to be ripe when the seeds are hard and purple or beginning to get purple. Men take the poles down, first cutting the vines for some feet above the ground and loosening them from the poles, which are then laid upon supports over the boxes or "bins," into which women and girls pick the hops, taking care not to let leaves and stems fall in. If the picking commences too early, the vines bleed, and not unfrequently are thus destroyed or receive great injury. The "horizontal" hop-yards, or those upon cords, offer thus a great advantage, for the strings are loosened at the poles, and the vines, thus lowered within easy reach, allow of the hops being picked into large baskets. The "bins" before mentioned usually hold 7 to 10 bushels. When full they are emptied into immense bags, and taken upon wagons to the kiln, where they are dried immediately after picking, for they spoil easily if they lie in heaps.

The kiln is a building ordinarily of wood, containing usually four rooms—a lofty stove-room, a low drying-loft immediately above the stove-room, a store-room on a lower level than the drying-loft, and a press-room beneath it. The kilns are built to correspond with the size of the yard, or two or more are used, and they are of various plans. There are several patent kilns or patented methods of drying. The floor of the drying-loft is of slats covered with a hempen carpet, tightly spun, but loosely woven to allow the air to pass freely. The hops are spread upon this carpet to the depth of 12 to 14 inches, and stirred when they become nearly dry. After from 12 to 22 hours' drying they are generally cured, and are shoved and swept off into the store-room. In one of these patent kilns the carpet rolls back and forth, thus carrying the dried hops and depositing them on the floor of the store-room. In another the carpet is on a frame which tilts when over the store-room floor. Hops are dry enough when they crumble two-thirds to pieces in the hand, and when the stems do not feel moist or cool when pressed by the lips. After the first heat, and subsequently, flowers of sulphur are burned in the stove-room. The fumes passing through the hops serve to liberate the moisture rapidly, and in case the hops are rusty the effect is very marked, but much more sulphur is needed. For fair hops one pound to one and a half is sulphur enough, but for rusty hops several pounds are required. It is important to get hops dry enough, and they should be stirred once during the drying, but not until all perceptible steam has passed off. Should a charge get too dry, a pan of coals is set in the store-room, the ventilators are closed, and salt thrown upon them. This gives out moisture, which toughens the overried hops. The fire must go down and the hops cool off considerably before they are removed to the store-room, and the newly-dried hops cannot be mingled with the others until the next day; and the best way is to leave them on the cooling floor, shoving them back as space is needed, keeping two or three charges spread over the floor all the time, and putting the oldest daily into the bins. After ten days or so, and within six weeks, the hops should be baled, the press being in the room below the cooling floor. The usual size of the hop bale is 20 or 24 inches, by 4 feet or thereabouts; screw presses are generally employed. The press is lined with cloth made for the purpose called "Dundee sacking," and this is sewed tight after the pressing and before the pressure is relieved. Hops are marketed through commission merchants, and are consumed by the brewers almost exclusively.

Hops are raised in the U. S. not only in sufficient quantities for home consumption, but for export. The production has vastly increased within a few years, it having been in 1850 about 3,000,000 pounds; in 1860, 11,000,000; and in 1870, according to the last census, 25,136,699. Over 22,000,000 were produced within the States of New York (17,558,000) and Wisconsin (4,630,000). The principal hop-producing States named in order of production are as follows: New York, Wisconsin, Michigan, California, Vermont, Maine, Minnesota, Iowa, and Illinois. (See *Hops*, by PROF. HENRY WELCH, A. M.) M. C. WELCH.

**Hop-devouring insects** are quite numerous in species, and in some seasons and places are extremely destructive. Among the more important kinds are *Gryllotalpa interpositionis*, *G. asperitarsis*, *G. conania*, and *Therita humuli*, all hop butterflies; *Hopobates humuli*, a European moth; *Hypocrita humuli*, a very destructive hop moth, common in the U. S.; *Amthegophobus intersepiens*, a froth fly; *Haltica conania*, a flea-beetle; *Aphis humuli*, a plant louse, and others.

The best methods for treating them are hand picking, the use of whale-oil soap, frequent shaking of the vines, etc. Generous culture may enable vines to thrive in spite of insect ravages.

**Hope**, tp. of La Salle co., Ill. Pop. 1137.

**Hope**, post-v. of Haw Creek tp., Bartholomew co., Ind. Pop. 765.

**Hope**, post-tp. of Knox co., Mo., 14 miles N. N. W. of Rockland. It has manufactures of sash, doors, furniture, etc. Pop. 907.

**Hope**, tp. of Barry co., Mich. Pop. 1142.

**Hope**, tp. and post-v. of Warren co., N. J. Pop. 1542.

**Hope**, tp. of Hamilton co., N. Y. It has manufactures of lumber and leather. Pop. 638.

**Hope**, tp. of Williamsburg co., S. C. Pop. 1591.

**Hope** (ALEXANDER JAMES BERESFORD), LL.D., son of the author of *Anastasis*, b. 1 29; educated at Harrow and Cambridge, graduating at Trinity 1841; member of Parliament for Maidstone 1841-52, and again in 1857; elected for Stoke-upon-Trent 1865, and in 1868 for the University of Cambridge, which he now (1875) represents; was president of the Royal Institute of British Architects 1865-67. He has taken an active part in the Church movement and in artistic architectural questions, being strongly on the Gothic side. In 1844 he purchased the ancient buildings of St. Augustine's Abbey, Canterbury, which he restored and endowed as a college for missionary clergy. Author of *Letters on Church Matters*, by D. C. L.; *The English Cathedral of the Nineteenth Century*, and numerous pamphlets, etc. In 1854, by royal license, he assumed the name of Beresford, the name of his mother, who married a second husband, the viscount Beresford.

**Hope** (Admiral Sir JAMES), G. C. B., b. at Edinburgh in 1808; educated at the Royal Naval College; entered the British navy as midshipman 1822; became captain 1838; served near Buenos Ayres 1844-45; in the Baltic 1854-56; in the East Indian and Chinese waters 1859-60; was distinguished in the operations that led to the taking of Peking; transferred to duty in the West Indies 1863; became a G. C. B. 1865, a full admiral 1870; is deputy lieutenant for Lincathgowshire, and also first and principal naval aide-de-camp to the queen.

**Hope** (THOMAS), b. in London in 1774; made extensive travels through Europe, Asia, and Africa, and attracted considerable attention in 1805 by his book on *Household Furniture and Internal Decoration*. Less influence had *The Costumes of the Ancients* (1809), *Designs of Modern Costumes* (1812), and *Architecture of Theatres*; while his romance, *Anastasis, or the Memoirs of a Modern Greek* (1819), made quite a sensation. D. in London Feb. 3, 1834. After his death an essay by him on *The Origin and Prospects of Man* was published.

**Hope** (THOMAS CHARLES), b. in Edinburgh July 21, 1766; became professor of chemistry at the University of Glasgow in 1787, and in 1799 at the University of Edinburgh. D. June 14, 1844.

**Hope & Co.**, a firm of bankers at Amsterdam, founded before 1700 by a Scotchman named Henry Hope. By marriages and business alliances the house has had intimate connection with the Barings, and by blood and marriage the house is also connected with several noble and aristocratic families of Great Britain.

**Hope'dale**, tp. and post-v. of Tazewell co., Ill., on the Chicago and Alton R. R., 25 miles W. by S. of Bloomington. Pop. 1096.

**Hopedale**, a beautiful post-v. of Milford tp., Worcester co., Mass., the seat of the Hopedale Community.

**Hopedale**, post-v. of Cadiz tp., Harrison co., O., 8 miles N. E. of Cadiz. Pop. 339.

**Hope'field**, tp. of Crittenden co., Ark. Pop. 137.

**Hope Valley**, post v. of Richmond tp., Washington co., R. I., has important manufactures.

**Hope'well**, tp. of Marshall co., Ill. Pop. 733.

**Hopewell**, tp. of Cumberland co., N. J. Pop. 1837.

**Hopewell**, tp. and post v. of Mercer co., N. J., on the Mercer and Somerset branch R. R. Pop. 1336.

**Hopewell**, post tp. of Ontario co., N. Y., on the Northern Central R. R., 6 miles S. E. of Gettysburg. P. 1863.

**Hopewell**, tp. of Licking co., O. Pop. 1009.

**Hopewell**, tp. of Mercer co., O. Pop. 894.

**Hopewell**, tp. and post v. of Madingum co., O. Pop. of v. 75; of tp. 1763.

**Hopewell**, tp. of Perry co., O. Pop. 1260.

**Hopewell**, tp. of Seneca co., O. Pop. 1350.

**Hopewell**, tp. of Beaver co., Pa. Pop. 1015.



**Hopewell**, tp. of Bedford co., Pa., on the Huntingdon and Broad Top R. R. The post-borough of Hopewell, on the same railroad, is in the adjoining tp. of Broad Top. Hopewell tp. contains iron-works. Pop. 1078.

**Hopewell**, a b. of Chester co., Pa. Pop. 268.

**Hopewell**, tp. of Cumberland co., Pa. Pop. 977.

**Hopewell**, tp. of Huntingdon co., Pa., on the Huntingdon and Broad Top R. R. It has iron-works. P. 412.

**Hopewell**, tp. of Washington co., Pa. Pop. 804.

**Hopewell**, tp. of York co., Pa. It contains the village of Stewartstown. Pop. 3850.

**Hopewell**, tp. of Anderson co., S. C. Pop. 1296.

**Hopewell**, tp. of Orangeburg co., S. C. Pop. 293.

**Hopewell Cape**, post-v., the cap. of Albert co., N. B., on Shipody Bay and the junction of the Memramook and Pentecost rivers, 21 miles S. W. of Dorchester. It has some shipbuilding. Pop. about 500.

**Hopkins**, county of W. Kentucky. Area, about 400 square miles. It is fertile, having a hilly surface, with plenty of coal and iron ore. Live-stock, tobacco, and corn are staple products. It is traversed by the Evansville Henderson and Nashville and other railroads. Cap. Madison. Pop. 13,827.

**Hopkins**, county in the N. E. of Texas. Area, 480 square miles. It is fertile and well timbered. Live-stock, grain, cotton, and wool are staple products. Cap. Sulphur Springs. Pop. 16,661.

**Hopkins**, tp. of Whitesides co., Ill. Pop. 1436.

**Hopkins**, post tp. of Allegan co., Mich., on the Michigan Southern R. R., 8 miles N. E. of Adrian. Pop. 1271.

**Hopkins**, post-v. of Nodaway co., Mo., is the S. terminus of the Creston branch of the Burlington and Missouri River R. R., and the N. terminus of the Maryville branch of the Kansas City St. Joseph and Concord Bluffs R. R. It is near the Iowa line.

**Hopkins** (ARTHUR F.), b. in Virginia about 1796, was well educated; removed in early life to Alabama, and became a prominent Whig politician; a lawyer of Huntsville, Tuscaloosa, and Mobile successively; was long in public life, and for many years a judge of the supreme court of the State, and afterwards president of the Mobile and Ohio R. R. D. in 1864.

**Hopkins** EDWARD, b. at Shrewsbury, England, in 1600; was a successful merchant of London; removed to Boston, Mass., in 1637; was seven times governor of Connecticut between 1640 and 1654, and assisted in forming the union of the colonies of New England 1643. He afterwards returned to England, became a member of Parliament, and held important offices under the Commonwealth. D. in London Mar. 1697, bequeathing a portion of his estate to the support of schools in Hartford, New Haven, Hadley, and Cambridge in New England. The town of Hopkinton, Mass., was named for him, having been purchased in 1760 of the "praying Indians" with moneys of his which fell to Harvard College.

**Hopkins** BENJ., b. at Saratoga, R. I., in 1718; was commissioned by Gov. Cooke as brigadier-general at the beginning of the war of independence. In 1775 he was appointed commander-in-chief of the navy by the Continental Congress, and addressed officially by Washington as admiral. In the beginning he was very successful in his undertakings, but afterwards he failed to fulfil the expectations of the government, and, having neglected to appear at Philadelphia when summoned, he was dismissed from the service in 1777. He retired to North Providence, where he resided till his death, Feb. 26, 1802, taking part very actively in the politics of the State.

**Hopkins** JOHN HENRY, D. C. L., LL.D., b. in Dublin, Ireland, Jan. 30, 1792; came in 1800 with his parents to America; received a good education, and assisted Alexander Wilson in preparing the illustrations of four volumes of his *Ornithology*; and afterwards was an iron manufacturer in Western Pennsylvania. He entered in business in 1817; was admitted to the bar at Pittsburgh in 1818; in 1824 became rector of Trinity church, Pittsburg (Protestant Episcopal), of whose church edifice he was the architect. In 1831 he became assistant minister of Trinity church, Boston, Mass., and professor of systematic divinity in a theological seminary in Massachusetts. In 1832 he was consecrated the first bishop of Vermont, became rector of St. Paul's, Burlington, and afterwards devoted much time to the establishment of the Vermont Episcopal Institute. He took a strong stand for the High Church movement, and was an active member of the Pan-Anglican Synod. D. at Rock Point, Vt., Jan. 9, 1868. Among his works are many brochures, sermons, etc., besides *Christianity Vindicated* (1833), *Primitive Creed Examined* (1834), *The Primitive Church* (1835), *Essay on Gothic Ar-*

*chitecture* (1836), *The Church of Rome in her Primitive Purity* (1837), *Vindication of Slavery* (1863), etc. etc.

**Hopkins** (JOHN HENRY), A. B., A. M., S. T. D., b. Oct. 28, 1820, at Pittsburg, Pa.; graduated in 1840 at the University of Burlington, Vt.; appointed rector of St. John's church, Essex, N. Y., in 1869, and of Trinity church, Plattsburg, N. Y., in 1872; ordained priest in 1872; elected trustee of the General Theological Seminary, N. Y., in 1871, and member of the board of missions in 1874. Besides minor works, he wrote *Decline and Fall of the Low Church Party* (1874), founded and edited *The Church Journal* (1855-68), *The Centives Noted* (1866), *Life of Bishop Hopkins of Vermont* (1872), and *Works of the Rev. Milo Mathan, D. D.* (1872-75).

**Hopkins** (JOHNS), b. in Anne Arundel co., Md., May 19, 1799, was carefully educated, became a wholesale grocer, retired with an ample fortune in 1847, and became president of the Merchants' Bank and a director of the Baltimore and Ohio R. R. He was never married, and was a member of the Society of Friends. In 1873 he founded the Hopkins free hospital, Baltimore, at a cost of some \$4,000,000; an orphanage for colored youth, a convalescent hospital, and the Johns Hopkins University at Clifton, near Baltimore, with 400 acres of land and an endowment of \$3,000,000, poor and deserving youth from Maryland and Virginia to receive free scholarships. These benefactions exceeded \$8,000,000 in aggregate value. D. at Baltimore Dec. 24, 1873.

**Hopkins** (LEMUEL), b. at Waterbury, Conn., June 19, 1750; graduated at Yale College; practised medicine at Litchfield, and removed to Hartford in 1784, where he d. Apr. 14, 1801. With Trumbull, Barlow, and others, styled the "Hartford wits," he put forth the *Anarchiad*, advocating an efficient federal constitution. He wrote several satires and other poems, among which are *The Political Greenhouse*, *The Godfather*, *The Hagarite's Hope*, and an elegy on a *Victim of a Cane's Quack*. Author of a favorite version of Psalm cxxiii.

**Hopkins** (MARK), M. D., D. D., LL.D., b. at Stockbridge, Mass., Feb. 4, 1802, and graduated at Williams College in 1824; and M. D. in 1828; was professor of moral philosophy and rhetoric in Williams College 1830-36; president of the college 1836-72; then resumed the former position; in 1857 he was also president of the A. B. C. F. M., an office whose duties he still discharges. Has published *Evidences of Christianity* (1846; new ed. 1864), *Law of Love and Love as a Law* (1869), *An Outline Study of Man* (1873), and many occasional addresses, etc.

**Hopkins** (SAMUEL), D. D., b. at Waterbury, Conn., Sept. 17, 1721; graduated at Yale in 1741; studied theology with Jonathan Edwards. In 1743 he was ordained over a church at Housatonic, now Great Barrington, Mass.; in 1770-76 minister of a church at Newport, R. I., and again in 1779. In consequence of his labors against slavery the State of Rhode Island freed all her slaves born after Mar., 1784. He published several works, the most noted of which is *System of Doctrines* (1793), and his views have had a wide influence. His complete works were published in 1805, with a *Life* by Dr. Stephen West, and in 1882, with a *Memor.* by E. A. Park. He is the hero of Mrs. Stowe's novel, *The Minister's Waning*. D. at Newport Dec. 20, 1803.

**Hopkins** (STEPHEN), LL.D., a signer of the Declaration of Independence, b. at Saratoga, R. I., Mar. 7, 1707; was bred a farmer; removed in 1731 to Providence, where he was a land-surveyor and merchant; Speaker of the Rhode Island Assembly 1732-41; became chief-justice of the common pleas 1739; chief-justice of the superior court 1751-54; ten times governor of Rhode Island between 1754 and 1768; a member of the Continental Congress 1774-78. Author of *Rights of the Colonies Examined* (1765) and other writings, and long the chancellor of Brown University, then Rhode Island College. D. at Providence July 19, 1785.

**Hopkins** (WILLIAM), M. A., LL.D., F. R. S., b. in 1793. With little early education, and after an unsuccessful attempt in business, he entered at the mature age of thirty at St. Peter's College, Cambridge, where he graduated as seventh wrangler, and, taking private pupils, became the most celebrated mathematical teacher of his day. Many of the most eminent mathematicians now living were trained by him. From Prof. Sedgwick he imbibed a strong interest in geology, and his published works consist chiefly of the application of the methods of mathematical analysis to the elucidation of problems of physical geology, such, chiefly, as the effects of elevatory forces from below in producing faults and fissures in the rocks, on the formation of crevasses in glaciers, on the geological theories of elevation and earthquakes, on the causes which may have produced changes in the earth's superficial temperature,



and on the conductivity of rocks and some other substances for heat. But his name is most widely known through his masterly mathematical investigation (*Phil. Trans.*, 1839-40-42) of the effects which internal fluidity should have upon the "precession of the equinoxes," and the much-quoted result which he arrived at, that the solid crust of the earth must have a thickness of at least 800 or 1000 miles. The erroneous nature of this conclusion, and the analytical source of it, is pointed out in the *Smithsonian Contributions to Knowledge*, vol. xix. Mr. Hopkins was president of the British Association 1853, and of the Geological Society 1851 and 1852. D. Oct. 13, 1866. O. FISHER.

**Hopkins** (WILLIAM PENN), A. M., LL.D., b. in Connecticut 1802; graduated from the U. S. Military Academy, but retained as professor of chemistry, mineralogy, and geology till 1835; resigned 1836, and engaged in business. He subsequently held various professorships, and in 1850 was appointed professor of natural and experimental philosophy at the U. S. Naval Academy, which he retained until appointed U. S. consul at Jamaica, W. I., where he d. July 13, 1859. G. C. SIMMONS.

**Hopkinson** (FRANCIS), a signer of the Declaration of Independence, b. in Philadelphia in 1737, and was a grandson of the bi-hop of Worcester, Eng. He graduated at Princeton in 1763; in 1765 was admitted to the bar. He held a profitable public office in New Jersey, which he was deprived of for his republican principles. He was a member of Congress from New Jersey 1776-77, and a resident of Bordentown. His witty and satirical writings during and after the Revolution had much influence in political affairs. He was an admiralty judge in Pennsylvania 1779-89; U. S. district judge for Pennsylvania 1790-91. D. in Philadelphia May 9, 1791. His humorous and patriotic poetical and other pieces—*The Treaty*, *The Battle of the Keys*, *Ode to Science*, *Essay on Whitewashing*, and many others—enjoyed an immense popularity, and were really meritorious. Three volumes of his *Works* were published in 1792. He had considerable artistic and musical talent.

**Hopkinson** (JOSEPH), LL.D., a son of Francis Hopkinson, b. in Philadelphia Nov. 12, 1770; graduated at the University of Pennsylvania in 1786. He became one of the ablest lawyers of his time, residing mostly in Philadelphia. He is chiefly remembered as the author of "Hail Columbia." He was (1816-20) a prominent member of Congress, and in 1828 was appointed U. S. district judge for the eastern district of Pennsylvania. D. Jan. 15, 1842, at Philadelphia.

**Hopkinsville**, city, cap. of Christian co., Ky., 71 miles N. W. of Nashville, Tenn., on the St. Louis and South-eastern R.R., situated in the most fertile section of Western Kentucky. It contains an academy and 2 seminaries, 8 churches, 2 banks, 2 carriage-factories, 2 weekly newspapers, a planing-mill, a plough-factory, 2 large mills, a public library, a city-hall, and a State insane asylum. Tobacco is the principal staple. Coal and iron are found in the vicinity. Pop. 3436.

SAM. M. GAINES, ED. "KENTUCKY NEW ERA."

**Hop'kinton**, post-v. of Delaware co., Ia., 4 miles from Sand Spring, a station on the Dubuque South-western R. R.

**Hopkinton**, post tp. of Middlesex co., Mass., on the Hopkinton and Milford R. R., 30 miles W. S. W. of Boston. It has 4 churches, 1 national and 1 savings bank, a good public-school system, and extensive manufactures of boots and shoes. Pop. 4419.

**Hopkinton**, post tp. of Merrimack co., N. H., on the Contoosook River R. R., 7 miles S. W. of Concord. It contains the village of Contoosook (which see), and has 7 churches and important manufactures. Pop. 1814.

**Hopkinton**, tp. and post-v. of St. Lawrence co., N. Y. It has 3 churches, and manufactures of starch, lumber, cooperage, etc. The township is very extensive, comprising large forests and numerous lakes. Pop. of v. 200; of tp. 1907.

**Hopkinton**, tp. and post-v. of Washington co., R. I., 35 miles S. W. of Providence. The township has good water-power and several manufacturing villages, where cotton goods, machinery, etc. are made. Hopkinton has a national bank. Pop. 2682.

**Hoplegnathidae** [from *ὄπλις*, "mail," and *γνάθος*, "jaw"], a family of acanthopterous fishes, with the body compressed and covered by ctenoid scales; the lateral line continuous; the spinous division of the dorsal fin longer than the soft; the ventrals thoracic, with one spine and five soft rays; and the intermaxillary and innaxillary bones provided with a trencant edge, with which the teeth, when developed, are continuous, and form then a serrated margin, somewhat as in the Scoridae. The pharyngeal bones are separate. This family is limited, so far as now known, to a single genus (*Hoplegnathus*, Richardson), which has,

however, received several generic names, and is represented by species in the Eastern Asiatic and Australasian seas.

THEODORE GILL.

**Hoplrophoridae** [ὄπλοφόρος, "armor-bearer"], an extinct family of loricate edentate mammals, most nearly related to the existing pichiegos (*Chlamyphoridae*) and armadillos (*Dasypodidae*), but also related to the extinct megatheriids. They were of large size, and some of them attained gigantic dimensions. (1) The carapace, instead of being articulated, as in the armadillos, formed an inarticulated shell resembling in shape the carapace of the turtle; (2) a breast shield or plastron was also developed; (3) the teeth were uniform in number, there having been in all the species five molars on each side of each jaw; and (4) these characters were co-ordinated with numerous more or less decided modifications of the skeleton. This family (which has also been named *Glyptodontidae*) was composed of a number of species which existed in South America, and, especially in the later Tertiary epoch, in the Argentine Republic and Brazil. In external appearance they bore considerable resemblance to gigantic tortoises, and some of them attained a length of fifteen feet or even more. The various forms exhibited two decided modifications in the structure of the members: (1) Some had four digits before as well as behind, those corresponding to the thumb and great toe of man being wanting, as in the group comprising the genera *Hoplrophorus* (Lund) and *Panochthus* (Burmeister); while (2) others had four digits before and five behind, those corresponding to the thumb and great toe being present, and the missing digit of the fore foot being the outer of the other species, or, in other words, corresponding to the little finger of man. This group includes one genus with two well-marked sub-genera (*Glyptodon*, Owen, and *Schistopleurium*, Nodot). The Hoplephorids have been the objects of special study on the part of eminent naturalists. (See the 1st and 2d vols. of the *América del Museo Público de Buenos Aires*.) THEODORE GILL.

**Hop'per** (ISAAC TATEM), a benevolent Hicksite Quaker, b. at Deptford, N. J., Dec. 3, 1771; became a tailor in Philadelphia, and afterwards a successful merchant and bookseller of New York; was a prominent abolitionist, and devoted a large part of his lifetime to works of benevolence. D. in New York May 7, 1852. (See his *Life*, by L. M. CHILD, 1853.)

**Hop'pin** (AUGUSTUS), b. at Providence, R. I., July 13, 1828; graduated at Brown University 1848; became a lawyer; studied art in Europe, and became distinguished as one of the first of American artists in his special department, that of the illustration of books. His female figures and scenes from society are often full of spirit.—His brother, THOMAS F. HOPPIN (b. 1816), a pupil of Paul Delaroché, is also distinguished as an artist.

**Hoppin** (REV. JAMES MASON), D. D., b. in Providence, R. I., Jan. 17, 1820; graduated at Yale in 1840; studied law at Harvard, and afterward theology at Andover and in Germany under Neander; became pastor of a church in Salem, Mass., Mar. 27, 1850, and was appointed professor of homiletics in the theological department of Yale College in 1861. He received the degree of D. D. from Knox College, Ill., in 1870. He has published *Notes of a Theological Student* (1854), *Old England, Its Art, Scenery, and People* (1867), *The Office and Work of the Christian Ministry* (1868), *Life of Andrew Hull Foote, Rear-Admiral U. S. N.* (1874); has contributed many articles to the *Bibliotheca Sacra* and the *New Englander*. R. D. HITCHCOCK.

**Hops** [Ger. *Hopfen*; Fr. *houblon*; bot. *Humulus lupulus*], a diocious plant. The pistillate flowers are clustered in short axillary catkins; the two-flowered leafy bracts are imbricated, and in fruit form a kind of membranaceous strobile. The fruiting calyx is sprinkled with yellow resinous grains (lupuline). The nervine, aromatic, bitter tonic, and other supposed virtues of the hops, as imparted to beer, etc., reside chiefly in this yellow powder, though the scales of the strobiles also possess most of them, to a far less extent. The constituents of commercial hops, which consist of the dried strobiles, are a highly aromatic essential oil, residing almost entirely in the yellow powder; a resinous substance, a bitter crystalline principle, tannic acid (morintannic, Wagner), gum, cellulose, extractive matter, soluble in water, quercitrin, and, according to some, a waxy matter. The yellow powder, called lupuline, forms in a pure state about 10 per cent. of the whole; a proportion estimated up to 18 percent. by some authorities. This, according to Personne, is of the nature of a gland, which secretes a resin. The name was given to it by Dr. A. W. Linné of New York, who first analyzed it, and whose name and analytical results are strangely misquoted in the text-books. Thus, *Ward's Dictionary*, apparently following L. Hoppe, makes him *Monsieur Yess*, a Frenchman, and gives his figures very incorrectly.



Analyses of the Yellow Granules, Lupuline.

	Wimmer.	Chevalier and Pavon.	Wagner.	Dr. Ives.	Alkattan Exp. C. Nene.
Essential oil.....	0.12				0.50
Bitter substances.....	3.01	8.3 to 12.5		9.25	
Resin.....	2.91	2.5		30.00	15.90
Wax.....				1.00	
Astringent constituent.....	0.65		3.2 to 5.7	4.17	3.02
Cellulose.....	8.99			38.33	48.33
Extractive matter.....	4.92			8.33	6.40
Gum.....	1.26				11.10
Water.....	78.16			8.92	14.50
Soluble salts.....					0.25
	100.00			100.01	100.00

Dr. Ives's figures are misquoted in European works of high authority (under the name of Yves) as 11 per cent. of bitter, 36 of resin, 12 of wax, 5 of tannic acid, 10 of extractive, and 26 of "residue insoluble in water" (*cellulose*), footing up just 100, *without any water*. The discrepancies among the different figures given, however, detract almost wholly from their value. Another authority states that the whole hop contains *two per cent.* of volatile oil. (*Watts's Dictionary*, art. "Lupulin.") Wimmer gives an analysis of the scales of the strobiles, apart from the yellow granules, in which he found no volatile oil, 5.83 of gum, 64 of cellulose, and 12.22 of extractive matter.

The hop-crop is one which exhausts the soil rapidly. The ashes of the strobiles contain from 20 to 25 per cent. of potash (anhydrous), 15 to 20 per cent. of phosphoric acid, and 10 to 23 per cent. of silica. The potash is estimated to be equivalent to an exhaustion from an acre of from 20 to 25 pounds of hydrate of potash annually.

**Essential Oil of Hops**, obtained usually by distilling the cones with water; but Prof. C. A. Seeley, of New York, claims, with much reason, that this method alters its constitution and greatly injures its natural aroma. Indeed, Personne found the malodorous substance, valerianic acid, in the products of distillation of lupuline with water. Seeley has within a few years introduced and patented a new and ingenious mode of procuring this oil, sufficiently economical to be used for the preparation of a commercial oil of hops to be used for flavoring beer, for which purpose it is said to be now coming largely into use. This consists in dissolving out the essential oil by means of very light petroleum naphtha, or "gasoline," and then distilling off the latter, which is as volatile as ether, and requires a temperature so low as not to alter the essential oil. The oil of hops obtained by the first method has an odor like thyme, and contains, according to Wagner, a terpene,  $C^{10}H^{16}$ , and a compound,  $C^{11}H^{10}O$ , near to valeric acid,  $C^8H^{10}O_2$ , and convertible into the latter by oxidation. Hence, hops acquire by age a valerianic odor. Personne considered this essential oil as analogous to oil of valerian, the terpene in which is *borneone*. No dextro-rotatory camphor, however, like borneol (Borneo camphor) has been obtained from oil of hops. H. WURTZ.

**Hop Tree** (*Ptelea trifoliata*), also called **Shrubby Trefoil**, an American shrub of the rue family, found from Pennsylvania southward and westward. When kept trimmed to a single stem it attains a height of 30 or 40 feet. The leaves are trifoliate, with leaflets ovate, pointed, and downy when young. The flowers, borne in cymes at the ends of the new shoots, are greenish, small, and not conspicuous; they are polygamous—staminate, pistillate, and perfect ones being found on the same plant. The fruit is two-celled and two-seeded, having a broad wing, and resembles that of the elm, whence its generic name (Gr. *πτελέα*, "elm"). The flowers and bruised leaves have an unpleasant odor. The fruit is intensely bitter, and is destitute of the aromatic principle of the true hop, for which, however, it is often substituted in the manufacture of beer. An infusion of the leaves and young shoots is used as a remedy for worms. It is a neat ornamental shrub, not liable to the attacks of insects, and from the compound character of its leaves contrasts well with other trees and shrubs. It is a late plant, the branches remaining bare in spring long after other shrubs are clothed with foliage, but later in the season its large clusters of winged fruit give it an attractive appearance.

**Hor**, a mountain of Arabia Petraea, forming a part of the range of Seir or Edom, upon which Aaron died. The summit which is generally conceded to be the Mt. Hor of this incident still bears the name of Mt. Aaron (Arab. *Jebel Harân*), and, rising to the height of 4800 feet above the sea, is the most conspicuous summit of the range. The mountain has a double top, and is surmounted by an edifice, of later date than the Crusades, which is called Aaron's tomb. There is another Mt. Hor, mentioned in Num. xxxiv. 7, 8 as one of the marks of the N. boundary of the land which the Israelites were to conquer. The word *Hor*

means simply "mountain," and in this instance probably designates the entire Lebanon range.

**Horace** (QUINTUS HORATIUS FLACCUS), b. Dec. 8, 65 B. C., at Venusia, in Apulia. His father, a freedman, was a collector of money for tax-gatherers and bankers, and owned a little farm, which he sold in order to give his son a liberal education. After finishing his studies in Rome, Horace went in 47 B. C. to Athens to study philosophy and rhetoric, but the murder of Cæsar and the civil war which ensued made him a soldier, and he fought as a tribune under Brutus in the battle of Philippi (42 B. C.). After the defeat he fled to Rome, and his offence was forgiven or forgotten. With the rest of his patrimony he bought a position as a registrar in the office of the prætor, but he soon gave it up in order to devote himself entirely to literary pursuits. His first productions were satires, or, as he calls them himself, *sermones*, on account of the colloquial tone in which they are written. These he read to his friends, and thus by degrees he was admitted to the literary circles of Rome. He made the acquaintance of Varius and Virgil, who introduced him to Mæcenas, who again introduced him to Augustus; and Mæcenas appreciated his talent and his friendship so much that he gave him a fine country-seat near Tivoli, in the Sabine Mountains, and also a competency. After the satires (35 B. C.) followed the epodes or *iambi* (30 B. C.), then the odes or *carmina* (23 B. C.), and at last the epistles (19 B. C.), the second book of which contains the long epistle *Ad Pisones*, generally known under the title of *Ars Poetica*. D. Nov. 27, 8 B. C., and was buried at the Esquiline Gate, beside Mæcenas. With the great social and political movements of their time the poems of Horace have no connection, but they possess another (and to us a still greater) charm: they tell in a thousand different ways, and always in an intimate and pleasant manner, of private life. But for Horace we should have a very imperfect and meagre idea of refined and educated life in pagan Rome, its tastes and vanities, its convivialities and extravagances, its forms and implements. This, however, was not the secret of his wonderful success. That which through eighteen centuries has made him the most-read poet of antiquity was his representativeness. He had exactly genius enough, and not too much, to express the instincts, moods, and methods of average humanity. His imagination is not very great; he visits no man's mind with strange visions; but that which he has is precise and graceful. Nor is his feeling very warm either; he stirs no man's heart with excitement, but that which he has is sound and pleasant. His principal faculty is his power of reflection. His intellect, always clear, never deep, always striking, never strong, makes him complete master of himself—a decent and humorous cynic, a prudent and elegant epicurean, always polite, seldom noble, always cordial, seldom kind. And this genius, so well adapted to be the representative of average humanity, was equally well trained to fill its task. His verses have no music, perhaps with the exception of a few drinking-songs. But they have all a piquant, catching movement. His form has no simplicity or naturalness, and it lacks almost entirely plasticity. But the artificiality is so elaborate, so easy and elegant, that the mind of average humanity is impressed by this manner of expressing ideas and sentiments as would be their body by a garment of velvet, satin, and lace. Since the beginning of this century, however—that is, since the predominance of the romantic school—the verses of Horace have lost some of their poetical charm; their historical interest they will, of course, never lose. Of recent editions we mention those of Anthon (New York, 1830), Orelli (Zurich, 1850), Lincoln (Boston, 1851), Ritter (Leipsic, 1856), Didot (Paris, 1855), and Wickham (London, 1873). CLEMENS PETERSEN.

**Horæ.** See HOURS.

**Horanyi** (FRANCIS JOSEPH ALEXIS), b. at Buda, Hungary, Feb. 15, 1736; d. at Pesth, Sept. 11, 1809. Author of *Memoria Hungarorum et Provinciarum scriptis editis notorum* (1775–77) and *Nova Memoria* (1792); edited *Johannis Bethlenii Historia transilvanica* (1782) and the *Chronicon Hungaricum* of Simon of Keza (1782).

**Horapol'lon**, or **Horus Apollo**, the name of the author of a small Greek essay entitled *Hieroglyphica*, which is the only work on the interpretation of the Egyptian hieroglyphics which has come down to us from antiquity. The book is believed to belong to the fourth century A. D.; of the author nothing is known.

**Ho'reb**, according to some, a lower part or elevation of Mt. Sinai; others consider it to be a general name for the whole range of which Mt. Sinai was one of the principal summits. The name itself in Hebrew means "desert."

**Hore'hound**, the name of several labiate herbs of temperate climates. *Marrubium vulgare*, the common or white horehound, is naturalized in the Eastern U. S., but is a



native of Europe and Western America. It is an excellent tonic remedy, very useful in coughs and colds, and is generally taken in syrup or candy. The fetid horehound (*Baltona nigra*), is also a naturalized plant from Europe. It resembles the former in appearance, taste, and properties. The water horehound (*Lycopus Lucernus*) grows in Europe and America. It is considered a good tonic. *Lycopus Virginicus* (bugle-wort) nearly resembles it, and is sometimes used on account of its expectorant properties.

**Hor'gen, or Hor'chen**, town of Switzerland, in the canton of Zürich, on the Lake of Zürich, has some manufactures of silk, cotton goods, and chemicals. Pop. 5311.

**Hor'icon**, post-tp. of Warren co., N. Y. It abounds in lakes and mountains, has 4 churches, and manufactures of leather and other goods. Pop. 1500.

**Horicon**, post-v. of Dodge co. (Hubbard tp.), Wis., on the Chicago Milwaukee and St. Paul R. R., 54 miles N. W. of Milwaukee, at the junction of the Ripon branch, and on Rock River at the outlet of Horicon Lake. It has manufactures and extensive water-power.

**Horicon Lake.** See GEORGE, LAKE.

**Horicon Lake**, in Dodge and Fond du Lac cos., Wis., is 15 miles long, and 5 miles across. Its waters flow into Rock River, and finally fall into the Mississippi. It is a shallow, grassy basin, sometimes called the Winnebago Marsh.

**Ho'rites**, the aboriginal inhabitants of Mt. Seir before the Canaanites conquered Palestine. Their name is derived from Hori, the grandson of Seir (Gen. xxxvi. 22), and refers to their habit of dwelling in caves, of which there still are many extant in the cliffs of Edom.

**Horizon** [ὁρίζων, the "bounding" (circle)], the line formed by the apparent contact of the sky and earth. This, or, more exactly, the circle upon the heavens bounding the plane which is tangent to the earth at the point where the observer stands, is the *sensible horizon*. The *rational horizon* is a circle on the celestial sphere bounding a plane parallel to the sensible horizon, which plane divides into two equal parts both the terrestrial and the celestial spheres. Except the moon, all the heavenly bodies may be practically considered as always situated either above or below each of the horizons alike.

**Hormis'das**, POPE, a native of Frosinone, became pope in 514, and d. Aug. 6, 523. Eighty of his letters are extant.

**Horn**, a hard projection, diminishing from its base to a point, on the heads of many animals, especially the cloven-footed quadrupeds. It is generally curved or spiral, but that of the cow, bull, or ox, being most familiar, has become a familiar descriptive term for all similarly formed projections—e. g. the horns of the moon. The word in its origin is of very great antiquity, since it is found in both Aryan and Semitic tongues. In Sanscrit *karna*, it is true, signifies an ear, but the Latin *cornu*, Greek *keras* and *korónē*, Gothic *hauru*, Persian *karna* ("trumpet"), and the Irish and Cymric *corn*, all indicate an Indian origin, while the Hebrew *karn*, the Chaldean *garna*, and the Arabic *garn*, *gurnat*, show that it has always been known to the southern branch of civilized humanity. The word is conjectured by speculative philologists to be allied to a large family of terms, such as the originals of *crown*, *corn*, etc. As a very prominent symbol in ancient literature the horn signified strength, power, or dignity (Jer. xlviii.; 1 Sam. ii.), and with the Greeks abundance or fertility, as was set forth in the cornucopia, or horn of plenty. The connection of horns with sexual attributes appears to have been partly due to their association with the bull and the goat, and their extraordinary increase in size in the ox, who in all countries was regarded as the type of one whose privileges are usurped by the bull. In all animals bearing them "the formation of the horns has been long known to be much influenced by the condition of the organs of generation: in the deer they acquire their full bulk and complete form just before the season of rutting." The most dignified of the deities, whether Semitic or Aryan, were represented as horned, and for a different reason all those which were most closely connected with reproductive nature—as, for instance, the rural gods.

Horn, *per se*, is of four kinds. That of the rhinoceros "consists of a uniform, compact, or glutinate mass of epidermal fibres, the slightly concave base of which is attached to the dermo-perioste of a slightly elevated or rugous tract of bone." The second type is that of most ruminants, in which the growth extends from the frontal bones, and the dermo-periosteum develops a sheath of horny fibres, the horn being hollow. The bone is termed the *core*; it has usually a rugous or grooved exterior. In Bovidae and Ovidae the frontal sinuses extend therein; in Antelopidae the core is solid. The growth each year is marked by a circular groove near the root, from which the age may be determined. The giraffe (third type, Owen) has a pair of small, short, cylin-

droid, unbranched horns, which consist of bone covered by hairy skin, terminated by a tuft of coarser hair. The bones are not processes of the skull, but are joined, like epiphyses, by synchondrosis to both frontal and parietal bones, the base crossing the coronal suture. The young are born with such horns, and are the sole horned mammals that enter the world with such weapons. In deer (fourth type) the horns consist wholly of bone, which grows from the frontal; the periosteum and finely haired integuments called "velvet" coextending therewith during the period of growth; at the end of which the formative envelope loses its vascularity, dries, and is stripped off, leaving the bone as a hard, insensible weapon. After some months these horns lose all vascular connection with the skull, and are shed; after which the growth of a new pair commences. The reindeer is one of the very few Cervide in which antlers are developed by the female. Thus, deer are the only ungulates that annually shed their horns; the prong-buck is the only known hollow-horned ruminant that annually sheds the extra-vascular part of the horn, called the sheath. The horns of ungulates may be summarized as consisting either of horn only, as in the rhinoceros; of bone only, as in the Cervus or deer genus; of horn and bone, as illustrated by the bovine or ox genus; and of skin and bone, as in the giraffe. From these facts it has been observed that in the English language we have in horn only one word to express two quite different substances—the branched bony horns of the stag genus, and the laminated horns of the genus Bos (ox). In French the antlered kind are called *bois*, or forest, from their branches, while the other kind, as of the ox, antelope, and goat, is called *corne*.

In olden times horns were extensively used, especially among the Northern races, for drinking-cups, and in Saxon and Norman sculptures it is the common goblet.

**Manufacture of Horn.**—The peculiar texture of horn, its toughness and agreeable natural colors, have always caused it to be a favorite material for many works, though of late years the increasing cheapness of glass, gutta percha, and metal wares has caused a great disuse of it. At one time there was held annually in England a fair at which every object for sale was made of horn, and until within a few years a large class of Scottish gypsies maintained themselves entirely by making and selling horn spoons. As true horn consists, chemically, of albumen (keratin) and a little phosphate of lime, it is readily softened in boiling water or by heat; sometimes the process is aided by the addition of quicklime. It is usual to prepare the horns of oxen and sheep by steeping them for several weeks in cold water, which has the effect of separating the cored bony part from the cover of true horn. The latter is then heated, first for half an hour in boiling water, and then over fire. In this condition it may be cut or moulded with great ease. To make sheets for lanterns or combs, the horn is slit lengthways at the side, heated and pressed out, either between plates or by machines, of which several have been invented for the purpose. Care must, however, be exercised as to the application of both heat and pressure, since, owing to its peculiarly laminated structure and the strain abounding through it—as may be specially observed in that of the rhinoceros—horn has a tendency to split. It receives dyes of different kinds, and is made to closely resemble tortoiseshell, but this process also is apt to render it fragile. Its softness may, however, be restored by steeping it in glycerine and water; and if it be then treated with nitric and pyroligneous acids, tannin, potash, sulphate of zinc, and water, it assumes a peculiar strength and great elasticity. As sheets or other pieces of horn may be incorporated together, there is little waste in the manufacture. Of late years there has been an extensive manufacture in London of so-called Abyssinian drinking-cups, made of segments of horn straightened and with a bottom, colored in imitation of the beautiful gray and black cups brought from the plunder of Magdala. The horn of the rhinoceros has been greatly esteemed in all ages in the East, partly from a belief that it neutralized poison in liquids, and partly from its rich natural color and great beauty. It is often elaborately carved by the Egyptians and Chinese, and the writer has seen one from Canton which, owing to its exquisite work, cost \$600. He has in his possession one presented to him by a wealthy Copt which was highly esteemed, owing to its delicate semi-transparency, and has seen another which was supposed to be almost unique in this respect. Some years ago parasol-handles of rhinoceros horn became fashionable in Paris, and to this day they are extensively imitated in horn. The Romans made oil flasks both of ox and rhinoceros horn, and from an epigram in Martial it may be inferred that they too sometimes imitated the latter material with the former. The epigram is in reference to a lantern, and might serve as its inscription:

"Though by a bull there of late was borne  
You'd say 'I am of true rhinoceros horn.'"



These cups require occasional oiling, or they will "chip" or crack. In the East this is a favorite material for the hilts of weapons, preference being given to that which comes from Sumatra. It is worked, like ivory, entirely with the chisel and without heat. Deer or buck horn is used in all countries for knife-handles. As it is simply bone, and of coarse cellular structure within, it is seldom or never made up except in such a manner as to preserve in part, at least, its agreeably colored and peculiar rugged structure. In Germany thousands of artisans are devoted to making from deer-horn ornaments which vary from carvings of almost microscopic delicacy to large articles of furniture. Immense numbers of deer-horns, of the *Axis maculata*, are annually brought to Germany for such work, even England requiring about 250,000. The horns of the Eastern buffalo and of the American bison are in great demand; the latter, from its color and fine hard grain, being especially prized for the handles of dental instruments. The interior of ox-horns is used to make "bone-earth;" the refuse of all kinds is applied to the manufacture of prussiate of potash and ammoniacal salts; while fragments of ox and buffalo horn, powdered, are of value as manure. C. G. LELAND.

**Horn**, a wind instrument of music, usually of brass, much used in the orchestra. The French horn is usually coiled in such a way as to become portable, and its key may be modified by the insertion or withdrawal of suitable pieces. The sax-horn is a modification of the older instrument. Various other wind instruments are called from their shape "horns," and in ancient times the horns of animals were employed as trumpets, but they probably served only as the means of calling.

**Horn** (GUSTAF CARLSSON), b. at Örbjhus, Sweden, Oct. 23, 1592; studied at Rostock, Jena, and Tübingen; received his military training in Holland under Prince Maurice of Orange; and entered the Swedish army in 1624. Gustavus Adolphus called him his right arm, and after the battle of Lützen he made a brilliant campaign in the Rhenish Palatinate, but was taken prisoner in the battle of Nordlingen in 1634, and kept for seven years in the fortresses of Ingolstadt and Burghausen. Having been exchanged in 1641, he returned to Sweden; commanded in 1644 in Scania against the Danes; was made a count and field-marshal in 1651; and d. at Skara May 16, 1657.

**Horn**, or **Hoorno** (PHILIPPE, COMTE DE), b. in 1522, a son of De Montmorency-Nivelle, a Flemish nobleman. When his mother, having become a widow, married Count Horn, Philippe was adopted by his stepfather and assumed his name. He distinguished himself both in the battles of St. Quentin and Gravelines and in the councils of Philip II. and Margaret, viceregent of the Netherlands. He was a good Catholic, but he was tolerant. He was loyal to the Spanish crown, but he would not deliver up the rights of his native country without resistance. Thus, when Alva arrived in the Netherlands, he was seized, together with Egmont, at Brussels in 1567, a case was made out against him, and he was beheaded June 5, 1568.

**Horn-beam**, a name given to various trees. The horn-beam of Europe is the *Carpinus Betulus*, a handsome forest tree which has very tough, white wood, highly prized by turners and joiners. It is also excellent fire-wood, and makes good charcoal. In the U. S. the *Carpinus Americana* is called hornbeam, lever-wood, iron-wood, and blue beach. It is very hard, tough, and close-grained. The hop-hornbeam, called also lever-wood or iron-wood, is a slender tree, the *Ostrya Virginica*, with wood of the same qualities as those possessed by that of the former tree. Both grow extensively throughout the U. S. All the above belong to the order Cupulifera.

**Horn-bill**. See **BECCOS**.

**Horn-blende**, a term used in mineralogy, sometimes as synonymous with amphibole, sometimes to designate only the dark-colored varieties of that very variable mineral. In the former sense horn-blende is a mineral crystallizing in the monoclinic system, but occurring also imperfectly crystallized, or massive, fibrous, and granular. Its hardness varies from 5 to 6, and its specific gravity from 2.9 to 3.4. In composition it varies much, being, however, essentially a silicate of magnesia and oxide of iron, with generally lime, and with or without alumina, manganese-oxide, or soda. It is one of the more important rock-forming minerals, occurring especially in granitic and metamorphic rocks, and volcanic rocks of deep-seated origin. It presents a great variety of forms and great differences in color:

black and dark-green varieties are especially known as *hornblende*; lighter green as *actinolite*; white varieties as *tremolite*, and fibrous forms as *ANTHOPHYLLITE*, *ASBESTOS*, and *AMIANTHUS* (which see). EDWARD C. H. DAY.

**Horn-blower** (JOSEPH COERTEN), LL.D., a son of Judge Josiah Hornblower of New Jersey (1729-1809), b. at Belleville, N. J., May 6, 1777; was admitted to the bar in 1803; was chief-justice of the New Jersey supreme court 1832-46; a prominent member of the constitutional convention of 1844; and a man of practical benevolence. D. at Newark June 11, 1864.

**Horn-book**, a written or printed tablet of parchment or paper, covered with a thin transparent layer of horn, and framed in wood, containing the alphabet in Roman or black letter, with some other simple lessons, often followed by the Lord's Prayer. Hornbooks appear to have been chiefly English. Their use originated before the invention of printing, and continued till about the middle of the last century. There are but few existing specimens known.

**Horn-by**, post-tp. of Steuben co., N. Y. It has several manufactories. Pop. 1202.

**Horne** (GEORGE), b. at Otham, Kent, England, Nov. 1, 1730; took orders in 1753; became chaplain to the king in 1771, dean of Canterbury in 1781, bishop of Norwich in 1790; and d. at Bath Jan. 17, 1792. His principal work is his *Commentary on the Psalms* (1776); he also published several volumes of sermons, *Letter to Dr. Priestley*, *Letters on Infidelity*, and a letter to Adam Smith on David Hume.

**Horne** (RICHARD HENRY), b. in 1803 in London; studied in the college at Sandhurst, and became a midshipman in the Mexican navy; was in Australia 1852-70, where he held several local magistracies. Author of several tragedies, and a number of poems and miscellaneous works, among which are a *Life of Napoleon* (2 vols., 1841), *Orion*, an *Epic* (1843); of which three editions were sold at one farthing a copy, *Australian Facts and Figures* (1859).

**Horne** (THOMAS HARTWELL), D. D., b. in London Oct. 20, 1780; studied at Christ's Hospital 1789-95, and read law; was sub-librarian of the Surrey Institution 1809-23; took orders in the Church of England 1819; was senior assistant librarian in the British Museum 1824-60; became rector of St. Edmund's and St. Nicholas's 1833; was made a prebendary of St. Paul's 1841; d. in London June 27, 1862. In early life he was a Methodist. His principal work is the *Introduction to the Critical Study of the Scriptures* (1818, latest edition, London, 1856, 4 vols.); also author of a *Brief View of the Necessity of Revelation* (1800), *Lakes of Lancashire, Westmoreland, and Cumberland* (1816), *Deism Refuted* (1819), *Romanism Contrary to the Bible* (1827), *Manual for the Afflicted* (1832), *Protestant Memorial* (1835), *Manual of Biblical Bibliography* (1839), and *Marciolatry* (1849). (See *Reminiscences of T. H. Horne*, by his daughter, S. A. CHEYNE, London, 1862.)

**Horned Toad** (*Phrynosoma*), a genus of true lizards, of which ten or eleven species are found in Texas, Mexico,



Douglas's *Phrynosoma*.

California, Utah, etc. They are not toads at all. They are rather sluggish, especially in captivity. They do not leap, but crawl like other lizards. *P. Douglasii*, *Blainvillii*, and *cornutum* are the best-known species.

**Hornellsville**, post-v. of Steuben co., N. Y., 58 miles S. of Rochester, on the Erie R. R. It has good schools, 5 churches, extensive railway-shops, a mowing-machine factory, large boot and shoe, furniture, machine, and other factories, planing mills, 3 weekly and 1 tri-weekly news-



paper, and a handsome opera-house, 1 national bank, etc. Pop. of v. 1532; of tp. 3837.

H. H. GREENHOW, ED. "EVENING TRIBUNE."

**Horner** (FRANCIS), b. at Edinburgh Aug. 12, 1778; studied law at the university of his native city; removed to London in 1803, and entered Parliament in 1806. He soon acquired a conspicuous position in the House of Commons by his business capacity, his insight into political economy, and the nobleness of his character; but, having injured his health by excessive labor, he was obliged to travel, and d. at Pisa Feb. 8, 1817. A monument was erected to him in Westminster Abbey, and his *Memoirs and Correspondence* were edited by his brother (London, 1843).

**Horner** (WILLIAM EDMONDS), M. D., b. at Warrenton, Va., June 3, 1793; graduated at the University of Pennsylvania 1814; served in the navy as a medical officer 1813-15; became a distinguished practitioner of Philadelphia; was prosecutor and demonstrator of anatomy in the University of Pennsylvania; became adjunct professor of anatomy in the same 1819; full professor 1831; announced the discovery of the so-called Horner's muscle 1824; founded St. Joseph's Hospital 1817. D. in Philadelphia Mar. 12, 1853. Published a treatise on *Pathological Anatomy* (1826), *Practical Anatomy, Special Anatomy and Histology* (2 vols., 1851), *C. N. Dissector*, and an *Anatomical Atlas*.

**Horner's Method of Detached Coefficients.** The method of detached coefficients simplifies the processes of algebraic multiplication and division when the coefficients in the expressions to be operated upon are chiefly numerical. It consists in omitting the letters (or at least the letter according to the powers of which the expressions are arranged), and using the coefficients only of the successive powers. Before employing the method the expressions must be prepared so that the exponent of the letter according to which each expression is arranged must increase by one in each term toward the right from 0 to the highest given, or decrease in like manner, from the highest given to 0.

To illustrate the method in multiplication: Let it be required to multiply  $5x^4 + 2x^2 - x + 1$  by  $5x^3 - 2x + 1$ . In the multiplicand the term containing  $x^3$  is wanting, and in the multiplier the term containing  $x^2$ ; these must be supplied, so that the expressions, when properly prepared, will read  $5x^4 + 0x^3 + 2x^2 - x + 1$  and  $5x^3 + 0x^2 - 2x + 1$ . The operation is performed as follows:

$$\begin{array}{r} 5+0+2-1+1 \\ 5+0+2+1 \\ 25+0-10-5+5 \\ -10-0-4+2-2 \\ +5+0-2-1+1 \\ 25+0+0+0+1-1-3+1 \end{array}$$

Since the expressions to be multiplied are arranged according to the descending powers of  $x$ , the product will be so arranged, the highest power being that obtained by multiplying  $x^4$  by  $x^3$ , or  $x^7$ . The complete product will then be  $25x^7 + 0x^6 + 0x^5 + 0x^4 + x^3 + 4x^2 - 3x + 1$ , or, omitting the insignificant terms,  $25x^7 + x^3 + 4x^2 - 3x + 1$ .

To illustrate the method in division: Let it be required to divide  $x^7 - 2x^6 - 3x^5 - x - 1$  by  $x^3 - 2x - 1$ . Supplying the wanting terms in both the dividend and divisor, the expressions will read  $x^7 + 0x^6 + 0x^5 + 0x^4 + x^3 + 0x^2 - x - 1$  and  $x^3 + 0x^2 - 2x - 1$ , and the operation will read as follows:

$$\begin{array}{r} 1+0-0-2-3+0-1-1+0-2-1 \\ 1+0-2-1 \\ 2-1-3+0 \\ 2+0-4-2 \\ -1+1+2-1 \\ -1-0+2+1 \\ 1+0-2-1 \\ 1+0-2-1 \end{array} \quad \begin{array}{l} |1+0+2-1+1 \\ \\ \\ \\ \\ \end{array}$$

As there are four terms in the divisor, four terms of the dividend are first dealt with. To the first remainder ( $2-1$ ) the next term of the dividend ( $+0$ ) is annexed; and since the divisor of four terms is not contained in  $2-1-3+0$ , 0 is written in the quotient, and the next term of the dividend ( $+0$ ) is brought down; the rest of the operation needs no explanation. The power of  $x$  in the first term of the quotient will be that obtained by dividing  $x^7$  by  $x^3$  or  $x^4$ ; and the complete quotient will be  $x^4 + 0x^3 + 2x^2 - x + 1$ , or  $x^4 - 2x^2 - x + 1$ .

The process of division by detached coefficients is the inverse of that of multiplication by detached coefficients. To exhibit this, let it be required to multiply  $3x^2 - x + 2$  by  $x^2 - 2x + 3$ , and then divide the product by  $x^2 - 2x + 3$ :

$$\begin{array}{r} 3-1+2 \\ 1-2+3 \\ 3-1+2 \\ -6+2-4 \\ +9-3+6 \\ 3-7+13-7+6 \end{array}$$

The first term of the product is obtained by multiplying the first term of the multiplicand by the first term of the multiplier; hence, the first term of the quotient in division must be obtained by dividing the first term of the dividend by the first term of the divisor; the second term of the product is obtained by adding together the product of the second term of the multiplicand by the first term of the multiplier, and the product of the first term of the multiplicand by the second term of the multiplier; hence, the second term of the quotient must be the result obtained by subtracting from the second term of the dividend the product of the first term of the quotient by the second term of the divisor: the third term of the product is the sum of the three products obtained by multiplying the third term of the multiplicand by the first term of the multiplier, the second term of the multiplicand by the second term of the multiplier, and the first term of the multiplicand by the third term of the multiplier; hence, the third term of the quotient must be the result obtained by subtracting, in succession, from the third term of the dividend the product of the second term of the divisor by the second term of the quotient, and the product of the third term of the divisor by the first term of the quotient; and so on. If, now, the terms of the divisor, with the exception of the first, have their signs changed, the successive subtractions may be changed into additions, and the operation may be performed thus (the example being to divide  $3x^4 - 7x^3 + 13x^2 - 7x + 6$  by  $x^2 - 2x + 3$ ):

$$\begin{array}{r} \text{Divisor: } \begin{array}{r} 1 \quad 3-7+13-7+6 \\ 2 \quad -6+2-4 \\ -3 \quad -9+3-6 \end{array} \\ 3-1+2+0+0 \end{array}$$

the quotient being  $3x^2 - x + 2$ . The method of proceeding will be apparent from what has gone before. The method of division here exhibited was discovered, a little more than fifty years ago, by W. G. Horner of Bath, Eng., and is known as Horner's synthetic division or method of division by detached coefficients. It is of importance in the solution of higher equations.

It has heretofore been stated that Horner's method of division by detached coefficients is applicable only when the coefficient of the first term of the divisor is one. Mr. E. D. Hearn of England has recently shown that this is not really the case, though when that coefficient is not one, the process has to be modified. The reason for the modification and the character of it will be apparent from an example. Let it be required to divide  $12x^4 - 192$  by  $4x^3 + 8x^2 + 16x + 32$ . Using the coefficients alone, and supplying the terms wanting in the dividend, the ordinary process would be as follows:

$$\begin{array}{r} 12+0+0+0-192 \quad 4+8+16+32 \\ 12+24+48+96 \quad 3-6 \\ -24-48-96-192 \\ -24-48-96-192 \end{array}$$

Since the quotient of  $x^4$  by  $x^3$  is  $x$ , the quotient will be  $3x - 6$ . It will be observed that in this quotient the first term is obtained, as before, by dividing the first term of the dividend by the first term of the divisor; the second term is not, however, the remainder left after subtracting from the second term of the dividend the product of the first term of the quotient by the second term of the divisor, but, instead, that remainder divided by the first term of the divisor; and a similar remark will apply to the remaining terms of the quotient, if such there be. The operation, conducted after Horner's method, would be as follows:

$$\begin{array}{r} 4 \quad 12+0+0+0-192 \\ -8 \quad -24+48 \\ -16 \quad -48+96 \\ -32 \quad -96+192 \\ -24 \end{array} \quad \begin{array}{l} \\ \\ \\ \\ \left. \begin{array}{l} \text{False quotient line, each term in which} \\ \text{is to be divided by the first term of} \\ \text{the divisor} \end{array} \right\} \\ 3-6 \quad \text{True quotient line} \end{array}$$

EDW. DAVID HEARN. REVISED BY J. H. VAN ANRIDGE.

**Horner's Method of Solving Higher Equations.** Until Horner, in 1819, communicated to the Royal Society his method of solving algebraic equations of all degrees, no direct and reliable method of finding the roots of equations beyond the fourth degree was known; by his method the process is comparatively simple. It consists, in principle, in transforming the equation by one or more figures of the root at a time, and in a direct and reliable method of discovering those figures; when the operation itself is performed by means of detached coefficients. The explanation will be most facilitated by first enunciating the rule, and then elucidating the several steps or sections of the rule whilst working an example.

**Rule 1. To Find a Positive Root.** Having found the number and situation of the roots, transform the given equation into another whose roots shall be less than those of the given equation by the initial figure of the root; then







since 1868, of which society he was (1868) one of the founders.

**Horrocks, or Horrox** (JEREMIAH), b. at Toxteth, Lancashire, England, about 1610; studied as a sizar in Emmanuel College, Cambridge; took holy orders and became curate of Hoole, where in 1639 he made an observation of the transit of Venus (Nov. 24). William Crabtree was apprised by Horrocks of the calculations which led him to expect this transit (which not even Kepler had predicted), and accordingly Crabtree and Horrocks both made observations (the first on record) of the transit of Venus. The transit occurred on a Sunday, and Horrocks felt compelled to attend divine service, and thus lost a part of the observation. D. at Hoole Jan. 3, 1641. Author of *Venus in Solis Obscuratio Catalogus* (1672), *Nova Theoriae Lunaris explicatio*, of published *Letters* to Crabtree in Latin, and of a few other posthumous papers. It is possible that he was the inventor of the micrometer, but the point is uncertain.

**Hor'ry**, the easternmost county of South Carolina, having North Carolina on the N. E. and the Atlantic Ocean on the S. E. A part of its surface is marshy, and a part is sandy, with pine forests. Rice and pork are the staple products. Area, about 1000 square miles. Cap. Conwayborough. Pop. 10,721.

**Horry** (PETER), a distinguished South Carolinian in the Revolutionary war of 1776, was a brigadier-general under the partisan command of the celebrated Gen. Francis Marion. Gen. Horry was distinguished not only for his prowess in arms, but for his achievements with the pen. The life of Marion prepared by him and Weems, published in 1824 by Carey & Lea of Philadelphia, has gone through many editions, and will hold a permanent place in American literature.

A. H. SEEBENS.

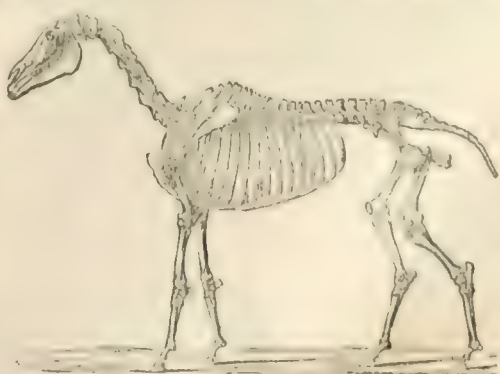
**Horsa.** See HENGIST.

**Horse** (*Equus caballus* of Linnaeus), a well-known domestic animal, non-ruminating and simple-hoofed, belonging to the soliped family of Cuvier's order Pachydermata (thick-skinned); but, according to the modern classification, the genus *Equus* belongs to the family Equidae, sub-order Perisso-lactyla (odd-toed), order Ungulata (hoofed), class Mammalia. The horse, with the ass, zebra, quagga, and a few other similar animals, constitutes a natural family of hoofed quadrupeds, the forms now living being closely related to each other, and widely separated from all other existing mammals. The horse differs from the other species of this family in having the tail covered with long hairs from the base, instead of tufted at the end, and in the presence of horny callosities on the inner side of the hind legs below the "hock," as well as on the fore legs above the "knee," where they are also found in the other species. The pattern of coloration in the horse is, moreover, not striped, but in most respects he closely resembles the other living representatives of the family. Nearly all these animals may breed together, producing hybrids, which are, however, usually sterile, as in the case of the well-known mule, the offspring of an ass by a mare, or the hinny, the product of a stallion by a female ass.

The principal characteristics of the Equidae, as exemplified by the horse, are the following: There are in the adult 3 incisors or cutting teeth, 1 canine, and 6 molars or grinding teeth on each side, above and below—40 teeth in all. The canines, however, are usually wanting in mares. An additional small tooth is occasionally found in advance of the upper molar series. This tooth, when present, is the smallest of all the teeth, and, as it has neither predecessor nor successor, its nature is in doubt. The grinding teeth are long, and have thick, square crowns. They are deeply implanted in the jaw, and without true fangs or roots, except in old age. These teeth are composed of interblended enamel, dentine, and cement, and when their summits are worn down by mastication a peculiar and complicated pattern is presented, especially by the upper teeth. The enamel, being much harder than the dentine or cement, takes in the section the form of an irregular, elevated ridge surrounding the tooth; outside this ridge is cement, and within dentine. There are also in the upper teeth two crescentic "lakes" of cement surrounded by a ridge of enamel, which often presents, especially in some fossil species, very complicated foldings. The canines are small when present. The incisors are arranged close together in a curve at the end of the jaw. They differ from those of ruminants by their greater length and curvature, and from those of all other mammals by the fold of enamel, which penetrates the crown like the inverted finger of a glove. When the tooth begins to be worn this fold becomes a ring of enamel, enclosing a cavity filled by cement and particles of food, and is called the "mark." In "aged" horses the incisors are worn down below the extent of the fold, and the "mark" disappears. This occurs in the lower mid-

incisors at the sixth year, and in the next and outer pairs in the seventh and eighth years respectively. The "mark" remains somewhat longer in the upper teeth. The skull is much elongated, chiefly in consequence of the great size of the face as compared with the hinder or true cranial portion. It is wide between the orbits, which are small, and closed behind by a bridge of bone, as in ruminants. The premaxillaries project beyond the nasals. The condyle of the lower jaw is much elevated above its alveolar border. The cervical vertebrae have their centra elongated, strongly convex in front and concave behind. The *ligamentum nuchæ* is a strong band of elastic tissue for the support of the head, extending from the spines of the anterior dorsal vertebrae to the occiput. In the dorsal region the vertebrae become gradually less convex anteriorly. The neural spines increase in length to the fourth or fifth. The dorso-lumbar vertebrae number 24, and there are 18 or 19 pairs of ribs. There are 5 sacral and about 17 caudal vertebrae. The clavicle is absent, as in all ungulates. The scapula, or shoulder-blade, is long and narrow, the low spine has no acromion, and the coracoid process is small. The humerus is short and strong, and the articulation with the radius and ulna is a very perfect hinge-joint. The two bones of the fore arm are co-ossified. The shaft of the ulna is obsolete, and the distal end small, so that the articulation for the carpus or wrist, commonly called the "knee," is furnished almost entirely by the radius. The carpus is composed of seven bones in two rows—the first row of the usual four bones, the second of three bones—the trapezium being obsolete, or sometimes represented by a small ossicle. The trapezoid and unciform are small, and the magnum large. Three metacarpals only are present, corresponding with those of the index, middle, and fourth or "ring finger" of the human hand. Of these, the middle, articulating with the magnum, is much the largest, supports the foot, and is called the cannon-bone. The other two metacarpals are small, and placed somewhat behind the middle one. They taper rapidly to a point, and, except in rare abnormal cases, support no digits. They are called splint-bones, and by their displacement give rise to the disease known as "splint." The cannon-bone is nearly symmetrical on the opposite sides, and at its lower end, at the fetlock-joint, articulates with the first phalanx, called the "great pastern-bone." The second phalanx is the "little pastern-bone," and the crescent-shaped ungual phalanx, supporting the hoof, is the "coffin-bone." The transversely elongated sesamoid bone in the tendon of the *flexor perforans*, at the articulation of the two latter bones, is the "navicular" of veterinarians.

The pelvic bones are elongated, and their long axis, on the length of which depends the proportional size of the "quarter," forms an acute angle with the back-bone. The femur is short, stout, and included in the common integument of the body. The third trochanter, as usual in odd-toed ungulates, is well developed for the insertion of the *gluteus maximus* muscle, and there is a characteristic fossa on the under surface of the bone above the external condyle. The fibula is rudimentary. In the ankle, or "hock," joint, the astragalus is deeply and obliquely grooved. It has a flat distal face, not borne upon any distinct neck, and articulates almost entirely with the navicular, presenting only a small face to the cuboid. The internal and middle cuneiform bones are small and united, and support the inner splint-bone. The ectocuneiform is large, and with the cuboid supports the cannon-bone, or metatarsal of the middle toe. The outer splint-bone is also supported by the cuboid. Below this point the structure is similar to that described in the fore foot. It will thus be seen that



Skeleton of a horse

throughout the whole extent of both the hind and fore limbs, except in the proximal portions of the carpus and



tarsus, development is principally confined to a single median series of bones, and thus, with the single solid hoof, is formed the highest type of a purely locomotive organ for progression over solid, even ground, and no mean weapon of defence.

The skin of the horse is thick, firmly adherent, especially along the back, and well provided with sweat-glands. The lips are very delicate tactile organs, and capable of much motion. They are set with long whiskers or bristles, the bases of which are lodged in the subcutaneous muscular tissue, and are furnished with sensory nerves. Respiration is performed through the nostrils. The stomach is simple; the cæcum very large, fully twice the size of the stomach. The alimentary canal is about eight times as long as the body. There is no gall-bladder. The principal peculiarities of the muscular system are, as might be expected, in the muscles of the limbs. The *serratus magnus* and the *levator anguli scapulae* with the *sterno-scapularis* form a great sling, by which the weight of the body is transmitted to the anterior extremities. The power of abduction and adduction not being needed in a purely cursorial animal, the deltoid is much reduced. On the other hand, the pro- and re-tractors and the flexors and extensors are well developed. The pronators and supinators are wanting, the limb being fixed in a constant state of pronation. In the hind leg the femoral muscles are the same as in man, but enormously developed. The *tibialis anticus* and *posticus* and the *peroneus longus* and *brevis* are wanting. The *flexor hallucis* and the *flexor longus digitorum* are united into a single perforating tendon for the distal phalanx. In this tendon is developed the sesamoid bone, known as the "navicular." The epidermis covering the terminal phalanx is developed into the hoof, a horny cylindrical or somewhat conical case, separable by maceration into the wall, the sole, and the frog. The wall is that part of the hoof that is seen when it rests upon the ground, and its anterior portion is called the toe. The heels are formed by the inflexion of its posterior extremities, and these extremities, passing along the inner border of the sole, are called the bars. The sole is a thick horny plate occupying the inferior surface of the hoof, and the frog is a pyramidal mass of horn lodged between the two posterior re-entering angles of the wall. The hoof of the ass and mule is narrower than that of the horse, the wall higher and thicker, the sole more concave, and the horn harder.

The period of gestation in the horse is eleven months. It often lives thirty years or more, but is usually serviceable for less than half that time. Its perception is quick, its memory retentive, and it is capable of much affection. It is surpassed in docility by no animal except the dog, and perhaps the elephant. Its flesh is often used for food.

The original habitat of the horse is unknown. It is found wild in Central and Western Asia, and upon the plains of both North and South America. In the latter country, especially upon the pampas of Brazil and Buenos Ayres, it is abundant and lives in large herds. All these animals are, however, known to be descended from domestic horses brought from Europe by the Spaniards. The horse has been domesticated from a very early period, probably first in Central Asia or Northern Africa. Its remains are very rare in the Stone Age, but a few bones have been found in the Swiss lake-villages, enough to indicate its presence. In the Bronze Period, however, its bones become more numerous. Upon Egyptian monuments it is not represented earlier than the eighteenth dynasty, but the horse appears to have been abundant in Egypt after that time. It is first mentioned in the Bible after the children of Israel went into Egypt, no reference being made to the horse in the full account of the pastoral lives of the early patriarchs.

The most celebrated races of the horse are those of Arabia, Turkey, and Barbary, and from these, by a thorough and judicious system of breeding, has sprung the English race-horse, an animal that now so far surpasses the originals from which it has sprung that almost no benefit has been derived from imported blood for the last three-quarters of a century. A single mile in 1½ minutes is considered fast running time for a race-horse. The height of a race-horse is about 15½ hands, or 5 feet 2 inches. A horse under 13 hands high is called a pony, and some Welsh and Scotch breeds of ponies are very celebrated for their endurance. A Shetland pony 11½ hands high has carried a rider 44 miles in 3 hours and 45 minutes. In America more attention has been paid to the rearing and training of trotting-horses, and the constant improvement is shown by the fact that nearly every year the fastest time previously recorded is surpassed. At present the best time for a single mile is 2 minutes 14 seconds, and was made by Goldsmith Maid in 1874 at Mystic Park, Boston.

The horses of the N. part of Africa, from Barbary (hence called Barbs), from Arabia, and from Turkey resemble each

other, and are usually confounded under the name of Arabians. They are beautifully formed, have fine legs and feet and small bony heads, and are usually small, not over 15 hands high. The Flanders horse is a large, heavy, coarse-legged, slow horse, and the Tartar horse, which has been carried into Russia and Hungary, is a small, bony, rough horse, with a large head and great endurance. From various mixtures of these three types the modern horses are descended. The Barb blood spread into Spain and Italy, and there met that of the other two races. The favorite horses of the fifteenth and sixteenth centuries seem to have been various crosses of the Barb and the Flanders horses. It is difficult to say what the original English horse was, but he is spoken of in the highest terms by Markham in 1609, who puts the breeds in the following order of merit: English, Neapolitan, Corsican, Turk, Barb, Spanish, Polish, German, Hungarian, Flanders, etc. The English horse of that time was probably a cross between the Flanders and the Hungarian, and being early used for racing and hunting purposes, he was swift and enduring. At least as early as 1600 it was discovered that the cross of the Barbary horse upon English mares was the best for producing speed and bottom, and in the reign of James I. Markham's Arabian and Place's White Turk were imported. Charles II. imported what were known as the Royal mares from Tangiers. The Darley Arabian was brought in during the reign of Queen Anne, and from this date (about 1705) there were numerous importations, and by crossing them with the native horses the foundation of the great family of thoroughbreds was laid. These horses now undoubtedly surpass all others for size, strength, bottom, beauty, and swiftness combined. The proper definition of a thoroughbred at the present time is a horse whose progenitors for five generations back are to be found in the *Stud Book*, which is a record of horses bred for racing purposes since about 1700, the complete pedigrees commencing about 1759. The first importations of thoroughbred horses into America were about 1725-30, and the *Stud Book* of the American branch is kept up on this side of the water. This class of horses is bred and used primarily for racing purposes, but the cross improves horses for all purposes, as is clearly shown by the superior quality of the average horse of Virginia and New Jersey, into which States the taste for racing introduced the thoroughbred horse at an early period. Owing to three and four mile races and heat-races having been kept up in America while short races and single dashes have been in vogue in England for some years, the average American thoroughbred is probably a stouter and stronger horse than his English cousin. It can hardly be said that there are any distinct families of horses in America, although those of different localities present some peculiarities. The average horse of the New England States and of Canada is small, hardy, good-tempered, a good traveller, and very enduring. The Morgan horse of Vermont is one of the best types. Lancaster co., Pa., possesses a breed of horses, now somewhat scarce, called Conestogas—large, well-made, slow draught-horses. In Virginia, Kentucky, and the South generally the thoroughbred and his connections predominate, and in Texas, California, and Mexico we find the mustang—a small horse, evidently descended from the Spanish horses introduced by the early conquerors of that region.

**HORSE, FOSSIL.** The existing species of the horse family are so closely related to each other as not to be distinguished generically by any characters derived from the skeleton, but a large number of extinct genera have left their remains in Quaternary and Tertiary strata of various parts of the world, and especially of North America. At the time of the discovery of this continent by Europeans, no species of horse or ass existed in either North or South America, but since the introduction of these animals the climate and conditions of life have proved so favorable that large herds of wild horses are now common on the pampas and prairies of both continents, the descendants of those that have escaped from domestication. This complete absence of indigenous species is the more remarkable in view of the fact that not less than twelve species of *Equus* have been described from Quaternary deposits, and more than thirty other related forms from the Tertiary of America. Some of these are readily distinguished from the living species by the greater complexity in the foldings of the enamel as they appear upon the worn surface of the molars. In the Pliocene Tertiary, the horse was represented by several extinct genera, the best known being *Hipparion* (or *Hippotherium*), in which the body was supported, as in *Equus*, on the extremity of the middle toe of each foot, which was also provided at the fetlock-joint with an additional pair of small toes, not reaching the ground, and resembling the dew-claws of cattle. In the upper molar teeth there is in *Hipparion*, on the anterior portion of the inner side, an isolated ellipse of enamel enclosing dentine,



and not joined with the main body of the tooth by an isthmus of dentine, as in *Equus*, at least until the teeth are nearly worn out. The species are small, as the name implies, *Hipparion* being a diminutive from the Greek *hippos*, a "horse." *Protolhippus* and *Platolhippus* of the Pliocene are genera nearly related to *Hipparion* and *Equus*. *Anchilippus*, also from the Pliocene, resembled in its teeth *Anchitherium* of the Miocene, a genus now considered as typical of a family distinct from that of the horse. In *Anchitherium* the shaft of the ulna is complete, moderately developed, and more or less separate from the radius. The fibula is ankylized with the tibia. The orbit is not closed behind, and there is a deep ant-orbital fossa. The molars have short crowns devoid of cement, and are inserted by distinct fangs. There are three digits in each foot, the middle being much the largest, but all appear to have reached the ground. *Miohippus*, also from the Miocene, was closely related to *Anchitherium*. In this genus the radius and ulna are free or only loosely united. The tibia and fibula are co-ossified at the distal end. There were three digits in each foot, all of which reached the ground, and they are more nearly equal in size than in *Anchitherium*. Another closely related Miocene genus, *Mesolhippus*, had, besides the three toes of the fore foot, a splint-bone representing the outer toe, or little finger of the human hand. The Miocene species were not larger than a sheep. The Eocene representatives of the group were still smaller, the largest hardly exceeding a fox in size. They belong to the genus *Orohippus*, which has four functional digits in the fore foot, and no ant-orbital fossa. The orbit is open behind. The dentition is very similar to that of *Anchitherium*, but the first upper premolar is larger, and the succeeding ones smaller than in that genus. The diastema, or "place for the bit," is distinct. The canines are large, and near the incisors. The crowns of the molars are short and destitute of cement. The skeleton is decidedly equine in its general features. The radius and ulna are distinct, the latter larger than in *Anchitherium*. The carpal bones are eight in number, and resemble those of the tapir, but the trapezium is proportionally much smaller. All the digits of the fore foot except the first are well developed. The third is the largest, and its resemblance to that of the horse is clearly marked. The terminal phalanx, or coffin-bone, has a shallow median groove in front, as in many species of this group from the Later Tertiary. The fourth digit exceeds the second in size, and the fifth or outer toe is much the smallest of all, and has its metacarpal bone considerably curved outward. There are but three digits in the hind foot. The tibia and fibula are distinct.

All the above genera except *Anchitherium* are found in the Tertiary and Quaternary of this continent, and *Anchitherium* is represented by the closely-allied genus *Mesolhippus*. This large number of equine mammals and their regular distribution in geological time afford a good opportunity to ascertain the probable lineal descent of the modern horse. The American representative of the latter is *Equus fraterculus*, a species almost, if not entirely, identical with *Equus caballus*, to which the recent horse belongs. Huxley has traced the later genealogy of the horse through European extinct forms, but the line in America was a more direct one and the record is more complete. Taking, then, as extremes of the series, *Orohippus*, *Platolhippus*, from the Eocene, and *Equus fraterculus*, from the Quaternary, the natural line of descent, as indicated by over thirty intermediate forms, would seem to be through the following genera: *Orohippus* of the Eocene, *Miohippus* and *Mesolhippus* of the Miocene, *Anchilippus*, *Hipparion*, and *Platolhippus* of the Pliocene, and *Equus*, Quaternary and Recent. The most marked changes undergone by these successive genera are the following: 1st, increase in size, from *Orohippus*, as large as a fox, to the modern horse; 2d, increase in speed through concentration of the limb-bones; 3d, elongation of the head and neck and modification of the skull. The increase of

the reduction of their lateral elements and enlargement of the axial one, until the force exerted by each limb came to act directly through its axis in the line of motion. This concentration is well shown in the fore limb. There was, 1st, a change in the scapula and humerus, especially in the latter, which facilitated motion in one plane only; 2d, an expansion of the radius and reduction of the ulna, until the former alone remained entire and effective; 3d, a shortening of all the carpal bones and enlargement of the median ones, ensuring a firm wrist; 4th, an increase in size of the third digit at the expense of those on each side, until the former alone supported the limb. The latter change is clearly seen in the above diagram, which represents the fore feet of four typical genera in the equine series, taken in succession from each of the geological periods in which this group of mammals is known to have lived. The ancient *Orohippus* had all four digits of the fore feet well developed. In *Mesolhippus*, of the next period, the fifth toe is only represented by a rudiment, and the limb is supported by the second, third, and fourth, the middle one being the largest. *Hipparion* of the Later Tertiary still has three digits, but the third is much stouter, and the outer toes have ceased to be of use, as they do not touch the ground. In *Equus*, the last of the series, the lateral hoofs are gone, and the digits themselves are represented only by the rudimentary splint-bones. The middle or third digit supports the limb, and its size has increased accordingly. The corresponding changes in the posterior limb of these genera are very similar, but not so striking, as the oldest type (*Orohippus*) had but three toes behind. An earlier ancestor of the group, perhaps in the lowest Eocene, probably had four toes on this foot and five in front. Such a predecessor is as clearly indicated by the feet of *Orohippus*, as the latter is by its Miocene relative. A still older ancestor, possibly in the Cretaceous, doubtless had five toes on each foot, the typical number in mammals. This reduction in the number of toes may perhaps have been due to elevation of the region inhabited, which gradually led the animals to live on higher ground, instead of the soft lowlands where a many-toed foot would be most useful.

The gradual elongation of the head and neck may be said to have already begun in *Orohippus*, if we compare that form with other most nearly allied mammals. The diastema, or "place for the bit," was well developed in both jaws even then, but increased materially in succeeding genera. The number of the teeth remained the same until the Pliocene, when the front lower premolar was lost, and subsequently the corresponding upper tooth ceased to be functionally developed. The next upper premolar, which in *Orohippus* was the smallest of the six posterior teeth, rapidly increased in size, and finally became in the horse the largest of the series. The grinding teeth had at first very short crowns, without cement, and were inserted by distinct roots. In Pliocene species the molars became longer, and were more or less coated with cement. The modern horse has extremely long grinders, without true roots, and covered with a thick external layer of cement. The large canines of *Orohippus* become gradually reduced in the later genera, and the characteristic "mark" upon the incisors is found only in the later forms. The bridge of bone bounding the orbit behind first appears in the Pliocene genera. It is an interesting fact that the peculiarly equine features acquired by *Orohippus* are retained persistently throughout the entire series of succeeding forms. Such, e. g., is the form of the anterior part of the lower jaw, and also the characteristic astragalus, with its narrow, oblique superior ridges, and its small articular facet for the cuboid.

Such is, in brief, a general outline of the more marked changes that seem to have produced in America the highly specialized modern *Equus* from its diminutive, four-toed predecessor, the Eocene *Orohippus*. The line of descent appears to have been direct, and the remains now known supply every important intermediate form. Considering the remarkable development of the group throughout the entire Tertiary period, and its existence even later, it seems very strange that none of the species should have survived, and that we are indebted for our present horse to the Old World.

O. C. MAYER.

**Horse'-Chestnut.** See SAPINDACEÆ.

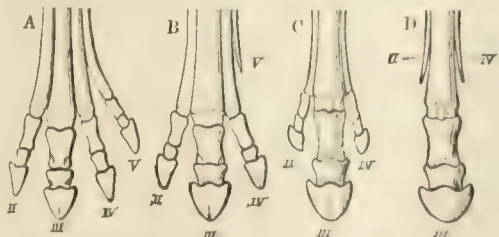
**Horse Creek**, tp. of Marengo co., Ala. Pop. 1337.

**Horse Creek**, tp. of Dade co., Mo. Pop. 597.

**Horse Creek**, post tp. of Ashe co., N. C. Pop. 813.

**Horse Distemper**, a species of catarrh. As the disease is contagious, an animal having it should be kept apart from the others, and after a thorough purge should be fed on light bran mashes and kept warm until recovery.

**Horse-Fly.** The females of many dipterous insects of the family Tabanidae are called horse-flies, from the great annoyance their bite causes the horse. Among the



A, *Orohippus* (Eocene); B, *Mesolhippus* (Miocene); C, *Hipparion* (Pliocene); D, *Equus* (Quaternary and Recent).

speed was a direct result of a gradual and striking modification of the limbs. These were slowly concentrated by



most common are *Tabanus lineola*, the green-headed fly, which in hot weather has been known to worry horses and cattle to death. The bite is severe, and even venomous, always drawing blood. *Tabanus atratus* and *cinctus*, the orange-belted fly, are also common. Their larvæ are very destructive of snails and of other larvæ. The horse-fly of Great Britain is *Hippoboscæ equina*. (See FOREST FLY.)

**Horse Guards.** (See GUARDS.) The term was used to denote the head-quarters of the British army, Whitehall, London, in consequence of the building being guarded by a squadron of horse guards, and of the striking appearance of the mounted sentinels on duty at the entrance. The head-quarters were changed in 1871 to the War Office, Pall Mall; papers emanating therefrom are still headed "Horse Guards," "War Office, Pall Mall," being added.

**Horse head,** tp. of Johnson co., Ark. Pop. 995.

**Horseheads,** post v. and tp. of Chemung co., N. Y., on the Northern Central and the Utica Ithaca and Elmira R. Rs., has 6 churches, 2 weekly newspapers, 2 grist-mills, a tannery, a sash and blind factory, a steam saw-mill, a woollen-mill, and the second largest brickyard in the U. S. Pop. of v. 1410; of tp. 2961.

T. J. TAYLOR, ED. "HORSEHEADS JOURNAL."

**Horse Island,** an island in Lake Ontario, in Hornsfield tp., Jefferson co., N. Y., 1½ miles from Sackett's Harbor. It has a lighthouse. Area, 27 acres.

**Horse-Mackerel,** a name given in Great Britain to the *Scad* (which see), but applied in the U. S. to *Thynnus secundo-dorsalis*, called also albicore and American tunny. It is often ten or twelve feet long, is very destructive to fish and fishermen's nets, and is caught chiefly for its abundant oil, although its flesh is pronounced excellent by good judges. It is best killed by the harpoon.

**Horse-manship.** It seems quite proper to suppose, taking into consideration the ancient myths relating to the Centaurs and to Pegasus, that the horse was used by man from the earliest periods for the purposes of war and the chase. This was unquestionably true in India and in Persia. The earliest regular treatise on horsemanship with which we are acquainted is by Xenophon, and from that it appears that the horsemen of his time were accustomed to feed, clean, and ride their horses much as we do. The saddle was not, however, known to them, and their bit seems to have been of the simplest possible form. The animal was ridden either barebacked or with a cloth or skin secured by a band. There were no stirrups, and the rider mounted by vaulting on, or by stepping from a projection upon the shaft of the lance. The saddle came into use in the fourth century, and the stirrup was no doubt invented soon after. From that time, and through the Middle Ages, the more civilized nations used most elaborate horse-trappings, and the art of riding was no doubt considerably advanced as the equipments were improved. As a recognized art, requiring long and difficult training, it seems to have had its origin at Naples, whence its professors spread over Europe. Spain took it up next to Italy, then France, and lastly England. The tournaments which were in fashion from the eleventh to the sixteenth century, and the Crusades, brought the art into special prominence; the carousals, which succeeded the tournaments, kept up the interest, and during the sixteenth and seventeenth centuries equestrian held the first place in the education of a gentleman. The riding-school was the fashionable lounge or club of young men of rank, and some superb buildings were erected in various places dedicated to this use alone. The interior court of the Louvre was used as the place of instruction of King Louis XIII. by his riding-master, Pluvinel. The saddle in the time of the Crusades was made principally of wood, very deep, and so formed that the rider sat upon his fork perfectly straight up and down, as if standing. The armor of man and horse was heavy, and a stout horse was required to carry its weight. About 1500 the equipments were somewhat modified to suit the purposes of civil life, but the position of the rider remained nearly the same until the time of De la Guerinière, whose folio volume, with beautiful plates drawn by Ch. Parrocel, appeared in 1733, when the saddle assumed more nearly the modern form, and the seat of the rider was changed by bending the knee and sitting down more in the saddle, much in the manner of the present European military seat. The Eastern nations have from the earliest times used a deep saddle, but with a very short stirrup, rising in their stirrups to use the javelin or lance. In the early part of the eighteenth century the saddle by successive changes approached nearly to the present English saddle, and the English riders adopted the short stirrup which is now characteristic of their school of riding, most other nations retaining the military seat. The heavy curb bit of the Middle Ages was retained until quite a late period, and the equipments and mode of riding of the Mexican and South

American of the present day are almost exactly those of the beginning of the eighteenth century. Among the continental European nations riding as a civil accomplishment has declined, but in England it still holds its place in the foremost rank among the amusements and accomplishments of a gentleman. FAIRMAN ROGERS.

**Horse Pasture,** post-tp. of Henry co., Va. P. 2302.

**Horse-Power.** See DYNAMIC UNITS, by PROF. W. P. TROWERIDGE, A. M.

**Horse-Racing.** Though horse-racing has probably been coeval with the possession of the horse by man, it seems likely that the Persians were the first to elevate the sport to a great institution. Horses with them were identified with the sun or with the fiery chariot driven once a day over the heavens. From the Persians the Greeks perhaps derived the sacred races which were held at the Olympian, Pythian, Isthmian, and Nemean games. These races were all conducted with clumsily-built chariots, without springs, exceedingly difficult to drive, the course involving as much danger as skill. Great as was the difficulty of driving, it was much increased by the horses being all the time near the spectators, who crowded close to the twenty short turns of the ground, and maddened the animals by their cries, "while artifice was employed for the express purpose of frightening the horses when they approached the statue of the genius Taraxippus." The charm of Greek races, apart from the interest in the victor, consisted in the excitement of seeing the chariots strike and shatter each other, the horses trampling on and killing the fallen drivers, and the overturns, in which the whole population of refined Athens delighted. The Roman races were much like the Greek, but with this difference, that the Romans employed their slaves as charioteers, instead of driving themselves. In time, the Romans, however, introduced mounted races, and with the exception that the riders were often expected to perform circus tricks and acrobatic feats, they were in many respects strikingly like the modern. The horses were entered thirty days in advance, and were trained, the jockeys wearing four colors—green, red, white, and sea-color (*veneta*), to which Domitian added yellow and purple. There were prizes given, but as betting was not practised, it would appear that races among the Romans were a far more creditable institution than those known at the present day. The Romans did not use saddles (which, according to Beckmann, were invented in the fourth century), but they and the Persians had thick saddle-cloths. The jockeys were called *sensores*, the trainers *agitatores*. Caligula once gave 2000 sesterces to the jockey Eutychus.

An old French song describes a horse-race run in the sixth century, the winner receiving for a prize the hand of a Breton princess. From the twelfth to the fourteenth century there appears in feudal grants mention of sums awarded at annual and regularly established races, "but it is not until the reign of Louis XV. that the history of horse-racing in France, seriously considered, begins." There is good ground for believing that in England the ancient Britons, decidedly addicted to horsemanship, had races, and that the Mithraic courses established by the Romans were continued by the Saxons. It is certain that the latter had mounted races, since "running horses" were among the presents sent by Hugh Capet to Athelstan when suing for his sister Ethelsitha. This king took great pains to improve the breed of the British horse by importations from the Continent, particularly from Spain, by which means a breed was produced, says Blaine, that flourished from the time of the Crusades until the days of the Tudors—a period which has been called "the era of the great horse." In the romance of *Bevis of Southampton* we are told that at Whitsuntide the knights

"A cours let them make on a daye,  
Steds and palfrey to assaye  
Which horse that best may run."

Fitzstephen informs us that in the time of Henry II. there was a great deal of racing on the ground where Smithfield Market now stands. In the time of Henry VIII. turfed courses were laid out and prizes allotted. The chief of these was a silver bell, whence perhaps comes the phrase "to bear away the bell."

Modern English horse-racing began strictly with James I., who was very fond of it. In his reign public and regular runnings were held in Yorkshire and Surrey. Attention was now paid to feeding and training horses and instructing jockeys. Eastern horses were imported during this reign, but none of them proved to be of any value. During the civil war and the Protectorate racing declined, but with the Restoration there was a grand revival of all field-sports, and especially of this. Charles II. was an enthusiastic admirer of the turf, even entering his horses in his own name. He established races at Datchet Mead, that he might more conveniently enjoy his favorite sport. He was also regular in his attendance at Newmarket, now



boasting every accommodation for the training of horses, with an excellent race-course, which, as the system progressed, was apportioned into distances corresponding with the several ages and supposed powers of the horses. By this arrangement, as well as by a judicious appropriation of the weights to be carried, according to similar circumstances, a scale of equality was kept up highly to the credit of the turf regulations. Indeed, much of the arrangement and most of the rules and regulations since in force were formed about this time and under the auspices of this prince. William III. encouraged the turf, and George, consort of Queen Anne, greatly aided it in every way. During his reign Curwen Baybad and the Darley Arabian were imported. Charles II. introduced the silver prize cup, value 100 guineas. "George I.," says "Nimrod," "was no racer, but he discontinued silver plates as prizes, and instituted the king's plates, being 100 guineas in cash." During the reign of George II. the Godolphin Arabian appeared, the founder of the best English "blooded" horses. George III. gave the turf some encouragement. His brother, the duke of Cumberland, was passionately addicted to racing. From his stud came the famous horses Herod and Marak, who sired the famous Eclipse, born in the fourth year of George IV. O'Kelley, the great turfman of these times, owned Eclipse, and was the breeder of Volunteer and Duncannon by Eclipse, who became the sire of 160 winning horses. The earl of Grosvenor is also held in honor as one of the great racing magnates of this reign. He raised the two famous mares Meteor and Violante, and lost his entire fortune in the end, though he won £200,000 by betting. "Honesty," says Blaine, "which ensures riches in most other pursuits, is almost certain to occasion loss in racing." The king, George IV., bred the famous horses Whiskey, Manfred, and Maria. This monarch, according to Blaine, was very shrewd in turf-matters, and "surrounded himself with men deeply versed in the 'mysteries' of racing. The turf abounded in rascals, and the prince found it necessary to meet the manoeuvres of such men by proper caution." By the exercise of this proper caution, he at last, in the affair of the notorious Escape against Grey Diomed, "succeeded in getting the accusation of foul play affixed to his name." His brother, the duke of York, was, however, a heavy loser, being less suspicious. Cowper had long before said of England,

"We justly boast  
At least superior to Key-ship, and claim  
The honors of the turf as all our own."

Unfortunately, the dishonors of the turf must also be claimed, and it was during the reign of George IV. that the turf became as noted for villainy as for sport. In the language of "Nimrod," "A set of masked, unprincipled miscreants are now usurping the place of gentlemen of integrity. No honorable man can be successful for any length of time against such a horde of determined depredators as have lately been seen on our race-courses." Among the celebrated jockeys employed by George IV. were Samuel Chipney, who became rich; South, Goodson, Robinson, and Nelson. Earl Fitzwilliam, "a princely conductor of his stud," bred the eminent racers Orville and Mulatto. The earl of Derby raised Sir Peter Tenzle, a descendant of the Godolphin Arabian, as of Blank, Snap, and Regulus. He produced more winners than any English horse known; 10,000 guineas were refused for him. The late duke of Dorset was a first-class jockey, and, like the duke of Grafton, was a great winner. It is remarkable that several racing authorities lay great stress on the fact that this nobleman was not a cheat, and always "ran to win." (For a fuller account of the great patrons of the turf from this time to the year 1833 the reader may consult the article "The Turf" in the *Quarterly Review*, No. 98.)

There are about 120 provincial race-meetings in England, Scotland, and Wales, and some of these are held twice in the year. Those of Newmarket, Epsom, Ascot, York, Doncaster, and Goodwood stand first in all respects. The annual Derby (Epsom) is the great London holiday, where 350,000 people often assemble. The Goodwood is called the "ladies' race," because it is specially visited by ladies, many of the highest rank, in splendid toilette. The better class of visitors sit and lunch in their carriages, while a stream of female gypsies, clamorous to tell fortunes or beg, itinerant musicians and peddlers, go from one to the other, and the background is filled in with booths for eating, exhibitions, cocoanut "shys," "Aunt Sallicies," and similar rude games, usually managed by gypsy men. It is said that the telegraphic department of the English post-office takes several hundred thousand pounds annually from turfmen, and that this "chief national pastime," which receives, in fact, nothing from the state, or which against £4000 received pays out £8000 excise-duty, "demands for its support an expenditure equal to the revenue of such small kingdoms as Portugal or Denmark." This is perhaps

the true reason why race-betting is not reformed out of existence, or rather why it exists as an anomaly and a national reproach. It is not long since a poor man was sent to prison for simply looking on at a game of pitch-penny in London, while the betting on the races fills columns not only in "sporting papers," but is recorded more or less in every daily journal. The usual pretext, that racing keeps up the quality, strain, and value of horses, is a weak apology; for, though it is true that that refined and highly artificial animal, the thoroughbred, executes the greatest feats of running, it is as useless to the world at large, save for betting on, as the giraffes or lions in the zoological gardens. Horses partly of this stock are found, however, to excel for almost every purpose. There is a great desire on the part of the English government to abolish betting, but as the entire system of racing depends on gambling, and as it involves such an immense amount of capital, and is, moreover, so near and dear to at least one-half the aristocracy, no violent reforms in it can at present take place. Much has, however, been done, and the Betting Act of the present year and other action show that there is a settled determination to do away with the greatest scandal which at present disgraces any Christian country, excepting, perhaps, bull-fighting in Spain. The most experienced writers on the turf admit that if the best horse the world ever saw were to be run at present, "he would have no more chance to win than if he had but the use of three of his legs," if he were heavily backed to lose. It is impossible to make the poor understand that they are justly punished for trivial gambling, when the journals with which they are most familiar represent the "plunging," or desperate betting-feats, of this and that lord as his crowning glory.

*Steeple-chasing*—so called either from the steep-hill riding which it involves, or from a steeple in the distance having been originally the goal—consists of headlong riding over a ground abounding in ditches, hedges, gullies, and all kinds of impediments. It is of Irish origin, and no longer enjoys its former popularity in England. *Hurdle-racing* was originally invented by George IV. on Brighton Downs. Hurdles are like segments of light fences or wattle of coarse basketwork. In a course of one or two miles three or more hurdles may be placed to be leaped over.

Great efforts have been made in France to render racing national, but it has always existed as a distinct imitation of an English institution. During all the reign of Louis XV. it was, as Larousse admits, the *Francis Anglomane* (or French who affected the English) who were fond of horses. Extravagant betting became fashionable, and races were abolished by the Revolution. Napoleon re-established them, and in 1833 a jockey-club was founded by Count Max Caccia, De Cumbis, Count Demidoff, M. Lafitte, and others. There are now in France sixty race-grounds, the principal of which are at the Bois de Boulogne and Chantilly. As the French only admit native-bred horses to their races, it seems hardly fair that they should send runners of English extraction to compete at English races, and then rejoice, as they do, over an occasional victory. When it is considered that these horses are generally trained and perfected in France by English grooms and jockeys, the ground for exulting over such triumphs as "French" is seriously diminished. Admiral Rous, the head of the turf in England, has recently endeavored, but in vain, to induce the French to abolish this restriction.

Much depends in racing on the skill of the jockey—so much, in fact, that a very good rider is sometimes almost able to win with any horse entered.

Great efforts have been made in America to perfect the race-horse or thoroughbred of Anglo-Arab origin, but the number is as yet far inferior to that of English horses, though, as the annals of our turf indicate, there are many such among us perfectly qualified to compete at any English course. When it is considered, however, that the best English writers on the subject are of the opinion that the race-horse is among animals what a dandy is among men, it may be something more than problematical whether Americans should not remain contented with the horse in which they are unrivalled, save perhaps by the Russians, and which has the advantage of developing practically useful animals.

The trotting-horses of America have long been remarkable. At first the breed appeared to be merely the result of accident, but breeders now recognize the fact that the best have a strong dash of thoroughbred blood. A large number of the most successful ones that are traced back to Messenger (imported about 1785-90). Trotting-time has gradually been reduced from a mile in 3 minutes, which used to be considered very good, to a mile in 2m. 14s., which time was made in 1874 by Goldsmith Maid. Up to the end of that year, 116 horses are recorded as having trotted in public in 2m. 10s. or less, the ten fastest having done it in less than 2m. 19s. Some of the lighter Norman



or Percheron horses of France have shown trotting action, and there is a family of horses in Russia, called "Orloff trotters," that has produced some only second to those of the U. S. Owing to the great difference between the speed of trotting-horses, it is necessary to divide them into classes, such as those which have not "beaten 2.30, 2.25, or 2.20," as the case may be; and very strict rules are made by the National Association regarding changes of name or any action which may cloud the identity of horses which trot for public money. Racing proper, as distinguished from trotting, has always been a favorite sport in the Southern States, and has lately been revived at the North with great success, as the summer meetings at Jerome Park, N. Y., Long Branch, and Saratoga show. Only thoroughbreds are fit for racing, and a part-bred horse would have no chance whatever to win. There is no classification, as in trotting, as all good race-horses can run within a few seconds of the best speed. There is a classification, however, as to age, the youngest horses carrying the least weight in cases where horses of different ages are engaged in the same races. Regular tables of weights are established; as, for instance, 3-year olds, 90 pounds; 4-year olds, 103 pounds; 5-year, 114 pounds; 6-year, 118 pounds; mares being weighted about 3 pounds less than horses. The best racing time made in the U. S. is that made by Grog Planet in 1874—one mile in 1m. 42s. Until within a few years 1m. 44s. was the best, but that has now been beaten by several horses. The best four-mile time for many years was that of Lexington in 1855 in 7m. 19½s.; it was beaten in 1874 by Fellowcraft in 7m. 19½s. There is no official time taken at English races, and therefore no means of comparing their time with ours. No confidence is placed by horsemen in the story that Flying Childers ran a mile in a minute. English courses are usually straight or nearly so, and over the turf. The regular American course is one mile, made up of two semicircles, each a quarter of a mile long, joined by two straight quarters, and is kept in order by harrowing and scraping, as turf becomes too hard in the dry summer for horses to run over. C. G. LELAND.

**Horse'-Radish** (*Nasturtium Armoracia*), a perennial herb of the order Cruciferae, whose large white roots furnish a well-known pungent condiment for the table. The roots yield a volatile oil which contains sulphur. The plant is European, and half naturalized in the U. S. Horse-radish leaves and roots are used in medicine as local stimulants. They have also antiscorbutic properties. The young leaves are boiled as potherbs, and are very delicate and pleasant.

**Horse-radish Tree**, the *Moringa pterygosperma*, a tree of the order Leguminosae, so-called from the acrid quality of its leaves. Its trunk yields a gum like that of the acacias, and the leaf has medicinal qualities; but its seeds, with those of *M. aptera*, are important as furnishing the commercial oil of ben. These trees grow in the East and West Indies, Arabia, Africa, and Southern Europe. The expressed oil is of admirable keeping qualities, and is used for oiling watches and as a basis for perfumes. The oil is mostly prepared in Europe.

**Horsens**, town of Denmark, in the province of Jütland, on the Horsens Fjord. It is an old town, but neatly built, thriving, and carrying on a lively trade. Pop. 10,501.

**Horseshoe Crab.** See KING CRAB.

**Horseshoeing.** See FARRIERY, by M. C. WEID, Ph. B.

**Horse'tail, Shave-grass, or Scouring Rush** (genus *Equisetum*). There are eleven species of this plant, the two principal of which are denominated the great and little horsetail, and belong to the cryptogamous or flowerless series. They have stems and branches, but neither leaves nor flowers. The stems are rush-like, hollow, and jointed, arising from running root-stocks, and terminated by the fructification in the form of a cone or spike, composed of shield-shaped stalked scales, with spore-cases underneath. The great horsetail (*E. Telmateia*) has stems as thick as a man's finger, the sheaths enlarging upward; is very rare, and only found on the shores of the upper great lakes and north-westward. It is from the fact that it contains so large a quantity of silex, and is consequently much used for polishing, that it derives its name of "scouring rush." The little, common, or field horsetail, as it is variously called, is indigenous to Illinois and New Jersey, but is found on almost every continent, and in every country from Africa to the Arctic zone, and is chiefly distinguished by its alleged poisonous influence on cattle which partake of it, though no tangible proof of its toxic effects has, as yet, been brought to light. One thing is certain—that the plant, when dried, is perfectly innocuous, from the fact that it has frequently been largely mixed, in that condition, with the hay and other food given to horses and other animals. The other species are *E. pratense*, found

in Michigan, Wisconsin, and other northern districts; *E. sylvaticum*, growing in wet, shady places in northern localities; *E. palustre*, prolific in Wisconsin, Niagara River, and other moist localities; *E. limosum*, rather common in marshes and shallow water; *E. laevigatum*, indigenous to dry, clayish soils, and found in Illinois and southward; *E. hyemale*, used for scouring purposes generally, growing on wet banks, and common in northward districts; *E. variegatum*, very rare, and found on shores and river-banks, such as in New Hampshire and Niagara, to Wisconsin northward; *E. scirpoides*, a species peculiar to wooded hillsides from New England to Pennsylvania, Michigan, and northward. Finally, the appropriately-named *E. robustum*, from three to six feet in height, and growing along the river-banks from Ohio to Illinois and southward, is one of the most respectable members of the horsetail family.

**Hors'ford** (EBEN NORTON), M. D., a chemist, b. at Geneseo, N. Y., in 1818; became principal of the Albany Female Academy; studied chemistry in Germany under Baron Liebig; was Rumford professor in Harvard University 1847–63, and one of the founders of the Lawrence Scientific School. He is the author of many scientific papers, and has given much attention to improved methods of making bread.—His wife, MARY (GARDNER), (1824–55), was the author of a volume of poems (1855) and of contributions to periodical literature.

**Hors'ham**, parliamentary borough of England, in Sussex, on the Adar. It has a fine old church and several good educational institutions. Pop. 7831.

**Horsham**, tp. of Montgomery co., Pa. Pop. 1382.

**Hors'ley** (CHARLES EDWARD), son of William, b. at Brompton, near London, Dec. 16, 1824. His general education was conducted at the Kensington grammar school, and for a time his parents tried to check his evident love for music, but a favorable opinion of Mendelssohn, who visited London in 1832, decided the question, and after some years of preliminary study under his father, Dr. Crotch, and other eminent English musicians, young Horsley was placed with the celebrated Moritz Hauptmann, then residing with Spohr at Cassel. Here for three years (1838–41) he had the advantage of thorough theoretical instruction from Hauptmann and the intimacy and advice of Spohr. Before returning home, Horsley passed several months with Mendelssohn in Leipsic, where the great pleasure and usefulness of this part of his education resulted in a lifelong friendship. Horsley returned to London in 1842, where he remained until 1861, when, owing to ill-health, he went to Australia, residing for some years in Melbourne, Victoria, where it may truly be said he created the true taste for music which now exists. In 1871 he returned to England, and in 1872 proceeded to New York, where as organist of St. John's chapel, Trinity parish, he pursued an active course of professional success. His principal works are three oratorios, *David* (1849), *Joseph* (1852), *Giulian* (1860); cantatas, *Concord* (1844), *Entree* (1870), *Bridal Cantata* (1870), besides a large number of symphonies, songs, glees, etc. As a composer, Horsley ranked on an equality with the best men of his time in originality and learning. D. Feb. 27, 1876.

**Horsley** (JOHN CALLCOTT), R. A., eldest son of William, an excellent painter of the modern English school, b. in London Jan. 29, 1816. His great and early love for drawing was observed and fostered by the celebrated painter (Horsley's great-uncle), Sir A. W. Callcott, R. A., and at the age of fourteen the young student entered the drawing academy of Mr. Sorsse, one of the best trainers of juvenile artists, and subsequently was elected a student of the Royal Academy of Arts. Here he gained all the best prizes for drawing, etc., and on the competition for cartoons for the new Houses of Parliament he received a premium of £300 and two commissions for large frescoes in the same building. Since that time his career has had an uninterrupted success. His works, too numerous to mention, command universal attention and very large prices. Mr. Horsley became a Royal Academician in 1865. One of his latest and most admired paintings is a large altar-piece for the chapel of St. Thomas's Hospital in London, a commission ordered by the will of Sir W. Tite, the celebrated English architect. Mr. Horsley resides in London, where he is greatly respected and honored.

**Horsley** (SAMUEL), b. in 1733 at St. Martin's-in-the-Fields, London, studied at the University of Cambridge; was appointed rector of Newington in 1759, bishop of St. David's in 1788, of Rochester in 1793, and of St. Asaph in 1802; and d. at Brighton Oct. 4, 1806. He gave new editions of Apollonius Pergæus (1770) and Newton (1779–80); translated Hæcæ; published *Critical Disquisitions on the Eighteenth Chapter of Isaiah*; and wrote essays on mathematics and the prosody of the Greek and Latin lan-



guages. But his controversy with Dr. Priestley concerning the divinity of Christ, which lasted for several years, attracted most attention. His theological works were collected in 6 vols. in 1816, and published in London.

**Horsley** (WILLIAM), b. at Whitehaven, in Cumberland, England, Nov. 15, 1774. Shortly after his birth the parents removed to London, and at a very early age the boy developed great talents for musical composition. His father's means were inadequate to afford his son a complete artistic education, but the youth possessed sufficient self-reliance to present himself to the distinguished composer, Dr. J. W. Callcott, who, perceiving his talents, took the lad under his protection, made him his assistant at the orphan asylum, and finally gave him his daughter in marriage, Jan. 12, 1813. Mr. Horsley proved himself worthy of such confidence, and almost surpassed his father-in-law in the excellence of his works and the correctness, learning, and effect of his compositions. For learning, his six *Books of Canons* are unrivalled by any similar specimens since Sebastian Bach; as a glee-writer, "By Ceala's Arbor," "See the Chariot at Hand," "Blow, Wind, thou Balm Air," and many others testify in undying beauty to the greatness of this master of the English school of music. Mr. Horsley took the degree of Mus. Bac. Oxon. early in the present century; was organist of the female orphan asylum for fifty years, also of the Charter-house and Belgrave chapels. His house at Kensington was the favorite resort of Mendelssohn, Spohr, Thalberg, and all the great musicians of his day. His eldest daughter married I. K. Brunel, the distinguished engineer. His long life was one of great purity, industry, and benevolence. D. June, 1859.

**Horta**, the largest town of Fayal, one of the Azore Islands, itself sometimes incorrectly called *Fayal*. It has a good trade. Pop. 8419.

**Horten**, town of Norway, on the Gulf of Christiania, the station of the Norwegian fleet, has an arsenal and good shipbuilding yards. Pop. about 5000.

**Hortense** (ÉUGÉNIE DE BEAUCHARNAIS), b. in Paris 1781; d. 1837; was daughter of the French general Alexandre de Beauharnais and of Joséphine Tascher de la Pagerie, who became the wife of Napoleon I. In 1802 she married Louis Bonaparte, afterwards king of Holland, and brother of Napoleon I. She gave him three sons, the youngest being afterwards Napoleon III., b. in 1808. After the fall of the First Empire, Queen Hortense resided usually in her château at Arenenberg, Switzerland. She wrote light poetry and is the author of one song—"Partant pour la Syrie," which under the Third Empire was a kind of national air for the Bonapartists. She is buried by the side of the empress Joséphine at Rueil, a suburb of Paris, near the château of Malmaison. FÉLIX AUGAGNE.

**Hortensius** (QUINTUS), son of L. Hortensius, a praetor of popular character. The son was b. 114 B. C.; made a speech in the forum when nineteen years old which gained the applause of the ablest men of the republic, and at once gave him rank with the ablest advocates of his time; served (91-90 B. C.) in the Social war, in which he became a military tribune; defended the youthful Pompey (86 B. C.), who was accused of the embroilment of public booty; attached himself to the side of Sulla and the aristocrats, and was the ablest advocate at Rome until Cicero arose to distinction; was quaestor B. C. 84; aedile in 76; praetor urbanus 72; unsuccessfully defended Verres against Cicero 70; was consul 69 B. C.; and after this was a prominent opponent of Pompey and a zealous defender of Milo in the quarrel with Clodius. Cicero was never a very hearty friend of Hortensius, whom he seems to have suspected unjustly of evil designs. The moral character of Hortensius was not altogether admirable. He was unscrupulous as to the means by which his successes were attained, and his private life was exceedingly luxurious, if not immoral; but his nature was kindly and generous, and he had many friends and few enemies.

**Horticulture** [Lat. *hortus*, a "garden," and *cultura*, "attendance," "care"], the management of the garden, the cultivation of a smaller area of land than a farm or field. Horticulture may be divided into **FRUIT-CULTURE** (which see), or the cultivation of flowers for profit, use, or ornament, and kitchen and market gardening; or the production of vegetables too perishable to form part of the staple crops of agriculture, and hence either raised in small quantities for the supply of a single family, or else grown as the product of a special branch of farming near large towns, where there is a ready market and where manures are to be had in abundance. **LANDSCAPE GARDENING** and **FRUIT-CULTURE** (which see), and the care of botanic gardens, form no part of general horticulture (except in the case of small fruits and dwarfed trees). Market-gardening is separated from agriculture by no definite line. What is

called *truck-farming* in the U. S. is market-gardening upon a large scale, and is a department of agriculture. For market-gardening the first essentials are abundant fertilizers (intelligently applied) and an unfailing supply of well-directed labor. The work of market-gardening is not heavy, but it is wearisome and incessant. Almost any soil can be made to grow vegetables, but a very light soil will usually afford but small profits, if any; and a very heavy soil requires thorough and expensive underdraining, and even then is harder to work and does not afford so early crops as some others. A good exposure to the sun and protection from heavy winds by hills, forests, or screens of trees are very desirable. It is ordinarily best for the market-gardener to raise a succession of products, the spinach, asparagus, and rhubarb of early spring and the growths of early summer, etc. following each other in such a way that there is something to sell throughout the season. Frequently, two crops may be raised from the same ground in a single year. Many early crops are greatly forwarded by the proper use of hot-beds and cold-frames. In the application of fertilizers regard should be had to the chemical constitution of the plant to be raised; and the same consideration ought to govern the rotation of crops. Success in market-gardening depends largely upon tact and skill in buying and selling, and upon buying and selling at the right time. Two days may make a difference of 50 per cent. in the prices of early products; hence the need of promptness and energy. The bulk of a crop is often sold at a small margin above cost; hence the need of economy and prudence. Two other most important things are the use of the best seeds of the best varieties, and fair dealing with marketmen and jobbers, for of two market-gardeners one may sell his goods at a fair price even when the market is dull, while the other cannot sell his at any price, because the latter does not supply products of uniform quality; his berries do not "grow bigger downward through the box." This principle holds good in every department of trade, but in no business is it so important as in the one we are considering. (See HENDERSON, *Gardening for Profit and Practical Horticulture*; QUINN, *Money in the Garden*.)

Horticulture has thriven from the earliest ages and in every country that has had any claim to be called civilized. In Japan, China, India, Persia, Rome, Egypt, Palestine, Assyria, Chaldea, from the earliest times, great attention was paid to gardens. At the very first man was put "into the garden of Eden to dress it and to keep it." Most elaborate and interesting representations of gardens exist on the monuments of Egypt and Assyria. The Old Testament Scriptures abound in references to gardens, and in the literature of the East gardens are still a favorite theme. The *Gildesten* ("Rose-Garden") and the *Bostan* ("Fruit Garden") of Saadi are names which illustrate the Oriental fondness for gardens. The hanging gardens of Babylon and the floating gardens of Cashmere and Mexico may be noticed. Hallowed associations surround the forever memorable garden of Gethsemane. The gardens of Alcinoüs and those of the Hesperides are a part of the traditions of the heroic age. The Greeks, says Plutarch, sometimes planted violets and roses among the onions and leeks. Of the Roman gardens we have full accounts. Floriculture, kitchen-gardening, landscape-gardening, and topiary work were carried by them to a high perfection. They had hot-houses and conservatories also. In Charlemagne's time, when gardening was one of the lost arts, the imperial edict commanded every man who could do so to have a garden, and the very plants to be grown were named. Among others, house-leek was to be set upon every roof; and it is believed that the geographical range of several herbs was greatly widened by the decree. The Saracens brought the love of horticulture into Spain, France, and Sicily; and in later times every monastery had its well-kept garth. Italy and the Low Countries especially excelled in gardening. The Dutch delighted in straight lines, clean culture, and topiary work. The Italian taste was more natural. In still later times the Scotch have excelled as gardeners, and at present they take the first place in this department of industry.

CHARLES W. GREENE.

**Horton**, tp. of Elk co., Pa. Pop. 641.

**Hortonia**, tp. of Outagamie co., Wis. Pop. 1080.

**Horus** [Gr. Ἥρος; Egyptian, *Hr*, the "day"], the name of several Egyptian gods, of which the principal was the son of Osiris and Isis. He was the sun god, and is often confounded with Harpocrates, who was called the Younger Horus; also with Harpocris, the hawk-headed god, called the Elder Horus. He is also confounded with the god Ra and with the Greek Apollo, whence Edison was called Apollinopolis Magna, since it was a great seat of the worship of Horus.

**Horvath** (MILYALY), b. Oct. 30, 1829, at Szentes, Hungary; studied theology at the Seminary of Waiizen 1829;



took orders in 1830; and was in 1844 appointed professor in Vienna of the Hungarian language and literature. During the Hungarian revolution in 1848 he was made bishop of Csanád and minister of public education and worship. After the revolution he lived alternately in France, Italy, and Switzerland until 1866, when he was permitted to return to Hungary. His principal work is a general *History of Hungary* (1 vols., 1842-16), but he has also treated of several periods of Hungarian history separately.

**Hos'ack** (DAVID), M. D., LL.D., F. R. S., b. in New York Aug. 31, 1769; graduated at New Jersey College in 1789, and in 1791 received his medical degree at Philadelphia; studied in Europe until 1794; became in 1795 professor of botany in Columbia College; was (1797-1807) professor of materia medica; professor of materia medica and midwifery in the College of Physicians and Surgeons 1807-11; after which he held other professorships there until 1826. After this he was until 1830 connected with Rutgers Medical College. He was one of the first mineralogists and botanists of his time, founded the first botanic garden in America, and was the author of several medical treatises which long had a standard value. He also wrote a *Life of Dr. Hugh Williamson* (1820) and one of DeWitt Clinton (1829). D. Dec. 23, 1835.

**Hosan'na**, a Hebrew term of blessing, congratulation, or well-wishing, adopted into use by the Christian Church. The name is also given to one of the subdivisions of musical masses, "Holy, holy, holy, Lord God of Sabaoth; heaven and earth are full of thy glory. Hosanna in the highest."

**Hose'a** [Heb. *Hoshea*, "deliverance"], the **Ose'e** [Ose'e, 'Osee] of the LXX., Vulgate, and New Testament, the first in order of arrangement, but apparently third in order of time, of the twelve minor prophets. His prophetic activity covers a period of about 60 years—say from 784 to 724 B. C. He belonged to the northern kingdom of Israel, and set himself against the idolatrous apostasy which had seemed almost essential in order to political independence. In style he is the obscurest of all the Hebrew prophets. In the Roman martyrology he is commemorated with Illegai on the 4th of July. R. D. HITCHCOCK.

**Hoshe'a** (another form of *Hoshea*), the last king of Israel, was a son of Elah; conspired against his predecessor, Pekah, and put him to death 737 B. C.; became established on the throne after eight years of war. His reign was much disturbed by civil commotions and by the invasions of the Assyrians. He very probably perished at the destruction of Samaria (720 B. C.). His name occurs on Assyrian monuments.

**Ho'siery** [from *hose*, "stockings"], in a large sense, includes knit goods of all kinds. Stockings were originally made of cloth and woven goods. The ancient Greeks employed stockings of felt. The Romans, we are told, used no stockings until after Hadrian's time. The Anglo-Saxons used them, and so did the people of mediæval Europe. Trunk-hose were a combination of stockings and breeches. The art of knitting is reputed to be a Scottish invention of the sixteenth century, and St. Fiacre, a Scotch-Irish saint, was made patron of a French stocking-weavers' guild in 1527. It is almost certain, however, that the art of knitting is older than this. Hosiery is now largely manufactured in the U. S. by machinery. Some of the most important improvements in knitting-machines are of American origin.

**Ho'sius** [Gr. Ὁσιος, "holy"], b. about 257 A. D., perhaps in Spain or perhaps in Egypt; became bishop of Cordova about 296; took part in the Council of Ilberi (about 300 A. D.); was persecuted under Diocletian and Maximian; was highly honored for integrity and faithfulness; was sent by Constantine the Great to Alexandria to conciliate the contending parties of Alexander the bishop and of Arius; was present at the Council of Nice (325 A. D.), and was, according to some writers, its president; induced Constantine to ratify the Nicene Creed 325; was at the Council of Sardica 347, and perhaps its president; was directed by Constantine in 355 to write against Athanasius, but refused; was compelled by the emperor to attend the Council of Sirmium, and after wearisome persecution the aged Hosius felt compelled to submit in part to the imperial will, and to take the communion with Arians, but he would not condemn Athanasius. In 357 he was permitted to return to Cordova, where he d. in 358 A. D.

**Hos'kins, or Hoskyns** (JOHN), b. in Herefordshire; was educated at Oxford; became a fellow of New College, sergeant-at-law, and a justice itinerant in Wales; was the instructor of Ben Jonson. Author of the *Art of Memory*, of a Greek lexicon, unfinished, of legal writings, and of Latin and English epigrams. D. 1638.—Another JOHN

HOSKINS, an Oxonian, an author, and a prebendary of Hereford, was a contemporary of the foregoing, and is stated to have been his brother.

**Hos'mer** (HARRIET G.), b. at Watertown, Mass., Oct. 9, 1830. Her mother d. when she was young, and her father, anxious for the health of his only child, insisted upon outdoor exercise and athletic sports. She became expert in rowing, riding, and skating; had the spirit of adventure; travelled alone in the West as far as the Falls of St. Anthony; visited the Dakota Indians, and on her return was distinguished by originality of mind and independence of manner. She took anatomical lessons in St. Louis, and both worked in clay and chiselled marble at home. In 1852 she went to Rome with her father and Miss Charlotte Cushman; was received into Gibson's studio; studied hard under him, and soon won her way to public favor. Her statue of *Puck*, sent to Boston in 1856, made her reputation in her own country; it was frequently copied. Her *Beatrice Cenci* and *Zenobia*, both full-length statues, the latter of colossal size, were more ambitious works, but of less originality. She exhibited at the Paris Exposition in 1867 a statue called *The Sleeping Faun*. The legislature of Missouri honored Miss Hosmer with a commission to make a statue of Thomas H. Benton. With the exception of a brief visit to her native country, the artist has remained in Rome since her first visit. O. B. FROTHINGHAM.

**Hosmer** (WILLIAM HENRY CUYLER), A. M., b. at Avon, N. Y., May 25, 1814; was educated at Genesee College; became a lawyer of Avon and a master in chancery; removed in 1854 to New York, and became a custom-house officer. Author of *The Fall of Tecumseh* (1830), *Yonondago* (1844), *The Months, Bird-Nests, Legends of the Senecas, Indian Traditions and Songs* 1850, etc.; *Complete Practical Works* (2 vols., 1853). D. at Avon, N. Y., May 23, 1877.

**Hos'pice** [Fr. for "hospital"], the name given to the houses maintained by ecclesiastics for the relief of travellers passing over the Alps in stormy weather. That of the Great St. Bernard, founded in 962 and inhabited by Augustinian monks, is the most celebrated. Others are kept up at the principal passes of the Alps. The name is also applied to other charitable institutions, such as the former asylum upon the Abendberg, Switzerland, for the treatment of cretins, and various establishments for those suffering with mental disease.

**Hospin'ian** (RUDOLPH), b. at Altdorf Nov. 7, 1547; studied at Marburg and Heidelberg; held different positions in the Reformed Church of his native country, and d. at Zurich Mar. 11, 1626. The most prominent of his works are—*De Monachis* (1588), *De Festis Christianorum* (1595), *De Festis Judæorum et Eucharistia* (1592), *Concordia Discors* (1609), which occasioned much controversy with the German Lutherans; and *Historia Sacramentaria* (1598-1602). A collected edition of his works was published in 7 vols. fol. at Geneva in 1681.

**Hos'pital** [from the Latin *hospitālis*, "pertaining to guests or strangers;" Fr. *hôpital*; Ger. *Krankenhaus*, *Lazareth*; It. *ospedale*]. Hospitals for the sick poor appear to have been established in India, through the influence of Buddhist priests, about 220 B. C. They are, however, more especially characteristic of Christianity, and were recognized institutions in the fourth century. (For account of the first hospitals, properly so called, consult H. HÄSER, *Dissertatione de cura gratiorum publica a Christianis Orinda*, Gryphiswald, 1856.)

Hospitals, as now existing, are institutions intended primarily for the care of the sick and wounded; secondarily, to furnish means of instruction to students of medicine, to serve as monuments or memorials of their founders, or as a means of support or excuse for the existence of a society, charitable organization, or medical school. The general principles of hospital location, arrangement, and construction, with reference to the requirements of the sick and to facility of administration, may be considered as fairly established; but while, theoretically, these requirements outweigh all others, it will usually be found in practice that for any proposed hospital there will be something in the site, limit of cost, or purpose of the builder which will require a modification of what may be termed the standard plan; and that in many cases the so-called secondary objects will be really, though not perhaps avowedly, of primary importance. Hospitals may be designed to receive patients of both sexes and all ages, or may be more or less specialized, as for women, for the insane, for contagious diseases, etc.

In some respects the simplest form of hospital is that intended for adult males only, as in the military and naval service; and it is now believed that in these, in which the secondary objects above referred to need not be considered, the buildings should be temporary in character—that is, not intended to last more than ten or twelve years.

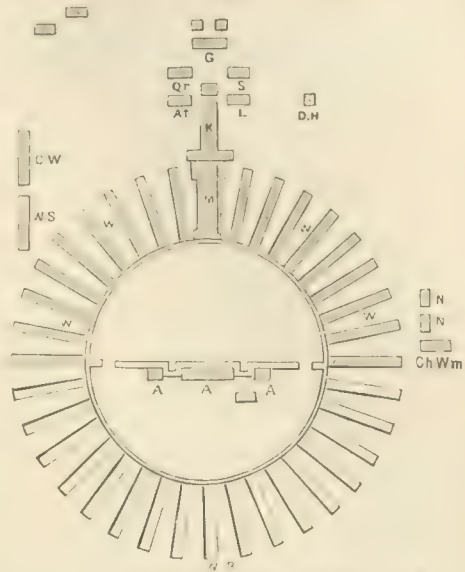


Such hospitals are found, by experience, to be more favorable to the recovery of the sick and wounded, because of the less prevalence of erysipelas, hospital gangrene, and other septicemic diseases, than the much more ornamental, pretentious, and costly structures which are usually desired by societies, municipalities, or private donors. In a financial point of view, the temporary hospitals are the most economical, for, as has been elsewhere shown,\* if the money required to construct a stone or elaborately ornamented brick hospital were divided into two equal parts, one half being used to put up frame buildings of the same capacity, and the other half being invested at 6 per cent., the income from the latter sum would suffice to furnish a new hospital every twelve years for succeeding generations.

The true principles of hospital construction, as first established by a commission of the French Academy of Sciences in 1778, and subsequently elaborated as to details by Nightingale, Gapon, Oppert, and others, may be briefly stated as follows: The important part of the hospital is the ward, which should be separated from the administrative part of the institution, and should be arranged in pavilions, preferably of one story, and never more than two, in height. These pavilion wards should be about 25 feet wide, 14 feet high, and of sufficient length to allow not less than 100 square feet per bed. In warm climates the height should be 15 feet and the floor space per bed 120 square feet. Not more than 32 beds should be placed in each ward. The windows should be opposite each other, and reach from within three feet of the floor to one foot from the ceiling; they should occupy one-third of the wall-space, have a nearly E. and W. exposure, and in cold climates should be double sashed or of plate-glass. The floors and other woodwork should be of hard pine or oak, with impervious joints, waxed, oiled, or permeated with paraffine, and polished. It is usually stated that the walls should be made as smooth and non-absorptive as possible by the use of parian cement, paraffine, silicates, oil-paint, etc. It has been even proposed to make them of glass. The advantage of this is doubtful. An ordinary plastered wall absorbs gases and organic compounds to a very considerable extent, and they are then oxidized and reduced to more stable compounds, much as sewage is affected in a running stream, and the depurative and quasi-respiratory powers of such walls should not be overlooked. Making them impermeable is somewhat like varnishing an animal's skin, and there is no satisfactory evidence as to its good effects. For a permanent hospital it might be best to construct the walls with the ordinary hard finish—to have, as suggested by Dr. George Derby, one ward always empty and open to the outer air—each ward being thus emptied and freshened in succession—and to have the old plaster torn out and the walls fresh plastered once in five or six years.

The great object is to have the ward supplied with plenty of light and fresh air, and to keep it at a proper temperature. The minimum amount of fresh air to be furnished is 3000 cubic feet of air per hour per man, and under some circumstances it may be desirable to double this amount. The modes of effecting this will be discussed in the article VENTILATION. The ventilation of each ward, water-closet, bath-room, and kitchen should be entirely independent of all other rooms, halls, or parts of the building. The kitchen and laundry should be either in a separate building, or in the upper story of the administrative building; they should never be put beneath the wards or offices. The various offices required for the administrative department are necessarily much alike, whether the institution be large or

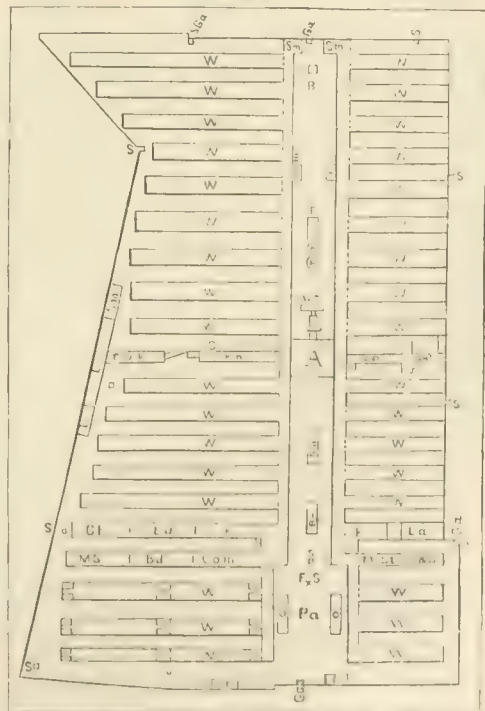
FIG. 2.



Plan of the Hicks Hospital, near Baltimore, Md.

A, administration buildings; M, mess or dining-room; K, kitchen and laundry; Q, quartermaster's quarters; S, stores; G, guard house; W, wards; Ch W M, chief wardmaster's quarters; N, nurses' quarters; D H, dead-house; W S, workshop; C W, ward for contagious diseases; N B, The light portion (N B) not built.

FIG. 3.



Ground-plan of U. S. Army General Hospital, West Philadelphia, Pa. 1882.

A, administration building; O, officers' quarters; W, wards; K, kitchens; L D K, extra-hot kitchen; L L, laundry; M, mess-room; M St, medical store-room; C, corridor; Bd, bath; St, stables; B, boiler and boiler-room; L, engineers' quarters; W C, water-closets; L, laboratory; L, lectures and library; S, sentry; G, gating; G, guard; G B, garage; G H, house; P, printing-office; C and D, closets and closets; mess-room; T, tanks; St, stables and stalls; I S, flag staff; Pa, parade.

Net Capacity beds, min. 2500, max. 3124. This includes guard barracks, 132.

The wards are each 14 feet wide, 13 ft. 4 in. high at the wall and 19 feet at the peak. The wardmaster's and sentry's rooms in front, and the bath-rooms and water-closets in the rear, take 20 feet from each ward. The wards are ventilated at the ridge. The central or administrative building, the storehouse, extra-

FIG. 1.



Regulation plan for a U. S. post hospital of 24 beds. A, attendants' room; B, bath-room; C, closets; D, dormitory; E, earth or water closets; H, hall; K, kitchen; M, mess-room; N, nurse; P, parade; S, stores; St, steward; V, veranda; W, ward; IW, isolation ward.

\* Circular No. 4, War Department, Surgeon-General's Office, Washington, 1870; *Report on Barracks and Hospitals*, pp. xxii, xxiii.

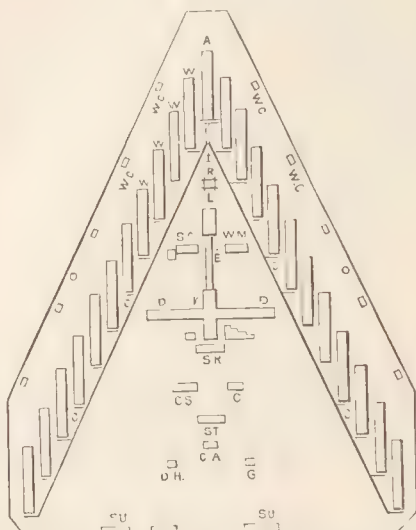


dict kitchen, and smoking building, are each two stories high. The second story of the first named furnishes quarters for the officers; that of the store-room and extra-diet kitchen for the Sisters of Charity, clerks, druggists, and hospital attendants.

small; hence for small hospitals, such as those for military posts in the U. S. army, which usually contain from 12 to 24 beds, the ward becomes a comparatively small part of the building. (Fig. 1.)

When a large number of patients are to be provided for, the pavilions may be arranged to radiate from a common centre, or from H-shaped corridors, or *en echelon* in a triangle. These plans are illustrated by Figs. 2, 3, 4:

FIG. 4.



Plan of Lincoln Hospital, Washington, D. C.

A, administration building; W, wards; L, laundry; D, dining-room; K, principal kitchen; WM, chief wardmaster's quarters; S, Sisters of Charity's quarters; E, steam-engine; S.R., store-room; W.C., water-closets; C, chapel; St, stable; G, guard-house; D.H., dead-house; Su, surgeons' quarters; C, corridor (covered); R, reservoir; CS, cow-stable; CA, colored attendants.

The three large hospitals above figured were all American army hospitals in use during the late war. Many other ways of arranging the pavilions can be easily devised to suit locality, direction of prevailing winds, etc.

Besides the care of the sick, it is necessary in many hospitals to provide for the supervision and restraint of the vicious. A considerable portion of the applicants for hospital relief in our large cities are suffering from the effects of lust and drink, and if opportunity be allowed will perpetuate or aggravate their maladies by repeating the original cause. The proper restraint of patients without giving the building a gloomy and prison-like aspect is best secured by placing the hospital in such a location that access to means of dissipation shall be as difficult as possible. On this account a small island is a very desirable locality, and especially so in seaport towns and for marine hospitals. Floating temporary hospitals also have many advantages at such points. Whatever be the plan of the hospital, the most important thing is that it shall be under the constant hygienic supervision and management of a competent man who should be a physician. A hospital under non-professional superintendence, or which is to rely on the occasional advice of its attending physicians, who have other interests, will almost surely deteriorate, and the temporary barrack-plan is specially useful in such cases, as making the evil results less permanent and costly.

(For details on this subject consult OPPERT, *Hospitals, Infirmeries, and Dispensaries* (London, 1867), in which is given, pp. xiii.-xvi., a good bibliography; HUSON, *Étude sur les Hôpitaux* (Paris, 1862); NIGHTINGALE, *Notes on Hospitals* (London, 1868, 3d ed.); ESSÉ, *Die Krankenhäuser* (2d ed., Berlin, 1868); DEMOGET (A.), *Étude sur la construction des ambulances temporaires, sous forme de Barricades* (Paris, 1871); Report of the Royal Commission (SUTHERLAND and GALTON) appointed for Improving the Condition of Hospitals and Barracks (London, 1863); GALTON, *Report Descriptive of the Herbert Hospital* (London, 1863); GALTON, *An Address on the General Principles which should be Observed in the Construction of Hospitals* (London, 1869); SMITH (STEPHEN), *Principles of Hospital Construction* (New York, 1866); Report on Barracks and Hospitals, Circular 4, Surgeon-General's Office (Washington, 1870).

JOHN S. BILLINGS, M. D.

**Hos'pitallers**, a name given to the members of various fraternities and sisterhoods of the Roman Catholic Church, who join to the vows of perpetual poverty, chastity, and obedience, another which binds them to serve the poor and sick in hospitals. Some knightly orders also took the monastic and hospital vows—such as the Knights of St. John of Jerusalem, Knights of the Holy Sepulchre, and the Teutonic Knights; but in the case of the first-mentioned order, at least, it appears that the *hospitals* they founded were rather in the nature of *hostels* or public inns. There have been twelve or more monastic congregations whose members were popularly called Hospitaliers, but the term more generally denotes the Knights of St. John of Jerusalem. (See ST. JOHN OF JERUSALEM, KNIGHTS OF.)

**Hos'podar** [Slavic], a former title of the governors of Wallachia and Moldavia under the Turks. The term signifies "master." The same officers were also called waiwodes or wojewodes—i. e. dukes or leaders. The czar of Russia is popularly called *hossodar* or *gospodar*, forms of "hospodar;" and equivalent titles were employed by Polish kings and Lithuanian princes in former days.

**Host** [Lat. *hostia*, "victim," "sacrifice"], in the Roman Catholic Church, the consecrated Eucharistic bread, believed by that Church to be the veritable body of the Lord Jesus Christ. As such, it is elevated by the priest at the mass for the adoration of the people. It is a circular wafer or cake of unleavened bread, having various emblematic figures, made of the finest wheat flour. It is borne upon a plate called the paten, broken by the priest over the chalice, and distributed to the laity.

**Hos'tages** are persons placed under the control of the government of a state as pledges of the faithful fulfilment of a treaty. The same custom has taken place when a captured vessel is allowed to go on its way upon what is called a ransom contract, and also in other stipulations between parties at war. The practice is going out of use in the first-mentioned case, the last instance known to the writer of this article having been the detention of two British noblemen on parole at Paris after the peace of Aix-la-Chapelle in 1748, who were, in fact, to remain in this condition until Cape Breton should be restored to France.

T. D. WOOLSEY.

**Ho'strup** (JENS CHRISTIAN), b. in 1819; studied theology at the University of Copenhagen, and took orders in 1854. While yet a young man he became the favorite of the Danish people on account of his comedies—*Gjenboerne*, *Et Eventyr paa Fjeldsiden*, *Master og Lærling*, etc.—which give a fresh, original, and exquisitely humorous picture of the Danish middle classes. After taking orders he ceased to write for the theatre. "Life has become too grave an affair to me; I have forgotten to laugh."

**Hot-air Engine**, a prime mover in which the motive-power is derived from the expansion of atmospheric air by heat. Numerous inventions of this kind have been produced, of which the earliest to excite interest was that of the Rev. Dr. Stirling, now of Galston, Ayrshire, in Scotland, patented in 1816; though earlier air engines were constructed by Sir George Cayley and others which seem to have been very simple and were unsuccessful. An improvement on Stirling's engine was suggested, later, by his brother, Mr. James Stirling; and this was patented in 1827, and again, with further improvements, in 1840. Among more recent inventions of this class which have been more or less successful, may be mentioned those of Ericsson, Wilcox, Roper and Shaw, all of this country, and those of Lauberau and Belou of France. At the Vienna Exposition of 1873 there was exhibited, by Friedrich Siemens, of Berlin, under the name of a *calorimotor*, a working model of a hot-air engine on quite a novel plan; more remarkable however for its ingenuity than for promise of utility. It would be impossible within the limits of an article like the present, to give a detailed description of these various forms of mechanism. Those who desire such particulars, are referred to the *Report on the Machinery and Processes of the Industrial Arts*, etc. in the Paris Exposition of 1867, by the present writer. In what follows, it is proposed to give only their characteristic differences, and to set forth certain general principles relating to this mode of generating motive power.

All forms of the hot-air engine have certain advantages in common, and all are subject to certain disadvantages which are inseparable from the system. It is an advantage that they require no boiler, and are exempt from the dangers which arise from that source. Could air be employed at a pressure equal to that of steam, it would be an important advantage to be free from the great weight which the use of the boiler necessitates, and unembarrassed by its bulk. As yet, however, this condition has not been realized, and hence the dimensions of the working parts of air-engines are necessarily so much more considerable than



those of steam-engines of corresponding power, as to render the gain in this direction, if there is any, unimportant. It is, however, an advantage that air-engines are cheaper of construction than those driven by steam, and that their management is easier, and requires less constant watchfulness. It has generally been claimed for them that they economize fuel. Theory might seem to justify this claim, but in practice it has not been generally sustained. The disadvantages of air-engines consist in the difficulty of heating and cooling the air employed, with the rapidity necessary to secure the best performance; and in the fact that the supply of the cylinder consumes more than half the power developed. To this it may be added, that, while the efficiency of the machine depends upon the difference between the maximum and minimum temperatures, there are certain practical limits which neither of these temperatures can transgress.

Air-engines may be arranged in two classes, of which the first embraces those which draw their supplies directly from the atmosphere, and discharge them into the atmosphere again after they have produced their effect; and the second, those which employ continually the same air, which is alternately heated and cooled but is not allowed to escape. Stirling's first engine belonged to the first of these classes; his later forms, to the second. To the first also belong Ericsson's, Wilcox's, Roper's, Shaw's and Belou's; to the second, Lauberau's. The second class have the advantage that they admit the use of high pressures; but this is attended with the disadvantage that they require refrigerating appliances, which, with the first, are wholly unnecessary.

In each of these classes a subordinate classification may be made, according as the air is heated in the cylinder in which it performs its work, or in a separate chamber. The plan of the Ericsson engine is the first of these. That of Roper's, Shaw's and Belou's, the second. In Lauberau's, which does not discharge the air, the heat is applied in one cylinder, and the work is done in another. In this class of engines the arrangements admit of a variety of modifications. The heater and the refrigerator, for example, may be both independent of the working cylinder, and of each other; presenting an analogy to the boiler and condenser of the steam-engine; or the refrigerator only may be separate; or finally, as in the engine of Lauberau, the heating and refrigeration may take place at the opposite extremities of the same vessel, the air being driven from one end to the other alternately by means of a plunger.

It is true of these, as of all engines operated by heat, that there is a theoretic limit to the economy of which they are capable—that is to say, whatever be the amount of heat received from the source, a fraction only of this can under any circumstances be converted into mechanical force; and theory enables us to state definitely the maximum value which this fraction can have. This maximum depends on the extreme temperatures at the command of the engineer. Suppose the highest of these temperatures, as referred to the absolute zero (a point  $273^{\circ}$  C. below the freezing-point of water) to be represented by  $T$ , and the lowest, referred to the same zero, by  $T'$ ; then if  $Q$  be the entire quantity of heat imparted to the air, steam, or vapor operating any thermo-dynamic engine; and  $U$ , the portion of that quantity capable of being converted into useful effect, it is true in all cases that

$$\frac{U}{Q} = \frac{T - T'}{T}$$

This principle we take at present for granted. For the demonstration of its truth see *Thermodynamics*. It follows that, in proportion as the interval between  $T$  and  $T'$  is increased, the machine will work with correspondingly greater economy. This interval can be increased by increasing  $T$ , or by diminishing  $T'$ , or by doing both at once. It is impracticable, however, to employ a refrigerator having a temperature below that of the weather. We must therefore take for a mean lower limit about  $17^{\circ}$  C., or  $62.5^{\circ}$  F., a temperature which, referred to the absolute zero, is equal to  $290^{\circ}$  C. On the other hand, a practical upper limit is imposed by the consideration that a red heat is reached for solids at about  $650^{\circ}$  C., which is  $923^{\circ}$  C. above the absolute zero. This limit could not be safely approached; but supposing it to be actually attained, the economical coefficient would be

$$\frac{923 - 290}{923} = 0.684,$$

or a little more than two-thirds of the heat taken up by the air. Probably no hot-air engine has yet been actually employed in which the temperature has been carried much above  $300^{\circ}$  C. With a maximum temperature of  $407^{\circ}$  C.,  $580^{\circ}$  C. above the absolute zero, the economical coefficient would be

$$\frac{580 - 290}{580} = 0.50,$$

which would show a utilization of one-half the heat taken up. The first Ericsson engine was designed to work at a maximum temperature of about  $450^{\circ}$  F. =  $232^{\circ}$  C. =  $506^{\circ}$  above the absolute zero. The limit of economy realizable by it, had it been successful, and provided the air could have been made to pass through the complete cycle of changes of temperature and pressure embraced in the theory, would have been

$$\frac{505 - 290}{505} = 0.426.$$

But in point of fact, no hot-air engine fulfils, or can fulfil completely, the theoretic conditions. In order to do so it would be necessary that the air should leave the working cylinder at the minimum temperature; that is to say, at a temperature as low as that of the supply; or else that, by some contrivance, the excess of heat which it retains should be transferred to the supply on its way to the working cylinder. As the first of these conditions—that is to say, the expansion of the air, in working, sufficiently to reduce the temperature to the minimum—is practically unrealizable, it is the second which inventors have in many instances sought to secure. In order to accomplish this, the emergent air has, in some cases, been made to pass through successive sheets of wire gauze, or between thin sheets of metal, or has been in some other manner brought into contact with metallic surfaces of large extent in proportion to the weight of the mass, in order that the excess of heat being transferred to these might be afterwards taken up by the cold air of the supply as it enters. The first of the expedients here mentioned was employed by Ericsson, and the second in the successive inventions of Stirling. In Shaw's engine, the hot air escapes through a cluster of thin tubes, while the cold air circulates between them. The term "regenerator" was applied by Ericsson to this contrivance, as applied to his original engine, and this term has come into general use. The regenerator is applicable to any form of engine, but it is not employed in all. The theoretic advantage is considerable, but in practice is not fully realized; and it is attended with the disadvantage of sensibly increasing the amount of the passive resistances of the machine. In fact, in order that the regenerator, suppose it for instance to be a succession of wire gauze sheets, should entirely absorb the excess of heat of the escaping air, the number of sheets should be very considerable. It is easily seen that if this number were quite unlimited, there would be somewhere a point at which the air would have no longer any heat to impart; its temperature being sensibly reduced to that of the metal. From this point backward to the cylinder from which it was discharged, the successive sheets of wire gauze would rise in temperature, and the last one would have sensibly the same temperature as that with which the air emerged. The number of sheets which would be required effectually to absorb the heat would depend for a given excess of temperature upon the closeness of the meshes, and in any case must be considerable. The obstruction which every such contrivance necessarily presents to the free passage of the air, creates a resistance which makes its presence objectionable, and which may go far to neutralize the advantage which it is designed to secure. By diminishing the number of the sheets and the closeness of the meshes, the resistance is reduced, but the absorption of the heat is proportionally less complete. Practically, where the regenerator continues to be used, a middle course is taken; the economy is not wholly realized, and the obstruction to circulation is not very serious. This is the case in the engine of Shaw, in which the regenerator consists, as above remarked, of a series of tubes. It is to be considered, however, that the loss of heat suffered in operating engines driven by heated air or steam is by no means limited to the fraction, large as it is, of the heat which, after being actually imparted to the medium, is unavailable for work. If this were true, the cost of working such engines would fall to a very small proportion of what it actually is. It is unfortunately the case that by far the largest source of loss is to be found in the escape of a great part of the heat which the combustible develops, in other ways than in raising the temperature of the elastic medium which does the work. And the improvement of all these engines, so far as economy is concerned, is to be sought in such forms of furnace and such modes of applying heat as may reduce what is now the sheer waste of the chimneys or of the radiating surfaces, rather than in the endeavor to push to extremes the temperatures employed in the working cylinder. It is to be observed that the difficulty of guarding against losses by conduction and radiation is enormously increased when excessive temperatures are employed; and also that such temperatures decompose lubricants, destroy packing, and, by the large expansion which they give to metals, loosen joints, and impair the strength of the whole structure. Since the largest room for economy is evidently in



the direction of preventing the useless waste at present occurring, the effort should be to keep the maximum temperature as low, and not to push it as high, as possible.

In passing to particular forms of hot-air engine, a few words only can be given to each.

**Ericsson's Engine.**—This engine is more generally known in this country than any other of its class. In its present form it differs essentially from that which it had when constructed on a large scale, about the year 1860, to be employed as the motive power of a sea-going vessel; or, more properly, the present one is a different machine. In the original model a working cylinder was placed immediately over the fire of the furnace, and a cylinder of supply of about two-thirds the capacity was placed immediately over that. The engine was single-acting, the working cylinders were quite open, and the working pistons were of great bulk and formed of non-conducting substances, being designed to fill the cylinders when at the point of the lowest depression, so as to prevent their cooling by contact with the air of the atmosphere. The bottom of each cylinder was arched, forming a dome for a furnace, and the piston received at its lower surface a corresponding figure. The pistons of the supply cylinder and working cylinder were firmly connected, and had therefore an equal length of stroke. At the descent of the piston, the supply cylinder was filled by aspiration from the atmosphere; and in the ascent, the charge, after undergoing compression, was driven into a reservoir, from which it passed subsequently into the working cylinder. The upward stroke being completed, the heated air escaped through a regenerator formed of wire gauze, depositing there its excess of heat; and the new charge from the reservoir, passing to the working cylinder through the same regenerator, re-absorbed this heat, and thus entered the heating-chamber already at an elevated temperature. This engine performed very well in practice, so far as its performance was merely a question of mechanics. But it failed practically, because the heating arrangements were inadequate to the demand made upon them. Mr. Ericsson did not expect to be dependent on his furnaces for the supply of more than a moderate fraction of the heat which each successive charge of air was to receive. He supposed that the regenerators would serve to transfer so large a quantity from each charge to the next, that it would be necessary to provide for little more than the always inevitable loss by mere radiation; but this anticipation was not realized. Superadded to this, however, there was a further cause of failure, arising from the difficulty of heating air at all by means of a furnace. Radiant heat produces scarcely any impression upon air. The inventors of all the air engines which have been to any degree successful have recognized the necessity of applying their heat as much as possible by conduction and actual contact. Mr. Ericsson himself is no exception, as his more recent and successful invention shows. This machine possesses a special interest, from the fact that it was the first of its class to secure for itself a recognized place in the industrial world as a valuable aid to productive power.

The engine at present known as the Ericsson is far less simple to appearance than the one above described. It has a horizontal cylinder within which at one end, and occupying about two-fifths of its length, is the furnace, also cylindrical, between which and the surrounding cylinder is an annular space. Within the cylinder there are two pistons, the inner, or that nearest the furnace, acting as a supply piston, and the other as the driving piston. The rods of the supply piston pass through the driving piston. When, by the action of the mechanism, the distance between the two pistons is increased, the supply is received by inspiration through valves opening inward in the driving piston. When this distance is diminished, the charge is driven by compression through valves in the supply piston opening towards the furnace. But these valves open on the outside of a sheet-iron cylindrical bell, carried by the supply piston, which enters into the annular space above mentioned between the furnace wall and the external cylinder, and therefore the air in passing them is obliged to pass down outside this bell to the extremity of the annular space, and to return inside the bell, in a thin annular sheet in close contact with the furnace wall. The working power is derived from the heat thus imparted. This power is effective through not quite half the revolution. Through the remainder it is zero, or the resistances predominate. Hence, a heavy fly-wheel is necessary.

As to the economy of this engine, tests were made by Mr. Tresca, sub-director of the *Conservatoire des Arts et Métiers*, of Paris, in 1861, upon a specimen engine of two-horse-power, in which the consumption of coal amounted to 4.10 kilograms (about 9 pounds) per horse power per hour—two or three times that of a good steam-engine. The mean maximum temperature of the heated air did not

exceed 270°, and the expansion of volume was hardly 50 per cent. (1.50).

**Shaw's Engine.**—Of this the principal parts are a furnace, cylindrical in form, of boiler iron, lined with refractory brick; two single-acting cylinders working alternately; and a regenerator, which consists of a chamber filled with tubes similar to those of a tubular boiler, through which the exhaust air escapes. The air is heated in the furnace immediately in contact with the fuel, of which it at the same time supports the combustion. This furnace is accordingly closed air-tight, fuel being supplied when necessary by means of a box or receiver on the top, between which and the interior of the furnace, communication can be opened; the box itself being, in the mean time, tightly closed. From the furnace, the air, along with the gaseous products of combustion, is admitted beneath the pistons of the working cylinders alternately; and after it has performed its function, it is discharged through the tubes of the regenerator into the chimney. The upper portions of the working cylinders are employed to furnish the supply of cold air from the atmosphere. For this purpose each piston is provided with a trunk considerably smaller in diameter than the cylinder; and the annular space between the trunk and the cylinder, being closed in at the top, forms an air pump. As the piston descends, the air of the atmosphere enters this annular space through valves opening inward; and on its ascent this air is forced into the regenerator, where it becomes partially heated by contact with the tubes through which the dilated air is escaping, and thence passes into the furnace. The brick lining of the furnace is double, with a space between the walls; and this space the entering air from the regenerator is obliged to traverse before it reaches the fire. Its temperature, which is already somewhat raised by compression and by contact with the tubes of the regenerator, becomes still more elevated in its passage through this space; and the additional heat which is wanted to bring up the pressure to the point required, is supplied by the fuel. In this engine, the difficulty which impeded the success of most earlier inventions of the kind, viz., that of adequately heating the air, is ingeniously overcome. The heat developed by combustion is necessarily taken up by the air which supports the combustion, and by the gaseous products at the same time generated. Hence it has been found practicable to maintain a pressure under the pistons averaging about an atmosphere. But it must be observed that such a pressure can only be secured by carrying the temperature to a point destructive of lubricants and packing, and liable to cause leaks by unequal expansion.

**Roper's Engine.**—This is very compact and well adapted to small industrial operations. The furnace is a cast-iron cylinder lined with fire-brick. Immediately over the furnace, and formed in the same casting, is the working cylinder, smaller in diameter than the furnace, and open above. The piston rod is kept vertical by means of a guide; and two connecting rods, one on each side of the proper piston-rod, operate balance levers united at their opposite ends by a cross-bar, to the middle of which is attached the connecting rod which turns the crank of the main shaft. The balance levers are pivoted in supports secured to the working cylinder itself, and they carry, also, a pair of rods which operate the piston of the supply cylinder. The supply cylinder is immediately under the working shaft, and is as conveniently near the furnace as practicable, standing upon the same base with it. The furnace is air-tight, and the air supply is forced into it beneath the grate, passing through the fuel, and so upward into the working cylinder. Provision is made to divide the air current so as to allow a part, at pleasure, to enter the furnace above the fuel, for the purpose of regulating the rapidity of combustion, and the temperature of the charge. No provision is made for introducing the fuel while the engine is in operation. Occasional interruptions will therefore occur in order to replenish the fire. In starting the machine it is necessary to turn the fly-wheel for a few revolutions by hand. And it is also necessary that the fire shall be well lighted before the door of the ash-pit is closed.

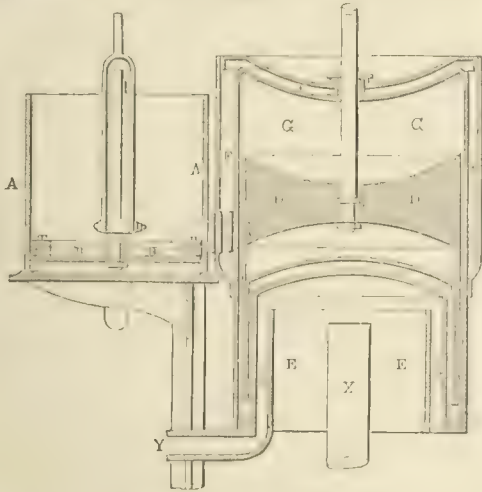
**Wilcox's Engine.**—A hot-air engine under this name was exhibited at the International Exposition of London in 1862. The distinctive peculiarity of this consists in the employment of two working cylinders through which the air successively passes. The furnace is in the lower portion of one of these cylinders, and the supply pump is in the upper chamber of the same cylinder. The engine is further provided with a regenerator of thin metal plates. The air, after being compressed in the supply pump, passes through the regenerator, taking up the heat left there by the last charge of escaping air, and thence into the second working cylinder. In this it produces a partial effect, due to the heat already absorbed, and then enters the first or principal working cylinder, where it receives the heat of the



furnace. The advantage of admitting the supply air to the cylinder which contains the furnace is very considerable, as it tends to prevent that cylinder from being overheated, while it utilizes the heat which would otherwise be injurious.

*Lauberau's Engine.*—In this a certain volume of air is enclosed in a cylinder of metal, in which there is also a large moving plunger, which, by occupying alternately one end and the other of the cylinder, displaces the air and drives it in the opposite direction. The upper portion of the cylinder is surrounded by a jacket, between which and the cylinder itself there is a constant circulation of cold water. As the plunger itself is but slightly less in diameter than the interior of the cylinder, the air during the transfer is reduced to a thin cylindrical stratum, and is brought into close contact with the cold walls. The effect of the engine depends as much upon the efficiency of this cooling process as upon the subsequent heating, and therefore it is desirable that the water of refrigeration should be as cold as possible. But as this water must necessarily be drawn from natural sources, it is obvious that the engine will be more efficient in winter than in summer. The lower por-

Fig. 1.



Lauberau's engine, small model.

tion of the cylinder is occupied by a furnace resembling the furnace of the Ericsson engine; viz. a cylinder smaller than the air cylinder, with an annular space between the walls of the two. The plunger also, like that of the Ericsson engine, is provided with a bell shaped continuation, which enters the annular space around the furnace.

Fig. 1, above, shows a section of one of these engines of small model, in which E is the furnace room; but here the heat is applied by means of a powerful gas lamp, X. The flame, reverberating, passes down the narrow annular space X' X', and the products of combustion are conducted off at Y. D is the plunger with its attached bell. For lightness it is partially hollow. F is the space filled by the refrigerating water. A A on the left is the working cylinder, and B the working piston. A communicating tube shown in dotted lines admits the heated air to the space in A beneath the piston when the plunger rises, and allows it to return to G G when the plunger descends. The plunger of course receives its motion from the working piston. As the engine is but single-acting, a fly-wheel is necessary. Provision must be made by a force pump to maintain the flow of the refrigerating water. If the confined air employed is under more than the atmospheric pressure, there must also be some contrivance to make good the gradual waste by leakage through the packings. If no upward pressure is employed, a small shifting valve on the cold side will suffice for this purpose.

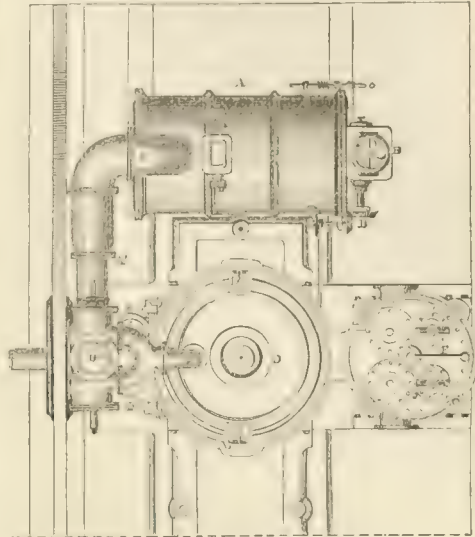
The main advantage, however, of using a confined body of air in these engines, rather than to draw the successive charges directly from the atmosphere, is that we may thus obtain a higher pressure, and consequently a greater power within the same bulk. But this advantage brings with it the attendant necessity of employing refrigerators, which with the other class of engines are wholly unnecessary.

In the larger forms of Lauberau engines, the cylinders are horizontal. A test made by Mr. Tresca of the performance of one of these, having a horse power of about four-fifths, showed a consumption of  $1\frac{1}{2}$  kilograms (about 10 pounds) of coal per horse power per hour; while the refrigeration required 700 kilolitres (150 gallons) of water per hour also. It cannot, therefore, be called an econom-

ical source of power; but for many uses in which but a small power is required, it may be practically such.

*Belou's Engine.*—The only hot-air engine which has as yet been employed on a large scale as the motive power of an important industry, is that patented by Belou, in France, in 1860. This was introduced, ten or twelve years ago, into a large paper manufactory at Cusset; and as the experiments made with it there seem to have been economically successful, while little is known of it in this country, it deserves a more particular description than we have given of the others. Belou's engine in some respects re-

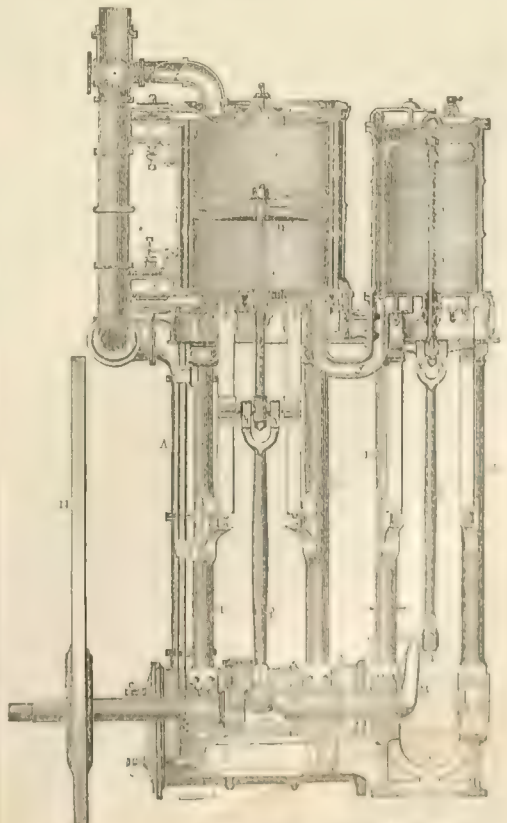
Fig. 2.



Belou's hot-air engine—plan.

sembles Shaw's, but differs from it in employing but one cylinder, which is double-acting, and in having an independent supply-pump and no regenerator. The cylinder, however, is surrounded by a jacket, between which and the cylinder itself the air circulates in passing from the supply-

Fig. 3.



Belou's hot-air engine—elevation and partial section.



pump to the furnace. The engine is represented in Figs. 2 and 3. The first is a general plan; and the second, a vertical section passing through the axis of the cylinder and of the supply pump. The furnace is at A, and the hopper for fuel at B. D is the cylinder and F the supply-pump. The air, in passing from F to the furnace, is driven through the space *d* between the working cylinder and its enveloping jacket. A portion of the air, larger or smaller as occasion may require, may be made to pass into the furnace over the fuel, and not through it. By this means the intensity of the heat may be varied, and the working pressure increased or diminished. M is the main shaft, N the fly-wheel, and Q Q' connecting rods which explain themselves. The fly-wheel on the large engine at Cusset weighs about fifteen tons. The fuel introduced into B is spread over the grate by a mechanical contrivance operated by the arbor B', connected with an eccentric on the main shaft.

Two Belou engines have been tested by Mr. Tresca; one of about four horse power, and the other (which is the engine at Cusset) of nearly thirty. In the smaller, the consumption of coal per horse power per hour amounted to 2.64 kilogrammes (nearly 6 pounds); in the larger, only 1.46 kilogrammes (three pounds). The working cylinder of this latter had a capacity of about eighty cubic feet; that of the supply cylinder was about half as great. In this case the amount of force developed, as measured by the indications of the manometer, was equal to one hundred and twenty-horse power, but of this the supply absorbed eighty-horse power, or two-thirds of the whole; and more than ten-horse power was estimated to be necessary to overcome the passive resistances. Less than thirty-horse power, therefore, or one-quarter of the whole, was actually utilized. It is of course upon the horse power actually utilized, and not upon the aggregate energy developed, that the foregoing statement of consumption is founded. The performance is therefore about equal to that of an economical steam engine.

It is to be observed, however, that the heat was carried to a height which could not but tend to deteriorate rapidly the parts of the engine exposed to it; and especially the interior of the working cylinder. In order to protect this surface, it was constantly lubricated with a solution of soap in water, of which about five gallons were consumed per hour. There was also a large final loss; the escaping air in the chimney having a temperature of not less than 250° C. = 450° F. above that of the atmosphere. Mr. Tresca computes that fully seven-eighths of the heat produced by the furnace was expended unproductively. Notwithstanding these drawbacks the practical result actually obtained is eminently encouraging to those who hope to see steam-power advantageously replaced by something safer and more universally available.

To the class of hot-air engines belongs properly the so-called inflammable gas engine known as Brayton's Ready Motor. For an account of this, see GAS ENGINE.

F. A. P. BARNARD.

**Hot'-bed**, a frame for forcing the early growth of plants in cold regions. Its top is a glazed sash, sloping towards the S. The glass permits the sun's rays to enter and heat the air, and at the same time prevents the escape of the warm air. The heat of the sun is reinforced by that of fermenting animal and vegetable matter—horse dung, wool-waste, leaves, chopped straw, and the like—which fill a trench beneath the soil of the hot-bed. These are very necessary to prevent freezing at night and in cloudy weather. When the sun shines brightly it is often necessary to admit some cold air, or partly to cover the hot-bed with mats, otherwise the sun's heat may blast the plants. In very cold weather bast matting is spread over the glass to keep from freezing. Hot-beds are very essential in market-gardening in the Northern States.

**Hotch'kiss** (VELONA R.), D. D., b. at Spafford, N. Y., June 3, 1815; educated at Madison University, N. Y.; pastor of Baptist churches in Poughkeepsie, Vt., 1839-42; Rochester, N. Y., 1842-46; Fall River, Mass., 1846-49; Buffalo, N. Y., 1849-54 and 1865-73; was professor of biblical literature in Rochester Theological Seminary 1854 to 1865. He is now (1875) pastor of the Washington street Baptist church in Buffalo, N. Y. He is an accomplished theologian and scholar.

**Hot Creek**, post-tp. of Nye co., Nev. Pop. 40.

**Hotel'** [Old Eng. *hostel*; Fr. *hôtel*, radical, *hôte*, "landlord" or "guest," derived by some from the Latin *hospes*, by others from *hostis*, "guest" or "enemy;" Middle Lat. *hostellaria*], an inn or house for the accommodation of travellers, at present applied in England and America to the larger or better class of such establishments. In France the word is used not only in this sense, but also means, as it did exclusively once, any large or magnificent residence, synonymous with *château* and *palace*. The

present English word *hotel* is rather of French than English origin. From the earliest ages, among the Jews and other Semitic people, the house of entertainment for travellers was, like the caravanserai or khan of the present day, simply a lodging, the occupants of which provided their own food. People of rank or respectability were entertained by the local governor or by their friends, to whom they took in some cases letters of introduction. For those of a lower or poorer class there arose at an early period, in addition to the caravanserai, a tavern, at which food and drink were sold, but which appears to have been invariably also of so bad a character in other respects that in Hebrew there was but one word (*וִּיְהוּ*) for landlady and courtesan.

Recent investigation makes it probable that the inn or khan at Bethlehem where Christ was born was the habitation of Chimham (Jer. xli. 18), which had been an inn for more than 600 years, and was perhaps originally a dwelling given by David to Chimham (2 Sam. xix. 38). "In these khans," says Olivier, "the stables join the chambers, and are better lighted. During the winter-time the former are often preferred by travellers for night-lodging; and when, as is often the case, they are of solid masonry or even real caves, they are favorite summer retreats." The Egyptians had lodging-taverns, but among the earlier Greeks of rank travellers were entertained only by private individuals. This was systematized by giving tickets (*σύνβολα*, *tesserae hospitalitatis*), on presenting which the guest was received; and these *tesserae* were handed down from father to son. (Full details of classic inns are given by Michell; also in Pollux.) The Romans, with their system of roads and posting, developed post-houses or inns, which under the Caesars were not inferior to those of the Middle Ages. The emperors were accustomed to give to ambassadors and others, as a great privilege, letters which not only entitled the bearer to horses and lodging, but also commanded the postmaster to furnish bread, wine, beer, pigs, poultry, sheep, fish, fruit, wax, and many other things in abundance properly and promptly. Polybius states that in his time inns abounded on the roads, and that provisions were so cheap that people were charged for all they ate in a day only the fourth of an obolus, or three-fifths of a cent per head. All the inns of the cities, whether good or bad, were morally infamous. Whether it was a *caupona*, *taberna*, *diversorium*, *ganea*, or *popina* (cook-shop), the Roman tavern was invariably a brothel—none the less because its female inmates were by law exempted from classification with ordinary prostitutes. It appears from Plautus, Martial, Apuleius, and others that tavern-keepers were supposed to murder their guests, and even to feed others on their bodies—a story which passes current at the present day in Spain, Italy, and Cuba. The Greek taverns, according to Aristophanes, Lucian, Aristotle, and Athenæus, had signs; and the Romans often used the bush and jug-handle (*ansa*) to indicate the sale of wine. Other signs were the Mice and Wensels, the Fighting Men, the Cock, and the Old Shepherd. In later times inns had the Cross for Christian customers, while heathens were attracted by the sun or the moon.

The inns of the Middle Ages long resembled the Roman, and are invariably described as a place of vile debauchery, where every device was used to induce guests to gamble, to waste their money on wantons, or where they were robbed outright. The evil character of ordinary inns caused the establishment of houses of entertainment for men belonging to different callings or nations. Thus, in Venice the Germans established the *Albergo dei Tedeschi*, at which Germans only were accommodated, and in all towns there were guild-taverns for the travelling members of their respective crafts. So early, however, as the thirteenth century public inns began to improve, especially on the grand route from Venice *viâ* Augsburg and Ghent, and in the fourteenth century taverns appear to have become more and more "the general lounge even of the industrious." There are many hotels in Europe bearing the name of "The Cross of Malta," the origin of which was as follows: Before the Crusades hospitality had greatly declined throughout Europe. The Templars, as well as the Knights of St. John of Jerusalem, having been impressed in the East by the Arab *fundihs*, or inns for poor travellers, established similar ones near their "commanderies." Hence, the Knights of St. John derived the name of *Hospitaliers*. Many of these, as in Bavaria, Provence, and Castile, were really palaces, in which the young knights also lived. The *Croix de Malta* is familiar to all who have travelled on the Continent.

The modern hotel dates from the peace which followed the downfall of Napoleon I. The annual streams of tourists caused the establishment of a better class of accommodation, and competition rapidly made luxury commoner and cheaper. To furnish a hotel in Switzerland or Germany properly, according to Guyer (*Das Hotelleesen der*



*Gegenwart*, Zurich, 1874), costs, admitting that the hotel is to contain 300 boarders—

Furniture .....	154,700 francs.
Beds and carpets .....	92,120 "
Linens .....	18,230 "
Service—i. e. silver, metal, glass, and porcelain .....	61,494 "
Kitchen utensils .....	5,000 "

305,544 francs,

or about \$72,708. But until railroads were established hotel keepers on the *grande route*—i. e. from London to Naples *via* the Rhine—were generally amenable to the charge of petty deception, as is indeed still too much the case in France and Italy. But the immense business which grew on the route soon induced a wiser policy. It was found more profitable to establish fixed rates for everything—rooms, *table d'hôte*, and service. Thirty years ago it was usual to bargain for rooms, the host often asking three times as much as he intended to take.

The extraordinary increase of hotels of late years, especially in summer resorts, has been such as to render prosperous many districts which at one time seemed destined to endless poverty; and it seems at present as if in another generation these public palaces will be in sight of one another all over the mountain-country of Europe. Thirty years ago the wretchedness of Switzerland was painful; at present real poverty seems hardly known there to any one who can remember the old time; and this change is due in a great measure to the railroads, and with them the numerous and excellent hotels and *pensions* which annually attract so many visitors.

CHARLES G. LELAND.

**Hotels in America.** The hotel, in its strictest sense as a *public-house*, has reached its highest development in the U. S., and particularly in our larger cities. This is no American boast, but the united testimony of unprejudiced travellers. The American hotels are not perfect—very far from it—but they excel all European hosteleries in several particulars. They are on a much larger scale; the elevator, an American invention, and rendered necessary by the great height to which the buildings are carried, is now connected with all first-class hotels. The charges at these hotels of the first class are high, but when the service rendered is considered they cannot be regarded as exorbitant. It is certain that the expenses of the great hotels are so heavy that even with their rooms generally filled, and often crowded, the actual profit is very moderate, and in a dull season they not unfrequently become bankrupts. The largest hotels are not, as might have been supposed, in New York, though some there are very large, but in some of the largest of the Western cities, Chicago, St. Louis, and San Francisco taking the lead in this particular. Of the new Palace Hotel at the latter city we are told that it is to cover an area of 96,250 feet, to be six stories in height, and to afford comfortable accommodation for 1200 guests. It is to have a large open court in the centre with flower-gardens and fountains, and is to cost, including the land, \$2,500,000. One or two of the Chicago hotels, and one at least of the St. Louis, have larger accommodations for guests than this, though possibly not a larger area. The summer hotels at Saratoga, Long Branch, and Newport are still larger, but they are open merely for three or four months. A very elaborate and exhaustive article recently (Dec., 1874) published in the New York *Tribune* gives very full statistics in regard to fifteen of the leading hotels of New York City (less than one-seventh of the whole number, though, perhaps, from their size and accommodations, receiving one-fourth of the guests). These hotels were the Albemarle, Ashland, Brevoort, Fifth Avenue, Gilsey, Grand Central, Grand Union, Hoffman, Metropolitan, New York, St. Nicholas, Sturtevant, Union Square, Winchester, and Windsor. Together, they had 1662 rooms—five of them having less than 150 rooms each. They could accommodate comfortably 6030 guests, and upon an emergency, 7640. Their daily average through the year was 3925; they employed 2935 servants, of whom 1456 were females, 1479 males, and had 390 coaches and carriages in attendance. The beef they consumed required the slaughter of 20,000 heaves every year, and other meats almost as large a number of sheep, calves, and swine; 600,000 pounds of fish and 15,000,000 oysters were also served up upon their tables; 5,000,000 eggs and 1,500,000 pounds of poultry and game; 10,000 barrels of flour, 20,000 barrels of potatoes, and a vast amount of green and root vegetables; 150,000 pounds of coffee, 35,000 pounds of tea, and 700,000 pounds of sugar, 1,500,000 quarts of milk, 170,000 quarts of cream, more than 450,000 pounds of butter, about 120,000 pounds of dried fruits, and nearly 63,000 gallons of canned fruits, jellies, etc. Of gas 60,000,000 feet were required for illumination, worth, at the current price in New York, \$165,000; 25,000 tons of coal, 12,000 tons of ice, and, for various uses, 1,250,000 pounds of soap, were among the other articles required. The washing of table-linen, bed-linen, towels, etc. amounted

to about 19,000,000 pieces a year. This was aside from the personal clothing of guests washed in the laundries. The waste of these establishments is enormous. That from the tables is of two kinds—the broken meats, etc., much of which, though good and wholesome, cannot be served up a second time, and is given to the charitable institutions which have the feeding of the poor, or in some instances disposed of to low eating-houses, etc.; the other kind, coming under the general denominations of swill and garbage, is nearly an absolute waste, and amounts in these fifteen hotels to 11,000,000 pounds annually, or 55,000 tons. The wear and tear of hotel furniture is estimated at 20 per cent. per annum, requiring refurnishing on an average once in five years. The receipts of these fifteen hotels average about \$40,000 per day, or \$14,600,000 per year, but the amount of net profit is not so large as it should be for such a vast expenditure. These figures represent, as we have said, but 15 of the 108 hotels of New York City, and their expenditures and receipts do not differ materially from those of a like number of hotels of the first-class in the other large cities, especially those of the West. The hotels of the second and third class fix their tariff of charges considerably lower, and, really, giving less service and luxuries in proportion to their prices than the first-class hotels, are generally more profitable. Some of these are well managed, and with less display are quite as comfortable and home-like as the high-priced houses. The usual charge per diem at the hotels of the first-class is from \$4.50 to \$5 per capita, but this includes no extras, such as wine, cigars, fire in the room, etc. etc. Hotels of the second and third classes, when not on "the European plan"—i. e. affording lodging only—charge from \$2.50 to \$3.50, and somewhat less than the others for extras.

The management and keeping of hotels, as conducted in this country, involves larger aggregate receipts and expenditures than any one branch of manufacture. Both receipts and expenditures are counted by hundreds of millions of dollars, and employ in various ways a vast number of people.

L. P. BROCKETT.

**Hotel**, tp. of Surry co., N. C. Pop. 709.

**Ho'tho** (HEINRICH GUSTAV), b. in Berlin May 22, 1802; studied at the university of his native city, and became professor of aesthetics at the same in 1830. He also held different positions at the art-galleries of Berlin, and d. there Dec. 25, 1873. He was a disciple of Hegel, and his books—*Geschichte der Deutschen und Niederländischen Malerei* (1843), *Die Malerschule von Eupke* (1859), etc., as well as his criticisms in the *Morgenblatt* and his lectures—bore very striking marks of the ideas and of the terminology of his master. But he deserves great praise for the manner in which he edited Hegel's *Vorlesungen über Ästhetik* (3 vols., 1835–38), chiefly from notes taken by his hearers.

**Hot-house.** See GREEN-HOUSE.

**Hot House**, tp. of Cherokee co., N. C. Pop. 645.

**Hot'man** (FRANÇOIS), b. at Paris Aug. 23, 1524, and began to lecture on Roman law at the university in 1546; but having embraced the Reformed religion, he was compelled to leave his native city in 1547, and retired to Lyons. From this moment, and up to his death at Bâle, Feb. 12, 1590, his life was wandering and adventurous, though generally brilliant, and his participation in the political intrigues of his time was very active, though not very honorable. By his lectures on law at Lyons, Geneva, Strasbourg, Valence, Bourges, and Paris, and especially by his work, *Franco-Gallia* (1573), he made a revolution in the political and social views of his time, and many of his writings are still read with great interest; as, for instance, *Commentarii in XXV. Ciceronis Orationes* (1574) and *Commentarius in IV. Institutionum Libros* (1580).

**Hot Spring**, county of S. W. Central Arkansas. Area, 550 square miles. It is mountainous, well timbered, and abounds in mineral wealth. Iron ores, novaculite (Arkansas hone-stone), salt, and a great variety of other valuable minerals are obtained. Corn, pork, and tobacco are staple products. Cap. Rockport. Pop. in 1870, 5877.

**Hot Spring Lake**, a beautiful lake 3 miles N. of Salt Lake City, Ut., fed by the hot springs near by. It is 3 miles long and over 1 mile broad. Its surface partly freezes over in winter.

**Hot Springs**, post-v., cap. of Garland co., Ark., 30 miles S. W. of Little Rock. It has about sixty thermal springs, much visited by invalids and others. The town has a weekly newspaper, and several hotels and churches. The springs are very copious, and two of them discharge waters of the temperature of 150° F. Pop. of v. 1276; of tp. 1604.

**Hot Springs**, tp. of Napa co., Cal. Pop. 2120.

**Hot Springs**, post v. of Bathen, Va., 30 miles N. E. of White Sulphur Springs. It contains several thermal



saline springs (of a temperature of 100°-106° F.), whose waters are useful in a wide range of diseases.

**Hot'tentots**, the native race of Cape Colony, South Africa. Their present territory extends northward from Cape Colony to Orange River, and eastward from the Atlantic to the boundaries of Caffraria. There are in this vast territory some well-wooded regions and tracts of good pasture-land, but generally it is an arid desert, miserable as the race which inhabits it. The Hottentots look like a mixture of the Mongolian and the negro race. They are tall, meagre, with high cheek-bones, sallow complexion, and oblique eyes, but they have thick lips, flat nose, and woolly hair growing in tufts. When the Dutch first settled at the Cape of Good Hope, in the middle of the seventeenth century, the Hottentots were quite numerous. They lived as herdsmen and hunters, and evinced some skill in rearing cattle and catching game; but their huts were miserable, they were nearly naked, their religious and moral ideas very few and weak, and their customs and habits often extremely savage. In contact with the Dutch they sunk still lower—that is to say, they sunk below the possibility of life. They sold their herds for rum, and died from starvation; their number decreased at a fearful rate. Under the English government they are much better off. Some of the tribes have become good and steady workmen, and show receptibility of civilization, though others—as, for instance, the Bushmen—have proved entirely unfit for civilized life. The Bushmen are very small of stature, ugly above description, and disgustingly degraded. They are widely scattered through all the English colonies in Southern Africa, but their number is rapidly decreasing. The language of the Hottentots has several marked dialects, all remarkable for the presence of clicking sounds. (See BLEEK, *Comparative Grammar of the S. African Languages*, 1862-69.) Curious anatomical peculiarities, such as the steatopygia, or prominent nates of the women, have been observed in the Hottentot race, but are not universal. The present number of Hottentots and Bushmen does not exceed 150,000. (See FRITSCH, *Dei Jahre in Südafrika*, 1869; *Die Eingeborenen Südafrikas*, 1872.)

**Hottentot's Bread**, a kind of yam *Tesudinaria elephantioides*, order Dioscoreaceae growing in South Africa. It is a beautiful vine, growing from the back of the large, rough, tortoise-like tuberos rhizoma, which grows half uncovered. The rhizoma affords starchy food.

**Hot'tinger**, the name of a family of Swiss scholars, the most prominent of whom were—JOHANN HEINRICH, b. at Zürich Mar. 10, 1620; studied at Groningen and Leyden; became professor in church history and Oriental languages at Zürich and Heidelberg; and was drowned near the former city June 5, 1667. By his writings, *Grammatica Quatuor Linguarum Hebraica, Chaldaea, Syriaca, et Arabica*, 1659, and *Etymologicum Orientale* (1661), etc., he contributed very much to a better understanding and a more general study of the Semitic languages.—JOHANN JACOB, a son of the preceding, b. at Zürich in 1652, and d. Dec. 18, 1735, as professor of theology at the university of his native city. He wrote *Hebraische Kirchengeschichte* (4 vols., 1708-29), a work still appreciated.—JOHANN JACOB, grandson of the preceding, b. at Zürich in 1750, and d. there Feb. 4, 1819. He was professor in Latin and Greek, and took part very actively in the great literary movement in German Switzerland under the leadership of Bodmer.—JOHANN JACOB, a nephew of the preceding, b. at Zürich in 1783, and d. there in 1859; wrote *Geschichte der Schweizerischen Kirchenrennung* (1825-27).

**Hottonia**. See FEATHER-FOIL.

**Hou-brachen** (AROLD), b. at Dort Mar. 28, 1660, and d. in Amsterdam Oct. 14, 1719. Of great value are his biographies of Dutch painters, *Groote schouburgh der nederlandsche kunstschilders en schilderessen* (1718).

**Houdin' (ROBERT)**, b. at Blois in 1805; was apprenticed to a watchmaker at Paris; studied mechanics, and won a medal for his toys and automata at the Paris exhibition of 1844. In 1845 he opened in the Palais Royal a series of soirées fantastiques, which he continued for ten years. In 1855 he retired to Blois with a large fortune. But in 1856 he went to Algeria on the invitation of the French government, and entered into a competition in making miracles with the marabouts or priests. His success was complete, and he contributed much to the breaking down of the bad influence of these impostors on their superstitious countrymen. After his return he published his *Life* (1857) and his *Confidences* (1859). D. at Blois in 1871.

**Houdon' (JEAN ANTOINE)**, b. in Versailles Mar. 20, 1741; d. in Paris July 15, 1828. He spent ten years in Rome as the king's pensioner, he having won the first prize at the Royal Academy for sculpture, and there executed the statue of St. Bruno in the S. Maria degli Angeli;

afterwards, in Paris, made statues of Voltaire, Cicero, Tourville, and busts of Napoleon, Josephine, Ney, Rousseau, Diderot, D'Alembert, Barthelémy, Mirabeau, Franklin, Targot, and other eminent men of the time; came to the U. S. with Franklin in 1785, and modelled the statue of Washington in the capitol at Richmond, Va. While making studies for the statue he was the guest of Washington at Mt. Vernon. The models of the human frame, without the covering of skin, executed for the Academy, exhibit his knowledge of anatomy. His finished statues and busts are highly valued as portraits. O. B. FROTHINGHAM.

**Hough (FRANKLIN B.)**, A. M., M. D., b. at Martinsville, N. Y., July 20, 1822; graduated at Union College in 1843, and at Cleveland Medical College in 1849; practised his profession 1848-52 at Somerville, N. Y. He has since been engaged in literary and scientific pursuits, and resides at Lowville, N. Y. Has published a *Catalogue of Plants of Lewis Cos., N. Y.* (1847), *History of St. Lawrence and Franklin Cos., N. Y.* (1853), of Jefferson co., 1854, of Lewis co. (1860), *Metamorphological Observations, 1825-50* (1854), *New York Civil List*, 1861, *Gazetteer of New York* (1872), and many other works, principally historical.

**Hough (JOHN STOCKTON)**, M. D., b. at Yardleyville, Bucks co., Pa., Dec. 5, 1845; was educated at Trenton, N. J., Fort Edward and Poughkeepsie, N. Y., and the Polytechnic College of Pennsylvania; took his medical degree 1868 at the University of Pennsylvania. Author of numerous papers upon questions in biology, social science, pathology, etc.; was resident physician of the Philadelphia Hospital 1868-69, etc.

**Houghton**, county of the N. peninsula of Michigan, bordering on Lake Superior. Its winter climate is severe. It has abundance of valuable ores of copper, iron, and silver, which are extensively wrought. Keweenaw Bay and other inlets of Lake Superior break its outline, and abound in excellent fish. The working of copper-mines is the principal industry. The surface is broken. Cap. Houghton. Pop. 13,879.

**Houghton**, post-v., cap. of Houghton co., Mich., on Lake Portage, an arm of Lake Superior, is the centre of the great copper-producing district, 15,000 tons being annually shipped from this port; contains 3 churches, a national bank, a newspaper and binding establishment, 2 hotels, machine-shops, stores, etc. Principal business, mining. Pop. about 1700. J. R. DIVERDEAN.

PROP. "PORTAGE LAKE MINING GAZETTE."

**Houghton**, tp. of Keweenaw co., Mich. Pop. 1325.

**Houghton (DOUGLASS)**, M. D., b. at Troy, N. Y., Sept. 21, 1809; graduated in 1829 at the Rensselaer Institute at Troy, in which he was in 1830 appointed assistant professor. He made a valuable report of the botany of the Upper Mississippi region, to which he was sent with an expedition. He became a practising physician in Detroit, Mich.; State geologist in 1837; mayor of Detroit in 1842; a professor in the State University; and a member of many learned societies. While on a government survey he was drowned in Lake Superior, near Eagle River, Oct. 13, 1845.

**Houghton (GEORGE FREDERICK)**, b. at Guilford, Vt., May 31, 1820; graduated at the University of Vermont in 1839; became a lawyer in 1841; secretary of state of Vermont 1848-49; State attorney for Franklin co. 1852-53; founded the *Vermont Transcript* 1854, and became connected with the *Church Journal* (N. Y.) soon after. D. at St. Alban's, Vt., Sept. 22, 1870.

**Houghton (HENRY CLARK)**, M. D., b. at Roxbury (Boston), Mass., Jan. 22, 1837; educated at Bridgewater Normal School; became an instructor; served two and a half years in the late Christian Commission; graduated M. D. from New York University 1867; resident physician to Five Points House of Industry 1867-69; surgeon to New York Ophthalmic Hospital since 1868; professor of physiology in New York Homoeopathic College 1868-70; professor of physiology in New York College for Women since 1869; member and officer of various professional societies. Author of *Lectures on the Diseases of the Ear*, etc.

**Houghton (RICHARD MONCKTON MILNES)**, BARON, D. C. L., F. R. S., b. June 19, 1809; was educated at Cambridge, and was long an independent and moderately conservative member of the House of Commons; widely known as a poet and an elegant critic. In 1863 he was raised to the peerage. He has published several volumes of poetry and travels: *The Real Union of England and Ireland* (1845), *Life of Keats* (1848), and other works.

**Houghton (ROYALL)**, b. at Guilford, Vt., Feb. 12, 1798, and in 1833 removed to New York, where he was (1835-51) a prominent banker and broker, distinguished for honor and probity. After leaving business he became a citizen of St. Augustine, Fla., where he d. Mar. 22, 1873.

**Houghton (WILLIAM)**, b. at Norwich in 1807; grad-



uated at Highbury College, London, in 1832; became minister of the Congregational church at Windsor in 1833, of the Congregational society at Kensington in 1844, and was elected in 1850 chairman of the Congregational Union of England and Wales. He wrote *The Ecclesiastical History of England* 4 vols., 1870 and *Canterbury Walks of a Novelist with his Children* 1869.

**Houl'ton**, post-v., cap. of Aroostook co., Me., 120 miles N. E. of Bangor, on the New Brunswick and Canada R. R. It is the rendezvous for the lumbermen of that region. Has a savings bank, 2 weekly newspapers, 7 churches, stores and shops. Pop. 2850.

W. S. GILMAN, Ed. "AROOSTOOK PIONEER."

**Houl'town**, tp. of Marion co., W. Va. Pop. 33.

**Hou'ma**, post-v., capital of Terre Bonne parish, La., 70 miles S. W. of New Orleans, with which it is connected by Morgan's R. R. It has several public and private schools, a convent and an academy, 4 churches, and 2 weekly newspapers. Pop. 593.

E. W. GORDON, Ed. "TERRE BONNE REPUBLICAN."

**Hou-Nan'**, or **Hu-Nan**, province of China, situated between lat. 23° and 30° N., and between lon. 109° and 114° E., comprises an area of 71,325 square miles, with 18,622,507 inhabitants. The surface is elevated, in many places mountainous, but the country is very little known. The northern part is very fertile, and produces large quantities of cotton. Metals are said to abound, but mines are not worked. Cap. Chang Sha.

**Hound** [Ger. *Hund*, a "dog"], a term properly restricted to those dogs which hunt by following the track of the game by scent. This definition includes the blood-hound, stag-hound, fox-hound, beagle, harrier, and a few others, but does not include the greyhound. Most hounds are muscular, strong, sagacious animals, with large pendulous ears. The more important varieties are described under their alphabetical heads.

**Hound'-fish**, a name given to some of the larger dog-fishes (which are themselves small species of sharks), such as the *Mustelus laevis*, or smooth hound-fish of European seas, two or three feet long, represented in America Atlantic waters by *M. canis*, a rather larger fish. These fishes have flat grinding teeth, adapted well to their food, which consists of crustaceans and mollusks.

**Houns'field**, tp. of Jefferson co., N. Y., on Lake Ontario. It includes SACKETT'S HARBOR (which see) and several islands. Pop. 2626.

**Houns'low**, town of Middlesex, Eng., 10 miles W. of London, consisting mainly of a single street. Pop. 9294.

**Hour** [Lat. *hora*], the twenty-fourth part of a day, or of the interval between two consecutive meridian passages of the mean sun (mean solar day), true sun (apparent solar day), or of a fixed star (sidereal day). As mean solar time is the legally recognized time according to which the affairs of business are regulated, and is the time kept by ordinary clocks and watches, the word *hour*, in its usual acceptance, is understood to signify a mean solar hour. As the mean solar meridian passage commonly divides the interval between sunrise and sunset unequally, clocks are sometimes, and for certain purposes, constructed to give apparent time. Such clocks are called equation clocks (see EQUATION OF TIME), and are designed to mark exactly twelve when the true sun is on the meridian. Astronomical clocks, so called, or the clocks of astronomical observatories, are regulated to sidereal time for convenience in recording right ascensions (which are measured in such time), or to facilitate the finding of celestial objects whose right ascensions are known. (See TIME.) E. A. P. BARNARD.

**Hour'-glass**, a contrivance much used, before the invention and introduction into general use of clocks and watches, for the measurement of time. It consists of a hollow glass vessel blown into a form externally resembling the figure 8, or presenting the appearance of two spherico-conoidal bulbs united at their vertices. In the blowing, the contraction in the middle is such as almost to close communication between the bulbs. This passage is then smoothly drilled out, by passing the drill through the aperture left in the base in blowing; and a quantity of fine and dry sand is then introduced, sufficient to occupy an hour in running through this passage from one bulb to the other when the instrument is held in a vertical position. During the adjustment the external aperture is temporarily closed by a cork. After then adjustment this aperture should be sealed in such a manner as effectually to exclude moisture. The whole should then be protected by a surrounding frame. The hour glass is by no means a very exact instrument. A perceptible difference will not unfrequently be observed between the times of running out, according as one or the other of the bulbs is uppermost. Tempera-

ture also affects its performance; and in case of the absorption of moisture by the sand, in consequence of imperfect sealing, its irregularities are much increased. Half-hour glasses, minute-glasses, half-minute glasses, etc. are constructed on the same principle. The hour-glass is now rarely used, more accurate and convenient time-keepers having superseded it; but the half-minute glass is still employed at sea to time the running of the log-line.

E. A. P. BARNARD.

**Hour** is [pl. *hōrē*, the "black-eyed"], the nymphs of Paradise, whose society, according to the Koran, is to be one of the great felicities of the Mohammedan believer after death. These beings are of pure musk, and are endowed with perpetual youth, health, and beauty.

**Hours**, The [Gr. *hōræ*; Lat. *Horæ*], in Greek mythology, the goddesses of nature and the seasons of the year; in later times the personifications of justice and good order. Their number and mythos are variously given. At Athens there were two—Thallo (Spring) and Carpo (Autumn). Hesiod makes them three—Eunomia, Dice, and Irene. In art they are blooming nymphs, laden with fruits and flowers.

**Housaton'ic**, post-v. of Great Barrington tp., Berkshire co., Mass., on the Housatonic R. R., 21 miles S. of Pittsfield. It has manufactures of bank-note paper, etc.

**Housatonic River** rises by several head-streams in Berkshire co., Mass., flows S., and traverses the State of Connecticut, falling into Long Island Sound in lat. 41° 9' 30" N., lon. 73° 3' 33" W. For 14 miles it is a tidal stream. Its valley abounds in wild and beautiful scenery, and it affords water-power for numerous manufactories.

**House'-Fly**, the *Musca domestica* of Europe and probably of the U. S., though it is not quite certain that the house-flies of the two continents are identical in species), a very common household pest, breeding as a maggot in heaps of filth, upon which it feeds. It is regarded as a preventer of disease because it acts as a scavenger, and thus defers and distributes over much space and time the fermentation and destruction of organic substances. Flies are especially abundant late in summer and early in autumn. They are generally most numerous near stables and ill-kept dairies, and their presence anywhere in numbers may be regarded as indicating possible danger to health from putrefying organic matter. Against the annoyance of flies, cleanliness is the best preventive.

**House'hold Suffrage**. Under the English law, the right to vote in boroughs for members of Parliament is granted to male persons of full age who during twelve months preceding the last day of July in any year, as well as on that day, have been occupiers, either as owners or tenants, of any dwelling-house within the borough, and have been rated, and have paid the rates, in a specified way for the relief of the poor in respect to the premises. The phrase "dwelling house" is defined by the act to mean any part of a house occupied as a separate dwelling, and separately rated for the relief of the poor. The right of suffrage is also extended to lodgers occupying the same lodgings for a similar period to that prescribed for occupants of dwelling houses, such lodgings being of the clear yearly value, if let unfurnished, of £10 a year and upwards. (See for the details of the subject 30 and 31 Viet. c. 102, s. n. 1867.) Rules of a similar nature in respect to the right of voting as a burgess of a borough at municipal elections are found in 32 and 33 Viet. ch. 55, A. D. 1869. T. W. DWIGHT.

**Household Troops**. See GRARDS.

**House'-Leek** (*Senpervivum tectorum*), an herb of the order Crassulaceæ, a native of Europe, often cultivated in the U. S. It takes its trivial name from the fact that it is often set upon the roofs of cottages, where it grows well, propagating abundantly by offsets on short and thick runners, rarely flowering. As a remedy for bee-stings, slight burns, and the like the bruised leaves are very efficacious. The plant was once so highly esteemed as a cure for scurvy that Charlemagne by edict compelled his subjects to keep it in their houses and plant it on their roofs. The name house-leek is popularly applied to several other crassulaceous plants.

**House'-maid's Knee** (so called because it is said, though with little reason, to be most common among house-maids, who scrub stairs and floors upon their knees), an acute or chronic dropsical effusion into the bursa before the knee pan. It is easily diagnosed, and it does not communicate with the knee joint proper. A cure may be secured by rest and the application of iodine, mercurials, and tight bandages; chronic ones, by compression with suitable splints, or even by evacuation and injection of iodine solution into the sac.

**House's Creek**, tp. of Wakecoo, N. C. Pop. 2008.

**Hou'sa**, or **Hau'sa**, is the name of a large territory



of Central Africa, extending between lat. 12° and 13° N., and between lon. 5° and 10° E., and consisting partly of tracts of low land inundated by the Niger and its affluents during the rainy season, partly of ranges of rocky hills enclosing elevated table-land. The inhabitants live in some places formed independent states, in others they have been subjugated by neighboring tribes, especially the Fellatahs, and thus the name Haussa signifies a race and a language, rather than a political unit.

**Houssaye** (ARSÈNE), b. at Bruyères, in the department of Aisne, Mar. 28, 1815, of a wealthy father, who had made his fortune in the milling business. About 1835 young Houssaye presented himself in the Paris fashionable and literary circles, and was so fortunate as to become the friend of Jules Janin, Théophile Gautier, Jules Sandeau, then the princes of criticism and light literature. Thanks to them, Arsène Houssaye soon attracted public attention to his first books, and afterwards conquered a well-earned celebrity. In 1849 he became director of the Théâtre Française, and under the empire was appointed inspector-general of the museums. Author of the periodical letters on Paris life being published by the *New York Tribune* (1875). Among his works are—*Philosophes et Conté-dicieux, Les filles d'Ève, Sous la République et sous le Troisième, Blanches et Marguerites, Nos grandes dames, History of the Forty first Centennial of the French Academy, King Voltaire, History of French Art*, etc.—HENRI, his son, b. Feb. 21, 1848, is just beginning to make his mark in the literary world of France, through the publication of his *History of Apelles, History of Alcibiades*, etc. FELIX AUCARNE.

**Hous'ton**, county of Central Georgia, bounded on the E. by the Ocmulgee River. Area, 550 square miles. It is level, and has a fertile, calcareous, and well-cultivated soil. Cotton, pork, and corn are staple products. It is traversed by the South-western and other railroads. Cap. Perry. Pop. 20,406.

**Houston**, the south easternmost county of Minnesota, having Iowa on the S. and the Mississippi River on the E. Area, 570 square miles. It is well timbered and fertile, and grain is its chief staple. Cap. Caledonia. P. 14,936.

**Houston**, county of N. W. Central Tennessee. Area, about 360 square miles. It is bounded on the W. by the Tennessee River, and is traversed by the Memphis Clarks-ville and Louisville R. R. It is diversified and fertile. Cap. Erin. It was constituted since the census of 1870.

**Houston**, county of the E. of Texas. Area, 1090 square miles. It is well timbered and watered, and generally rolling and fertile. Coal and iron are found. The International and Great Northern R. R. traverses the county, which has the navigable Neches and Trinity rivers respectively on its E. and W. borders. Cotton, corn, and live-stock are largely produced. Cap. Crockett. Pop. 8147.

**Houston**, post-v., county-seat of Winston co., Ala., 55 miles N. W. of Elyton. Pop. of tp. 498.

**Houston**, tp. of Adams co., Ill. Pop. 1239.

**Houston**, tp. and post-v. of Houston co., Minn., on the Southern Minnesota R. R., 19 miles from La Crosse. Pop. 1075.

**Houston**, post-v., cap. of Chickasaw co., Miss., about 42 miles N. W. of Columbus. It has 2 academies, 2 churches, a newspaper, 2 hotels, stores, etc.; contains the usual public buildings. Pop. 400.

FRANK BERRITT, ED. "CHICKASAW MESSENGER."

**Houston**, post-v., cap. of Texas co., Mo., about 75 miles S. of Jefferson City, situated in a mineral region; has large forests of pine and saw-mills in the neighborhood, an academy, the county court-house, 3 hotels, 2 newspapers, stores, shops, etc. It is 35 miles from the St. Louis Salem and Little Rock R. R. Pop. about 200.

BEN. C. LOWELL, ED. "TEXAS CO. PIONEER."

**Houston**, post-v. of Shelby co., O., on the Cleveland Columbus Cincinnati and Indianapolis R. R. Pop. 56.

**Houston**, city, cap. of Harris co., Tex., in lat. 29° 30', lon. 94° 50', at the head of navigation on Buffalo Bayou, 50 miles N. W. of Galveston. It is the railroad centre of Texas. The city is situated on both sides the bayou, on gently undulating land, and has steamboat communication with Galveston daily. It contains numerous schools, 2 academies for white and colored scholars respectively, 13 churches, 2 national, 5 private, and 1 savings bank, 2 home insurance companies, the Masonic temple of the Grand Lodge of Texas, in which the annual meetings are held, a city-hall and market-house unsurpassed in the South. It has cotton, ear, soap, and Portland cement factories, while its manufactories of wagons, carriages, ploughs, and other agricultural implements are a source of large revenue; a large flouring-mill, 2 steam, 3 hand fire-engines, and 1 hook and ladder company. The annual State fair is held here on

the fair-grounds. A horse railway from the general dépôts through the principal streets to the fair-grounds is in successful operation. There are 4 large hotels, 3 daily and 5 weekly newspapers, and its importance as a railroad and manufacturing centre is rapidly being developed. Pop. 9382.

E. W. TAYLOR.

**Houston** (DAVID C.), b. in New York; graduated at the U. S. Military Academy 1856, and assigned to the corps of engineers with the rank of brevet second lieutenant; but retained at the Academy as assistant professor of natural and experimental philosophy until Sept., 1857, when he was placed on construction duty at Hampton Roads, and subsequently at Sandy Hook. In the civil war he was engaged at Blackburn's Ford and Bull Run as engineer of Tyler's division; assistant engineer on defences of Washington; chief engineer 1st army corps, department of the Rappahannock; of 3d army corps at Cedar Mountain and second battle of Bull Run; of 1st army corps at South Mountain and Antietam; of department of the Gulf at the siege of Port Hudson, Red River campaign, etc.; brevet captain, major, lieutenant-colonel, and colonel for gallantry and meritorious conduct. Since the close of the war he has had charge of the defences of Narragansett Bay, R. I., and is at present in charge of extensive river and harbor improvements in the North-west. G. C. SIMMONS.

**Houston** (GEORGE P.), U. S. M. C.; entered the marine corps as a second lieutenant Oct. 23, 1860; became a first lieutenant in 1861; was brevetted major for "gallant and meritorious services" in the battle of Mobile Bay Aug. 5, 1864, where he commanded a division of the Brooklyn's guns, which Capt. Alden, in his official report, says he fought "nobly and well." FOXHALL A. PARKER.

**Houston** (GEORGE SMITH), b. in Williamson co., Tenn., Jan. 17, 1811; removed in youth to Limestone co., Ala.; was admitted to the bar in 1831; was chosen district solicitor in 1837; was in Congress 1841-49 and 1851-61, taking a prominent position; chosen in 1865 to U. S. Senate, but did not take his seat. In 1874 was elected governor of Alabama, and in 1878 was chosen U. S. Senator. D. Dec. 31, 1879.

**Houston** (Gen. SAM), b. in Rockbridge co., Va., Mar. 2, 1793. Left an orphan early in life by his father's death, he went with his mother in destitute circumstances to Tennessee, then the verge of civilization. Here he received a scanty education, and spent most of his youthful years among the Cherokee Indians. During a portion of this period he served as clerk to one of the traders, and also taught a rustic school. In 1813 he enlisted as a private in the U. S. army, and served under Gen. Jackson in his famous campaign against the Creek Indians. He had so distinguished himself on several occasions that at the conclusion of the war he had risen to the rank of lieutenant, but on the return of peace he resigned his commission in the army, and took up the study of law at Nashville. His political career now commenced. After holding several minor offices he was sent to Congress from Tennessee in 1823, and continued a member of the House until 1827, when he was elected governor of the State. In 1829, he resigned this office before the expiration of his term; went to Arkansas and took up his abode among the Cherokees. He not long after became the agent of this tribe to represent their interests at Washington. On a first visit to Texas, just before the election of delegates to the convention called there to form a constitution preparatory to the admission of Texas into the Mexican union, he was unanimously chosen a delegate to that body. The constitution so formed was rejected by the Mexican authorities, and Texas was denied admission as a state into that union. Santa Anna, the president of the Mexican confederated republic, demanded of the Texans a surrender of their arms. Resistance to this demand was determined upon. A military force was organized, and Houston, under the title of general, was soon appointed commander-in-chief of it. He conducted the war which ensued with great vigor, and brought it to a successful termination by the battle of San Jacinto in Apr., 1836, in which Santa Anna was captured, and by which the independence of Texas as a separate republic was achieved. In Oct., 1836, Gen. Houston was inaugurated the first president of the new republic. In 1845-46, Texas was admitted into our Union as one of the U. S., and Gen. Houston was elected as one of the two Texas members to the Senate of the U. S. This position he held for twelve years. His decided opposition to the policy of secession lost him the confidence of the people for whom he had done so much. He went into retirement, and survived the outbreak of the war in 1861 for a short time. Taken all in all, Gen. Houston was one of the most remarkable men who has ever figured in American history. D. at Huntsville, Tex., July 25, 1863. A. H. STEPHENS.

**Ho'ven**, or **Hoove**, a disease of cattle and sheep, characterized by great distension of the stomach by ear-



bonic acid gas, derived from fermentation of food. It is often seen after a marked change from a meagre to a rich pasture. A smart purge, the administration of lime-water or weak ammonia-water, and the introduction of the stomach-tube are to be tried. If these fail, plunge a trocar and canula into the stomach at a point halfway between the haunch-bone and the last rib, and near the back-bone. There is some danger of fatal peritonitis after the operation, but most animals recover.

**Hovey** (ALVAN), D. D., b. at Greene, N. Y., Mar. 5, 1820; graduated at Dartmouth College, N. H., 1844, and Newton (Mass.) Theological Institution in 1848; was Baptist pastor at North Gloucester, Me.; from 1850 to 1853 instructor in biblical literature at Newton Theological Seminary; from 1853 to 1856 professor of ecclesiastical history. Since 1856 he has been at the same institution professor of Christian theology, and its president since 1868. He has published, with Rev. D. B. Ford, a translation of *Perthe's Life of Chrysostom*, and by himself, *Life and Times of Isaac Backus* (1848), *State of the Impenitent Dead* (1859), *The Miracles of Christ* (1861), *Scriptural Law of Divorce* (1868), *God with Us* (1872), and, privately, *Lectures on Theology, Religion, and the State* (1874).

**Hovey** (ALVIN P.), b. at Mt. Vernon, Ind., May 8, 1821; studied law and practised his profession with success. During the civil war he was appointed major of Indiana volunteers, subsequently colonel, serving in the South-west at Shiloh and Corinth; promoted to be brigadier-general of volunteers Apr. 28, 1862; commanded a division at the battle of Champion Hills, contributing largely to the success of that day; subsequently engaged in the Vicksburg campaign. Brevetted major-general of volunteers July, 1864; resigned Oct., 1865. In 1866 he was appointed U. S. minister to Peru. G. C. SIMMONS.

**How** (LYMAN BARTLETT), A. M., M. D., b. in New Bedford, Mass., Feb. 25, 1838; graduated A. B. at Dartmouth College 1860; studied medicine in the medical department of that college and in the New York College of Physicians and Surgeons; took the medical degree in 1862; practises at Manchester, N. H.; became professor of anatomy and physiology in the medical department of Dartmouth College 1869, which position he holds (1875).

**How'ard**, county in the W. of Arkansas. Area, 625 square miles. Its W. border is washed by Saline Creek. It is fertile, rolling, and well wooded. Cap. Centre Point.

**Howard**, county of Dakota, traversed by the Missouri and the Little Missouri rivers. Its N. W. corner extends to the mouth of the Yellowstone. Area, 4320 square miles.

**Howard**, county of N. Central Indiana. Area, 310 square miles. It is level and very productive. Cattle, grain, wool, and lumber are staple products. It is intersected by the Indianapolis Peru and Chicago and the Cincinnati and Chicago R. Rs. Cap. Kokomo. Pop. 15,847.

**Howard**, county of the N. E. of Iowa, bounded on the N. by Minnesota. Area, 576 square miles. It is partly prairie and partly timber-land, and has a fertile soil. Grain is the staple product. It is intersected by the Milwaukee and St. Paul R. R. Cap. New Oregon. Pop. 6282.

**Howard**, county of the S. E. of Kansas, bounded on the S. by Indian Territory. Area, 1271 square miles. It has great water-power and much fine tillage-land, but is especially adapted to pasturage. Cap. Peru. Pop. 2794. Divided since 1870 into Elk and Chautauqua counties.

**Howard**, county near the centre of Maryland. Area, 200 square miles. It has a good soil and undulating and hilly surface, with abundant water-power. Grain and tobacco are staple products. Cotton goods, flour, and iron are manufactured. Granite and iron ores are abundant. Cap. Elliott City. Pop. 14,150.

**Howard**, county of N. Central Missouri. Area, 160 square miles. It is undulating, well cultivated, fertile, and abounds in coal, sandstone, and limestone. Cattle, grain, tobacco, and wool are staple products. The Missouri flows along the W. and S. boundaries. Cap. Fayette. P. 17,253.

**Howard**, county of Central Nebraska, drained by the Loup Fork of the river Platte. Area, 576 square miles. It is well adapted to grazing. Cap. St. Paul. There is no statement of its pop. in the census of 1870.

**Howard**, tp. of Conway co., Ark. Pop. 745.

**Howard**, tp. of Howard co., Ind. Pop. 1707.

**Howard**, post-tp. of Parke co., Ind. Pop. 554.

**Howard**, tp. of Washington co., Ind. Pop. 1158.

**Howard**, tp. of Howard co., Ia. Pop. 204.

**Howard**, tp. of Story co., Ia. Pop. 968.

**Howard**, tp. of Tama co., Ia. Pop. 1043.

**Howard**, tp. of Wayne co., Ia. Pop. 375.

**Howard**, tp. of Cass co., Mich., on the Michigan Central R. R. Pop. 171.

**Howard**, tp. of Gentry co., Mo. Pop. 1310.

**Howard**, tp. and post-v. of Steuben co., N. Y. Pop. of v. 167; of tp. 2122.

**Howard**, post-tp. of Knox co., O., on the Cleveland Mt. Vernon and Columbus R. R. Pop. 800.

**Howard**, tp. of Centre co., Pa. Pop. 875.

**Howard**, post-b. of Centre co., Pa., on the Lockhaven and Tyrone R. R., 13 miles S. W. of Lockhaven. It has iron manufactures. Pop. 334.

**Howard**, tp. of Brown co., Wis. It contains the village of Fort Howard. Pop. 3620.

**Howard** (CATHARINE), the fifth wife of Henry VIII. and queen of England for some months, b. in 1520, a daughter of Edmund Howard, third son of Thomas Howard, duke of Norfolk. The king first saw her at a banquet given by the bishop of Winchester in 1540. He had just married Anne of Cleves, and his dislike for that vulgar woman grew into disgust by comparison with the graceful and spirited Catharine. On July 9, 1540, he was divorced from Anne, and on Aug. 8 he married Catharine. The marriage was very happy. The queen understood how to dispel the gloom which gathered now and then in her husband's soul, and to manage the moroseness of his temper. But the happiness did not last more than five months. Archbishop Cranmer communicated to the king the confessions of a certain Laseelles, according to which Dereham and Mannock, two gentlemen in the service of the duchess of Norfolk, had been Catharine's lovers before her marriage. The king at first refused to believe. Nevertheless, Dereham and Mannock were seized and questioned. They confessed, and were executed. At last, even the queen confessed. But as such a crime, committed before marriage, was not a sufficient reason of divorce, her conduct after marriage was subjected to a most rigorous scrutiny. Very suspicious circumstances came to light. She had taken Dereham into her service after her marriage. Another of her former lovers, Thomas Culpepper, a relative of hers on her mother's side, she had admitted to her bed-chamber one night for several hours, no other being present than Lady Rochford. After a protracted trial she was sentenced, and decapitated Feb. 13, 1542. Most historians admit the dissoluteness of her conduct before her marriage, and few put any confidence in her loyalty after that time, but there seems to be an under-current of political intrigue running through her history. At the head of the religious reform party stood Cranmer, archbishop of Canterbury, while the duke of Norfolk and Bishop Gardiner represented a party which wished a reaction in favor of the Roman Catholic Church. The king's marriage to Anne of Cleves was the work of the Reform party, which hoped to bring the king entirely over to their side by placing him in more intimate connection with the German Lutherans. But the plan had failed. The Howards were in power. The Roman Catholic cause was in the ascendant, and it is more than probable that the fate which overtook Catharine Howard arose from these circumstances.

**Howard** (FLORANDO), M. D., Ph. D., b. in Stafford co., Va., Mar. 11, 1811; was educated at Columbian College and Georgetown College, D. C.; is professor of obstetrics, puerperal diseases, and diseases of children in the medical department of Georgetown College, Washington, D. C.; president of the Medical Association of the District of Columbia 1871-75.

**Howard** (HENRY), M. D., b. in Frederick co., Md., May 28, 1792; d. at Charlottesville, Va., Mar. 2, 1874. He took the degree of M. D. from the University of Pennsylvania, and for twenty-four years practised in Maryland. In 1837 he filled the professorship of obstetrics and diseases of women and children in the university of his native State, and then was elected professor of practice and obstetrics in the University of Virginia, which he occupied to 1867, when the infirmities of age compelled him to resign. He left an enviable reputation for his devotion to the profession and zeal as a teacher.

PAUL F. FIVE.

**Howard** (JOHN M.), LL.D., b. at Staunton, Va., 1805; d. at Detroit in 1871. Graduated at W. & A. College 1830; taught in academies in Maryland, Va., and Michigan in 1832; was admitted to the bar in 1833; became a member of the legislature in 1838; member of Congress in 1841-43, and attorney general of Michigan in 1843-61. From 1862 to 1871 he represented Michigan as its Senator, and was the sponsor of the Republican party in 1864, the drawing up of the platform at the last convention being also attributed to him. He is known in the literary world by his translation of the *Secret Memoirs of the Empress Josephine*, from the French.

**Howard** (JOHN), b. at Hackney, near London, Sept.



2. 1726. From his father he inherited a considerable fortune, and he spent his youth in studying medicine and in travelling. Having settled at Cardington, Bedfordshire, in 1758, and having made himself conspicuous by his schools and model cottages for the peasantry, he was elected sheriff in 1773. On visiting the jails he became acquainted with the intolerable conditions under which prisoners lived; thus it often happened that a man spent several years in jail because he could not pay the jailer's fee for his deliverance. Howard now travelled through the whole kingdom, visited all its jails, and presented in 1774 a report to the House of Commons, the result of which was the passing of two reform bills. Next he went to the Continent, visited France, Germany, and Holland, examined their prisons, and published on his return, in 1777, *State of the Prisons in England and Wales, with Preliminary Observations and an Account of some Foreign Prisons*, to which he afterward added supplements, having made new travels and new researches. The immediate result was the adoption, on trial, of the hard-labor system in some of the English prisons. In 1785 he started on a new tour through Italy, Turkey, and Asia Minor, in order to make himself acquainted with the lazarettos, and on his return published, in 1789, *An Account of the Principal Lazarettos of Europe*. In order to push his researches into this subject still further, he started in the same year on a tour to Asia, but d. Jan. 20, 1790, at Kherson, Russia.

**Howard** (JOHN EYGER), b. in Baltimore co., Md., June 4, 1752; served throughout the Revolutionary war with the greatest honor, and was present upon most of the important battle-fields of the war, attaining the rank of lieutenant-colonel, and receiving a medal from Congress for his valor at the Cowpens, Jan. 17, 1781. He was a member of Congress 1787-88; governor of Maryland 1789-92; U. S. Senator 1796-1803; and in 1798 was appointed a brigadier-general by Washington. He was a man of wealth, and his reputation for valor and patriotism made his old age one of great honor. D. Oct. 12, 1827.

**Howard** (OLIVER OTIS), LL.D., b. at Leeds, Me., Nov. 8, 1830; graduated at Bowdoin College 1850, and at the Military Academy 1854, when he was promoted in the army to be brevet second lieutenant of ordnance; promoted to be second lieutenant Feb., 1855, first lieutenant July, 1857; served as assistant at, and in command of, arsenals 1854-56; as chief of ordnance against hostile Indians in Florida 1857; and at the Military Academy as assistant professor of mathematics from Sept., 1857, to June 3, 1861; resigned June 7, 1861. Appointed colonel of the third Maine Vols. June 4, 1861, and commanded a brigade in the battle of Bull Run, July 21; appointed brigadier-general of volunteers Sept., 1861; served in the Virginia Peninsular campaign 1862, and at the battle of Fair Oaks (June 1) was twice wounded, losing his right arm; rejoined the army Aug., 1862, and was engaged in the battles of Antietam and Fredericksburg; appointed major-general of volunteers Nov., 1862; at the battle of Chancellorsville (May, 1863) he commanded the 11th army corps, as also at Gettysburg, July, 1863. Transferred with his command to Tennessee Oct., 1863, he was engaged in the battles of Lookout Valley and Missionary Ridge. In Apr., 1864, the 11th and 12th corps were united to form the 20th corps, and Gen. Howard was assigned to the command of the 4th corps, Army of the Cumberland, and in the July following to that of the Army of the Tennessee, being engaged around Dalton, at Resaca, Kennesaw Mountain, siege and occupation of Atlanta, and in the various actions and battles during the famous march to the sea with Gen. Sherman, and subsequent invasion of the Carolinas, terminating with the surrender of Gen. J. E. Johnston at Durham Station, N. C., Apr. 26, 1865. Appointed commissioner of Bureau of Refugees, Freedmen, and Abandoned Lands May, 1865, which position he retained till June, 1872; served as special commissioner of Indian affairs 1865, and was president of Howard University 1869-73. Gen. Howard was appointed a brigadier-general in the U. S. army Dec. 21, 1864, and brevet major-general U. S. A. 1865.

G. C. SIMMONS.

**Howard** (WILLIAM A.), b. in Vermont; graduated at Middlebury College 1839; moved to Michigan, from which State he was a leading member of Congress on the anti-slavery side 1835-61. Being a man of high order of talents, strong convictions, and unquestioned integrity, he had not only the respect but the esteem of his most decided opponents. Became postmaster of Detroit 1861.

A. H. STEPHENS.

**Howard Cen'tre**, post-tp. of Howard co., Ia. P. 294.

**Howard Cit'y**, post-v. of Montcalm co., Mich., 33 miles N. of Grand Rapids, on the Detroit Lansing and Lake Michigan and the Grand Rapids and Indiana R. Rs. It has good graded schools, 3 churches, an exchange bank, 1

newspaper, several large lumber, shingle, and planing mills, 2 hotels, and stores. Pop. about 1000.

W. E. MORRIS, Ed. "RECORD."

**Howardsville**, post-v. of San Juan co., Col.

**Howardsville**, post-v. of Scottsville tp., Albemarle co., Va. Pop. 32.

**Howard University**, an educational foundation situated at Seventh street, Washington, D. C., established by virtue of a charter granted by Congress in 1867, and deriving its patronymic from one of its most prominent founders, Gen. O. O. Howard, who continued to occupy the presidential chair until 1873, when he resigned. Though neither creed, color, nor sex is permitted to preclude admission to the ranks of its alumni, the institution was specially designed for colored people, of which fully two-thirds of its students consist. In 1872-73 the total number receiving instruction in the several departments (the normal, preparatory, collegiate, theological, legal, and medical) was 567. The university is placed under the management of twenty-one trustees; and though the U. S. government granted aid at its establishment, it is now entirely dependent upon voluntary contributions and the fees of students for its support. It possesses a library of 7500 volumes, a picture-gallery, a mineralogical collection, and a museum of curiosities. The terms of study allotted for the students in the various departments are—normal department, 2 years; preparatory, 3 years; collegiate, 4 years; theological, 2 years; law, 2 years; and medical, 3 years. Over fifty students have already graduated from this institution.

**Howe**, tp. of Forest co., Pa. Pop. 78.

**Howe**, tp. of Perry co., Pa. Pop. 410.

**Howe** (ALBION PARIS), b. at Standish, Me., Mar. 13, 1818; graduated from the U. S. Military Academy, and appointed second lieutenant of artillery July 1, 1841; after a term of two years passed on frontier and garrison duty, he returned to West Point as assistant professor of mathematics, where he remained until 1846; served throughout the war with Mexico with credit from Vera Cruz to the city of Mexico, winning the brevet of captain for Contreras and Churubusco. From 1848 to 1861 the monotony of garrison-life was relieved by occasional expeditions against Indians, and in 1859 he was at Harper's Ferry during the John Brown insurrection; on the outbreak of the civil war he was a captain of artillery, and accompanied Gen. McClellan in his campaign in West Virginia, at Rich Mountain, etc., and throughout the Virginia Peninsular campaign (1862) in command of light artillery brigade, having been appointed brigadier-general of volunteers June 11, 1862; subsequently in all the various battles of the Army of the Potomac, in command of a brigade and division of the 6th army corps, until the spring of 1864, when he was assigned to duty in Washington as inspector of artillery. At present serving on the Pacific Coast with his regiment (4th Artillery), of which he is major. G. C. SIMMONS.

**Howe** (ELIAS), inventor of the sewing-machine, b. at Spencer, Mass., July 9, 1819; was the son of a farmer and miller; went in 1835 to Lowell, and worked there, and afterwards in Boston, in machine-shops. In 1845 he completed his first machine, and patented it in 1846, laboring with the greatest persistency, in spite of poverty and neglect, working for a time as an engine-driver on a railroad for small wages and with broken health. He spent two years of unsuccessful exertion in England, striving in vain to bring his invention into notice. He returned to the U. S. in almost hopeless poverty, to find that his patent had been violated; but he at last found friends who assisted him with money, and after years of litigation he made good his claims in the courts in 1854. He afterwards realized a large fortune from his invention. During the civil war he volunteered as a private of the 17th Connecticut volunteers, and served for some time. He received the cross of the Legion of Honor and many medals. D. at Brooklyn, N. Y., Oct. 3, 1867.

**Howe** (JOHN), b. May 17, 1630, in Leicestershire, England; d. Apr. 2, 1705; completed his education at Cambridge and Oxford. After holding for several years a rural curacy, he was appointed (1654) domestic chaplain to Cromwell, a position he held until the death of the Protector (1658). He was an eloquent preacher, and universally esteemed for his ability and Christian character. He was the friend of Baxter, and labored in the same line with him for Christian unity. He was one of the leading controversialist writers of his day among the nonconformist party, but free from all animosity and bitterness. His principal works are - *The Oracle of God, The Living Temple, The Redeemer's Tears over Lost Souls, and The Blessedness of the Righteous*. Editions of his *Complete Works* during the present century have been issued at London,



1810-22, 8 vols.; *ibid.*, 1818, 3 vols.; and at Philadelphia, 2 vols. The best biography is that of Rogers, London, 1836.

**Howe** (HON. JOSEPH), b. in Halifax, N. S., in 1804, was the son of John Howe, a loyalist refugee from Boston. He was bred a printer, and in 1827 became connected with the *Acadian* newspaper, and in 1828 editor and proprietor of the *Nova Scotian*. As an outspoken liberal and friend of responsible government he was involved in a vexatious libel-suit and fought a duel with Mr. Halliburton. As a member of the Provincial Parliament, colonial agent in England, provincial secretary, etc., he was long one of the most prominent men in Nova Scotia, and was one of the founders of responsible government in the province. He was (1869-72) secretary of state for the provinces in the Dominion government, and superintendent of Indian affairs, and afterwards became a member of the Dominion Parliament for Hants, N. S.; was afterwards lieutenant-governor of Nova Scotia. He published two volumes of *Speeches and Public Letters* (1858). D. at Halifax June 1, 1873.

**Howe** (JULIA WARD), the daughter of Mr. Samuel Ward and the wife of Dr. S. G. Howe, b. in New York May 27, 1819; married Dr. Howe in 1843. Her *Passion Flowers* (1854), *Words for the Hour* (1856), and *Later Lyrics* (1866) contain her most important lyric poems. *The World's Own* (1855) and *Hippolytus* (1858) are dramas. She has also published two volumes of travel, and many able papers upon social and philosophical subjects. Many of her poems are of a high order of merit. She is an active worker in the woman's suffrage movement.

**Howe** (RICHARD), EARL, b. Mar. 19, 1725, was the third son of the second Viscount Howe; studied at Eton and Westminster; became a midshipman under Anson 1739; post-captain for gallantry at Fort William 1745; captured Cherbourg and Martigan 1758; succeeded his brother as viscount (Irish peerage) 1758; defeated Confians 1759; treasurer of the navy 1765; rear-admiral of the blue, with chief command in the Mediterranean, 1770; with William Howe, his brother, was appointed commissioner to avert the war in the American colonies 1776; fought D'Estaing off Rhode Island 1778; became admiral and viscount in the British peerage, by creation, 1782; relieved Gibraltar in 1782; first lord of the admiralty 1783; created earl 1788; took command of the Channel fleet 1793; defeated the French off Brest 1794; K. G. and general of marines 1795. D. in London Aug. 5, 1799. Howe was of a stock related closely to the royal family by illegitimate descent.

**Howe** (SAMUEL GRIDLEY), M. D., b. in Boston Nov. 10, 1801; graduated at Brown University in 1821; was a surgeon in the Greek war for liberty 1824-27; organized the surgical service and was placed at its head. He then returned to America for aid, and afterwards founded a colony on the Isthmus of Corinth. In 1831 he visited Europe again after his appointment to the superintendency of the Perkins Asylum for the blind, and while there attempted, as president of the Polish committee of Paris, to carry aid to the struggling Poles, but was imprisoned for six weeks in Prussia. After 1832 he had charge of the Perkins Institute for the blind, South Boston, Mass. He was long a prominent abolitionist. In 1871 he was one of the U. S. commissioners to Santo Domingo. Author of *An Historical Sketch of the Greek Revolution* (1828), *Reader for the Blind* (1839). D. at Boston, Mass., Jan. 9, 1876.

**Howe** (TIMOTHY O.), b. at Livermore, Me., Feb. 24, 1816; received an academic education; adopted the profession of law and was admitted to the bar; member of State legislature 1845; removed to Wisconsin late in 1845, and in 1850 was elected judge of the circuit and supreme courts of Wisconsin, which position he held until 1855, when he resigned. Chosen U. S. Senator for Wisconsin in 1861, and has been twice re-elected.

**Howe** (SIR WILLIAM), VISCOUNT, b. Aug. 10, 1729, brother of Richard, Earl Howe; studied at Eton; entered the dragoons; served at Quebec under Wolfe; colonel of the 4th Foot 1764, and major-general 1772; took the chief command in North America 1775, after Gage's departure. Howe having previously commanded at Bunker Hill; evacuated Boston Mar. 1776; went to Halifax, and thence to Staten Island; gained the battle of Long Island Aug. 27; occupied New York Sept. 15; won the victory of White Plains Oct. 28; of Fort Mifflin Nov. 16; of Brandywine Sept. 11, 1777; occupied Philadelphia Sept. 26; repulsed Washington at Germantown Oct. 4; was superseded by Sir H. Clinton in 1778; returned to England, where his conduct was vindicated after a parliamentary investigation; became a lieutenant-general 1782; general 1786; succeeded to the Irish peerage as viscount 1799. D. July 12, 1814.—The families both of Earl and Viscount Howe are now extinct, the present Earls Howe being of the Curzon family, ennobled in 1788 and raised to the earldom in 1821.

**Howell**, county of Missouri, bounded on the S. by Arkansas. Area, 864 square miles. Its soil is fertile, and it is extensively covered with pine forests. Corn is the principal product. Cap. West Plains. Pop. 4218.

**Howell**, post-v., cap. of Livingston co., Mich., 50 miles N. W. of Detroit, on the Detroit Lansing and Lake Michigan R. R., is surrounded by a fine agricultural district; has good educational advantages, 3 churches, 2 banks, foundry and machine shop, sash and door factory, 2 flouring-mills, 2 newspapers, stores, etc. Principal occupation, dealing in agricultural products and implements. Pop. of tp. 2563.

J. D. SMITH, Ed. "LIVINGSTON REPUBLICAN."

**Howell**, tp. of Howell co., Mo. Pop. 976.

**Howell**, tp. of Monmouth co., N. J. It contains a number of villages. Pop. 3371.

**Howell** (DAVID), LL.D., a native of New Jersey, was b. in 1747, and d. in July, 1824. At the age of twenty-three he was appointed professor of natural philosophy and mathematics, and filled the chair of law at the Brown University from 1790 to 1824. In the interval he filled the several offices of attorney-general of the State, judge of the supreme court, member of the Continental Congress, commissioner for settling the eastern boundary of the U. S., and district attorney, and was subsequently district judge for Rhode Island till his death. He was equally distinguished as a classical scholar and political argumentator.

**Howell** (JAMES). See FIRST BIENNIAL SUPPLEMENT.

**Howell** (JOHN ADAMS), U. S. N., b. Mar. 16, 1840, in New York; graduated at the Naval Academy 1858; became a lieutenant in 1861, a lieutenant-commander in 1865; served as executive officer of the Ossipee at the battle of Mobile Bay, Aug. 5, 1864, and is honorably mentioned in the despatches of his commanding officer, Com. W. E. Le Ray.

FOXHALLE A. PARKER.

**Howell** (JOHN C.), b. Nov. 24, 1819, in Philadelphia; entered the navy as a midshipman June 9, 1836; became a passed midshipman in 1842, a lieutenant in 1849, a commander in 1862, a captain in 1866, a commodore in 1872; was executive officer of the steam-frigate Minnesota at the battle of Hatteras Inlet, which resulted in the capture of Forts Hatteras and Clark, and commanded the *Nereus* in both the Fort Fisher fights. For "cool performance of duty" recommended for promotion by Rear-admiral Porter Jan. 28, 1865; from 1868 to 1870 chief of staff of the European fleet; from 1870 to 1872 commandant of navy-yard at League Island, Philadelphia; from 1872 to 1874 commandant of navy-yard at Portsmouth, N. H.; in Sept., 1874, appointed chief of the bureau of yards and docks.

FOXHALLE A. PARKER.

**Howell** (ROBERT BOYD CRAWFORD), D. D., b. in Wayne co., N. C., Mar. 10, 1801; graduated at Columbian College 1826; pastor of Baptist church, Norfolk, Va., 1827-35; Nashville, Tenn., 1835-50; Richmond, Va., 1850-57; Nashville, Tenn., 1857-68; and rendered good service to the cause of education. He wrote several works; the best known is *On the Deaconship*. D. Apr. 5, 1868.

**Howells** (WILLIAM DEAN), b. at Martinsville, Belmont co., O., Mar. 1, 1837; removed to Hamilton, O., in 1840 with his father, who was a printer. His father was of Welsh, his mother of Pennsylvania-German stock. Mr. Howells learned the printer's trade of his father, and was afterwards editorially connected with the Cincinnati *Gazette* and the Ohio *State Journal*. He was (1861-65) U. S. consul at Venice. In 1871 he became editor-in-chief of the *Atlantic Monthly*. He is one of the most facile and readable authors of our time, a graceful poet, and a writer of dainty, elegant prose. His works are *Poems of Two Friends* (written with J. J. Piatt, 1860), *Venetian Life* (1866), *Italian Journeys* (1867), *No Love Lost* (1868), *Suburban Sketches* (1870), *Their Wedding Journey* (1872), *A Chance Acquaintance* (1873), and *A Foregone Conclusion* (1874).

**Howellsville**, tp. of Robeson co., N. C. Pop. 1023.

**Howe's Cave**, post-v. and station on the Albany and Susquehanna R. R., in Cobleskill tp., Schoharie co., N. Y. It has a large natural cave and important quarries and limekilns.

**Howison** (ROBERT R.), b. at Fredericksburg, Va., in 1820, has been since 1845 a prominent lawyer of Richmond. He has published a *History of Virginia* (2 vols., 1846-48), *Lives of Morgan, Marion, and Gates*, *Criminal Trials* (1851), a *History of the War of 1861-65*, and other works.

**Howitt** (MARY), wife of William Howitt, b. at Uttoreter, England, about 1801, the daughter of a Mr. Botham, a Quaker; was married in 1823; has written many poems, hymns, and ballads, some novels, and instructive books for the young; translated Miss Bremer's works and some of those of H. C. Andersen, and was with her husband joint author



of *The Literature and Romance of Northern Europe* (1852) and other valuable works.—Her daughter, MRS. ANNA MARY WATTS, is author of *The Art Student in Munich* (1853), *The School of Life*, etc., and a painter of merit.—Another daughter is a successful writer of books.

**Howitt** (WILLIAM), b. at Heanor, Derbyshire, in 1795, of Quaker stock. His first books were written partly by his wife, Mary Howitt. He also published a *History of Priestcraft* (1834), *Rural Life in England* (1837), *Student Life in Germany* (1841), *Rural and Domestic Life in Germany* (1842), *Land, Labor, and Gold* (1855), an account of his experiences in Australia; *History of England* (1854-61), and translations from the German. D. Mar. 2, 1879.

**Howitzer** [derived by Grimm and Littré from the Bohemian *haufnice*, "catapult"], a short cannon for firing shells *horizontally*, differing in this from the *mortar*, which is used for *vertical fire*. It was introduced by the Dutch in 1606, and soon became of general use, except by the French, who, considering it of small value because of the short range and inaccurate fire, did not introduce it until after Napoleon's wars had shown him its value. The howitzer was made with a chamber for the powder (of smaller diameter than the bore), and with a length of bore regulated to admit of the shell being reached by the hand, to adjust the fuze in the axis, after the gun was loaded. After the adoption of *sabots* (a block of wood to which the shell is attached) this could be secured in long guns, and the howitzers for field and garrison service were then made of greater length and came into universal use. The siege howitzer, generally of 8-in. diameter, is still made short, as the sabot cannot be safely used if the gun is fired over advance parties, as is necessary in siege firing. The first cannon cast by the colonial authorities of America were 8-in. and 24-pdr. brass howitzers, some of which are now preserved. The Russians in 1777 introduced the *licorne*, an improved howitzer. Howitzers, except for siege and mountain service, are no longer manufactured in the U. S., as our present guns are equally suitable for shell-firing in field or garrison service. P. V. HAGNER.

**Howland**, post tp. of Penobscot co., Me., on the W. side of the Penobscot River, 32 miles N. of Bangor, Me., near the European and North American R. R. It has manufactures of lumber. Pop. 176.

**Howland**, tp. of Trumbull co., O. Pop. 664.

**Howland** (HON. WILLIAM PEARCE), C. B., b. in the State of New York May 29, 1811. He removed when young to Canada, and became one of the wealthiest merchants of the Upper Province. In 1858 he was elected to the Parliament of Canada; in 1862 became minister of finance; in 1863 receiver-general; in 1864 postmaster-general; in 1866 minister of finance; was sent as a delegate to England, and was made a C. B.; in 1868 became lieutenant-governor of the province of Ontario. He is a liberal in politics.

**Howling Mon'keys**, a genus of prehensile-tailed monkeys of South America, of a low grade of intelligence, fierce and untamable disposition, and large size. Some twelve or fourteen species are reported. The genus (*Mycetes* or *Alouatta*) is distinguished from all others by the presence of a great chamber within the hyoid bone and communicating with the larynx. The possession of this chamber gives these monkeys the power of producing those tremendous howls which in the night re-echo for half a league through the Brazilian forests. This hideous roar is probably an amorous serenade. The ursine howler (*M. ursinus*) is the best known species.

**Howe** (JOHN A.), b. in New York City in 1831, and d. in the same city Sept. 27, 1874. He graduated at Columbia College, and after studying first for the ministry, and afterwards for the law, besides being connected with religious and society journals, adopted art as his profession. He painted several pictures which achieved considerable prominence, but his best known works were his drawings on wood. Among the books which were illustrated by him exclusively were *A Forest Hymn, In the Wood, Forest Pictures in the Adirondacks, A Christmas Carol*, and *Coxe's Christmas Ballads*. J. B. BISHOP.

**Howson** (JOHN SARLE), D. D., b. in England in 1816; graduated with high honors at Cambridge in 1837; was ordained in 1845, and was principal of the Liverpool College 1849-65; became dean of Chester in 1867, and is examining chaplain to the bishop of Ely. With W. J. Conybeare he published (in 1850-52) *The Life and Epistles of St. Paul*, furnishing the principal part of the geographical and historical matter. He has also published *The Character of St. Paul* (1862; 3d ed. 1871), *The Metaphors of St. Paul* (1868), *The Companions of St. Paul* (1871).

**Höx'ter**, town of Westphalia, Prussia, anciently a Hanse town. It is 28 miles E. N. E. of Paderborn, and stands on

the Weser. It is a place of venerable antiquity, and has brisk manufactures of flax, cotton, and paper. Pop. 5041.

**Hoy**, one of the Orkney Islands, 2½ miles from Pomona. It presents a coast of wild, precipitous cliffs, in some places more than 1000 feet high, but to the S. it has a fine harbor at Longhope. Pop. 1486.

**Hoyle** (EDMUND), author of several works on games, was an Englishman, b. 1672, and d. 1769. Since his death there have been many much improved editions, British and American, of *Hoyle's Games*.

**Hoyt** (BENJAMIN THOMAS), son of the Rev. Benj. R. Hoyt, b. at Boston Oct. 18, 1820; was successively teacher, professor, and president in various collegiate and educational institutions, and editor of the *Indiana State School Journal*. From 1846 to 1852 he occupied the position of principal in the schools of Middletown, Conn., and Chelsea, Mass. From 1852 to 1858 he was president of the institute of Lawrenceburg, and of the College for Young Women in Indianapolis. He was professor of Latin from 1858 to 1863, and professor of belles-lettres and history in the Indiana Asbury University until his death at Greencastle, Ind., in 1867. His services to the cause of education in Indiana as superintendent of schools, as president of the State Teachers' Association, and as an educational writer were invaluable.

**Hoyt** (EDWIN), b. in Stamford, Conn., in May, 1805. When nineteen years old he became a dry-goods merchant of New York. In 1835 the firm of Hoyt & Bogart was established, afterwards Hoyt, Tillinghast & Co. In 1858 the firm of Hoyt, Spragues & Co. was constituted. Mr. Hoyt d. in New York May 15, 1874. At the time of his death he was the oldest dry-goods merchant in New York, universally honored for probity and mercantile rectitude.

**Hoyt** (FRANCIS SOUTHBACK), D. D., b. at Lyndon, Vt., Nov. 5, 1822; graduated at Wesleyan University, Middletown, Conn., in 1844; was president of Willamette University, Salem, Or., 1854-60; professor of chemistry, etc. in the Ohio Wesleyan University 1860-72; and in 1872 became editor of the *Western Christian Advocate*.

**Hoyt** (JOSEPH GILSON), LL.D., b. at Dunbarton, N. H., in Jan., 1815; graduated at Yale College 1840; became instructor in mathematics and natural philosophy, and subsequently for eighteen years fulfilled the duties of member of the faculty in Phillips Academy, Exeter, N. H., from 1841 to 1858; and was appointed chancellor and professor of Greek in Washington University, St. Louis, from 1859 to his decease at St. Louis, Mo., in 1862. His chief literary labors comprised a carefully revised and enlarged *Colton's Greek Reader*, and a volume of miscellaneous writings, reviews, lectures, and addresses.

**Huaca**. See GUACA, by COM. FOXHALL A. PARKER, U. S. N.

**Hualapai's Indians**, a hostile tribe of Arizona, found near the Colorado, N. of the Mohaves. They number some 1500.

**Hualla'ga**, a river of Peru, rises in the Andes in lat. 11° S., and empties itself into the Amazon after a northerly course of nearly 500 miles.

**Huamanga**. See AYACUCHO.

**Huancaveli'ca**, or **Guanacabelica**, town of Peru, situated in the Andes at an elevation of 11,000 feet, and engaged chiefly in mining gold and quicksilver. It is regularly built, is the capital of a province of the same name, but is rather decreasing. Pop. 5000.

**Huan'ta**, a well-built town in the department of Ayacucho, Peru, about 200 miles S. E. of Lima. It has a large trade in drugs, grain, and cattle. Pop. 5000.

**Hua'nucó**, or **Guanuco**, town of Peru, situated in an exceedingly beautiful and fertile valley of the Andes. Sugar and coffee are raised here, both of excellent quality, but as there are no roads, they cannot be raised for exportation. The town is decaying. Pop. 5000.

**Huaraz**, town of Peru and the capital of the department of Huaraz, on the Santa. It is a beautifully situated and well-built town, with about 8000 inhabitants, mostly mestizoes, engaged in agriculture and garden cultivation.

**Hub'bard**, tp. and post-v. of Trumbull co., O., on a branch of the Atlantic and Great Western R. R. Here are important coal-mines. Pop. of v. 1126; of tp. 4588.

**Hubbard**, tp. of Dodge co., Wis. It contains the village of HORICOX (which see). Pop. 3008.

**Hubbard** (DAVID), b. in Virginia, removed to Lawrence co., Ala., and in 1842 entered the State legislature, having previously for many years been connected with the State government; was in Congress 1839-41 and 1849-51; a man of decided ability, and an extreme State rights man; was a prominent State legislator, and after the war of 1861-65 removed to Nashville, Tenn.



**Hubbard (HENRY)**, b. at Charlestown, N. H., May 3, 1781; graduated at Dartmouth in 1803; became a lawyer, and was several times Speaker of the New Hampshire House; judge of probate in Sullivan co. 1827-29; Democratic member of Congress 1829-33, and for a short time Speaker; U. S. Senator 1835-41; governor of New Hampshire 1842-43; U. S. assistant treasurer 1846-49. D. at Charlestown, N. H., June 5, 1857.

**Hubbard (JOHN)**, M. D., LL.D., b. at Readfield, Me., Mar. 22, 1794; graduated at Dartmouth in 1816; taught in Maine and Virginia; practised medicine in Dinwiddie co., Va., 1822-29, and in 1830 removed to Hallowell, Me.; was State senator 1842-43; governor of Maine 1850-53, and a Maine law Democrat; agent for the U. S. treasury 1857-59; commissioner under the Reciprocity Treaty 1859-61. D. at Hallowell, Me., Feb. 6, 1869.

**Hubbard (JOSEPH STILLMAN)**, b. Sept. 7, 1823, at New Haven, Conn.; graduated at Yale College in 1843; in 1844 was appointed an assistant in the High School Observatory at Philadelphia, then in charge of the distinguished astronomer, Sears C. Walker. The next autumn he was employed by Capt. (afterwards Maj. Gen.) Fremont to reduce his Rocky Mountain observations, and was invited to accompany him on his next expedition. Declining this offer, he was appointed and commissioned a professor of mathematics in the U. S. navy May 7, 1845, at the instance of Fremont and Senator Benton, and was at once assigned to duty in the Naval Observatory at Washington, where he remained until the time of his death. He soon acquired a brilliant reputation, and the printed volumes of the Washington observations are full of the evidences of his skill as an observer and computer. He was a frequent contributor to the *Astronomical Journal*, which contains his elaborate investigations on Biela's comet, as also those on the great comet of 1843, on the orbit of Egeria, and on other subjects. D. Aug. 16, 1863. G. C. SIMMONS.

**Hubbard (SAMUEL DICKINSON)**, LL.D., b. at Middletown, Conn., Aug. 10, 1799; graduated at Yale in 1819; was a lawyer and a wealthy and benevolent manufacturer; a Whig member of Congress 1845-49; postmaster general 1852-53. D. at Middletown, Conn., Oct. 8, 1855.

**Hubbard (WILLIAM)**, b. in England in 1621; came in youth to New England; graduated at Harvard College 1642; settled as minister of Ipswich, Mass., 1658; temporary president of Harvard University in 1688; and d. at Ipswich Sept. 14, 1704. Author of *The Present State of New England* (1677), *Memoirs of Maj. Gen. Denison* (1684), and a *History of New England*, for which the colonial authorities paid him £50. Editions of this work were printed in 1845 and 1848.

**Hubbardston**, post-tp. of Worcester co., Mass., 64 miles W. N. W. of Boston. It is traversed by the Boston Branch and Gardner and the Ware River R. Rs.; has a fertile soil and manufactures of chairs and boxes. It has 3 churches and a public library. Pop. 1654.

**Hubbardston**, post-v. of Ionia co., Mich., 6 miles from the Detroit and Milwaukee R. R. It has 3 churches, a flouring mill, foundry, and steam saw-mill, sash and blind factory, 5 dry-goods and clothing stores, 2 drug stores, mineral springs, 1 newspaper, and good water-power. Pop. 611. A. V. PHISTIE, Ed. "ADVERTISER."

**Hubbardville**, post-v. of Hamilton tp., Madison co., N. Y. Pop. 117.

**Hubbardton**, post-tp. of Rutland co., Vt., 7 miles N. of Castleton. It has 2 churches and manufactures of leather. Here the Americans under Warner and Francis were defeated by the British and Hessians under Fraser, July 7, 1777. Pop. 606.

**Hubble**, tp. of Cape Girardeau co., Mo. Pop. 1689.

**Huber (FRANÇOIS)**, b. at Geneva July 2, 1750. Before the age of fifteen he had completed a course of physics under De Saussure, and familiarized himself with practical chemistry in the laboratory of a relation. Inheritance and education combined to awaken early in him a passion for natural history, but intense application and study at night by dim lamplight or moonlight forced him for a time to suspend his studies. His father took him to Paris, when he was just fifteen, to consult the best physicians. Tronchin ordered him to spend some months in the performance of common farm work, which soon restored his general health, but his ophthalmia was declared incurable, and he became, in a few years, totally blind. He married Marie Aimée Lullin, a wife who proved unflinching in her tenderness and devotion. By the aid of his wife, his son, and an intelligent peasant named Francis Burnens, whom he trained to the work of observation, Huber devoted his life to the study of bees. He discovered that the fertilization of the queen-bee takes place in the air, and but once, and that a

queen whose impregnation is deferred beyond the twenty-first day produces only drones. He confirmed Schirach's statement that bees when left queenless can convert a worker-larva into a queen by enlarging its cell and supplying it with different food. He determined the fact of the yearly massacre of the drones, and that it takes place only when swarming-time is past and a fertile queen secured. He observed that queen-manifest latter animosity against each other, engage in combats if there are two in the hive at the same time, and destroy all royal pupae. He investigated the question of the modification of bees in consequence of the size of cells in which they are reared, and witnessed through blown-glass cells all the processes of the cocoon-spinning. He examined into the senses of bees, and determined their seat, and discovered that they use their antennae for the communication of ideas and for the accurate performance of their varied work within the darkened hive. He found that the workers were of two kinds—wax-workers and nurse-bees—demonstrated the origin of propolis, and discovered the whole secret of the secretion and manipulation of wax for building purposes. He detected the *Sphinx atropos* in its ravages in the hive, and witnessed the bees' contrivances for their own protection. He found that bees respired, absorbing oxygen and evolving carbonic acid, and that the purity of the air is maintained by a system of ventilation, the currents of air being induced by the rhythmic motion of their wings. By means of dissections made at his request by Mdlle. Jurine he exploded the theory of neuters, and proved the worker to be an imperfectly developed female. The record of his work he first gave to the world under the title of *Lettres à Ch. Bonnet* (1792). In 1796 other discoveries were added to the former, and the new edition was entitled *Nouvelles Observations sur les Abeilles*. Later editions have included his subsequent observations under the same title.\* In connection with Senebier he published the *Mémoire sur l'influence de l'air dans le développement des grains* (Geneva, 1801). To this last work he contributed only the materials, which were worked into form and recorded by Senebier. He d. Dec. 22, 1831, in full possession of all his faculties. The work done by Huber in his own department perhaps equals that done by all observers before and since; his observations are almost without a flaw, and his generalizations remarkably accurate. Mrs. S. B. HERRICK.

**Huber (JOHANN NEPOMUK)**, b. in Munich Aug. 18, 1789; graduated at the university of his native city 1854; became in 1809 professor of theology, at which time he published his *Philosophie der Kirchengerichte*, which was soon after placed in the *Index Expurgatorius*. He was the avowed antagonist of the Ultramontanists; and they, in turn, used every effort to coerce him to silence, but without success. In 1871 he took a prominent part as a leader in the war against the Jesuits, and was an active and formidable opponent of the dogma of papal infallibility, in connection with the Old Catholic movement in Bavaria. He wrote several other polemical works and pamphlets in support of his peculiar views. D. Mar., 1879.

**Huber (PIERRE)**, b. at Geneva Jan. 23, 1777. He made investigations upon humble-bees, ants, butterflies, etc. His work is recorded in sixteen memoirs, to be found in *Bibl. Britannica* (1801 and 1806), and in the *Mémoires Soc. Phys.* (Geneva, from 1821 to 1843). He assisted his father in the observations and publication of the second part of *Nouvelles Observations sur les Abeilles*. His most valuable work is translated under the title *History of the Nature and Habits of Ants* (1820). D. at Yverdon Dec. 22, 1840.

Mrs. S. B. HERRICK.

**Hubley**, tp. of Schuylkill co., Pa. Pop. 547.

**Hubmeyer**, or **Hübmaier** (BALHASAR), one of the originators of the Anabaptist movement in Germany in the first part of the sixteenth century, b. about 1480 at Friedberg, near Augsburg; studied theology and philosophy at Freiburg under Eck 1503; became professor of theology in Ingolstadt in 1512, and in 1516 preacher at the cathedral of Regensburg, whence he removed in 1520 to Waldshut. Here he embraced the Reformation, but began soon to develop original, or rather separatist, views. Especially after his acquaintance with Thomas Münzer. He taught that it was wrong to baptize small children, the baptism ought not to take place until the full-grown man demands it as the external symbol of his faith. As Hubmeyer was a very gifted preacher, his congregation adopted his ideas, but soon the Austrian government interfered, and he then fled (in 1525) to Zurich. Imprisoned and persecuted here at length, he went to Schaffburg in Moravia, where he formed a large Anabaptist congregation. Although he was a sound and clear-headed man himself, he could not prevent the religious fanaticism and social eccentricities which generally characterized the Anabaptists from breaking out in his congregation. Disorders arose, and



when, at the death of Ludwig of Hungary, Moravia fell to Ferdinand of Austria, Hubmeyer was seized, carried to Vienna, sentenced to death, and burned at the stake, Mar. 10, 1528. Some of his writings were collected and published in 1746. (See ANABAPTISTS and BAPTISTS.)

**Hübner** (JOSEPH ALEXANDER), BARON, b. at Vienna Nov. 26, 1811. Having completed his studies at Vienna, he travelled in Italy, and on his return (in 1833) was introduced by Prince Metternich into the service of the government. His diplomatic career began at Paris in 1837. After several minor appointments he was sent ambassador to Paris in 1849, and recalled in 1859. It was to him, on New Year's Day, 1859, that Napoleon III. addressed the remark which foreshadowed the impending Franco-Austrian war. From 1866 to 1867 he was a second time at the head of the Austrian embassy at Rome. He has managed many delicate and difficult matters with consummate ability and tact. He visited the U. S. in 1870, and again in 1871, when he went around the globe. He is now (1875) residing in Rome. He has published an admirable work on Pope Sixtus V.—*Sixtus der Fünfte* (2 vols. 1871; English trans. 1872), and a charming account of his ramble around the globe—*Promenade Autour du Monde* (1873; 3d ed. 1874; Eng. trans. 1874). R. D. HITCHCOCK.

**Huc** (ÉVARISTE RÉGIS), b. Aug. 1, 1813, in Toulouse, where he studied theology; entered the order of the Lazarists and took holy orders in 1839. Immediately after he set out for Macao, where he lived for eighteen months, studying the Chinese language. With his skin dyed, his head shaved, and in Chinese costume he then travelled from Canton through the interior of the empire to Peking, and from Peking to He-Shuy in Mongolia. In 1844 he started from He-Shuy for Lhasa in Thibet, which he reached in 1846, but had to leave after a stay of a few months. He now travelled through the southern parts of the empire to Canton, and in 1852 he left China in order to return home. His health had suffered very much, and he d. in Paris Mar. 31, 1860. Published *Souvenirs d'un voyage dans la Tartarie, le Thibet, et la Chine* (2 vols., 1852), *L'Empire Chinois* (2 vols., 1854), *Le Christianisme en Chine, en Tartarie, et en Thibet* (4 vols., 1858), all translated into English.

**Huckleberry and Blueberry**, names applied to the North American representatives of the WHORTLEBERRY (which see) of Europe. Our huckleberry-bushes are ericaceous shrubs of the genera *Gaylussacia* and *Vaccinium*. The berries are extensively marketed, and eaten as dessert fruit and in pies and puddings. *Gaylussacia brachycera*, *dumosa*, *frondosa*, *resinosa*, and *urina* furnish most of the proper huckleberries, mostly hard and dark-colored fruits; the blueberries, generally lighter-colored, softer, and sweeter than the huckleberries, are mostly from *Vaccinium Pennsylvanicum*, *Canadense*, *vacillans*, *corpybosum*, and others. The annual product and the money-value of fruits of these two genera are very great.

**Huddersfield**, town of England, in the county of York, at the confluence of the Holme and the Colne. It has very large manufactures of cloths, kerseymeres, flushings, and serges, extensive coal-mines in the vicinity, and easy communication with all important commercial points of England. Pop. 70,253; of parliamentary borough, 74,358.

**Hudson**, county of the N. E. of New Jersey, bounded on the E. by the Hudson River and New York harbor. Area, 180 square miles. Its eastern border is marked by the Palisades, a remarkable ridge of trap-rock. The county is almost entirely suburban to New York City. It has manufactures of cigars, clothing, and many other kinds of goods. It is traversed by numerous railroads, centring at Jersey City and Hoboken, its largest cities. Cap. Jersey City. Pop. 129,067.

**Hudson**, tp. and post-v. of McLean co., Ill., on the Illinois Central R. R., 3 miles N. of Bloomington. P. 1392.

**Hudson**, tp. of La Porte co., Ind. Pop. 636.

**Hudson**, post-pt. of Penobscot co., Me., 15 miles N. N. W. of Bangor. It manufactures lumber. Pop. 739.

**Hudson**, tp. and post-v. of Middlesex co., Mass., 16 miles N. E. of Worcester, on the Fitchburg R. R. It contains 3 churches, a savings bank, several large shoe-shops, foundry, and pianoforte manufactory, 1 newspaper, 1 hotel, stores, etc. Principal occupation, shoemaking and farming. Pop. 3389. WOOD & RAWSON, Eds. "PIONEER."

**Hudson**, tp. and post-v. of Lenawee co., Mich., 50 miles W. of Toledo, on the Lake Shore and Michigan Southern R. R. It has 2 union schools, 7 churches, 2 banks, large spoke and butter-tub factories, 2 newspapers, carriage-shops, and other manufactories. P. of v. 2459; of tp. 4094. W. T. B. SCHERMEHORN, Ed. "HUDSON GAZETTE."

**Hudson**, tp. of Douglas co., Minn. Pop. 448.

**Hudson**, tp. of Macon co., Mo. Pop. 1376.

**Hudson**, tp. and post-v. of Hillsborough co., N. H., 3 miles E. of Nashua. Pop. 1066.

**Hudson**, city, cap. of Columbia co., N. Y., situated on the E. bank of the Hudson River, at the natural head of navigation, 115 miles N. of New York, and 36 miles below Albany, on the Hudson and Boston and the Hudson River R. Rs. It contains the Hudson Academy, one of the oldest collegiate schools in the State, 15 churches, 4 banks, large manufactories of paper car-wheels, steam fire-engines, and stoves, 2 iron furnaces, 2 daily and 3 weekly newspapers, 6 hotels, and an orphan asylum. The city, covering an area of about one square mile, is supplied with gas, and water from the river is being introduced (1875) at an expense of \$250,000. It has an extensive trade by the river. Pop. 8615. M. PARKER WILLIAMS,

Ed. "DAILY REGISTER" AND "WEEKLY GAZETTE."

**Hudson**, tp. and post-v. of Summit co., O., at the junction of the Cleveland and Pittsburg and the Cleveland Mt. Vernon and Delaware R. Rs., 24 miles S. E. of Cleveland. It is the seat of Western Reserve College. P. of tp. 1520.

**Hudson**, post-v., cap. of St. Croix co., Wis., 18 miles E. of St. Paul, Mo., on the West Wisconsin R. R. It has an academy and other schools, 5 churches, 2 banks, 3 newspapers, 3 hotels, railroad machine-shops, wagon and plough manufactories, numerous wheat warehouses, flouring-mills, etc. Principal occupation, farming. Pop. of v. 1748; of tp. 2203. H. A. TAYLOR, Ed. "STAR AND TIMES."

**Hudson**, tp. of Walworth co., Wis. Pop. 1312.

**Hudson** (ERASMUS DARWIN), M. D., b. Dec. 15, 1806, at Torrington, Conn., was educated by private tutor and at Torrington Academy; graduated in medicine at the Berkshire Medical College 1827; practised in Bloomfield, Conn., and was a member of the Connecticut State Medical Society, etc. In 1828 he began to lecture on temperance. From 1837 to 1849 he was lecturing agent of the Connecticut Anti-slavery Society and general agent of the American Anti-slavery Society. Since 1849 he has devoted himself to mechanical and orthopedic surgery, not only in private practice, but in a majority of the government cases of gunshot injuries of bones, resections, ununited fractures, and amputations at the knee and ankle joint. He has written *Essay on Temperance* (1828); was a contributor to *The Liberator* and *National Anti-slavery Standard* (1837-49); co-editor of *The Charter Oak* (1838-41); has published monographs on *Resections* (1870), *Syme's Amputation* (1871), *Immobile Apparatus for Ununited Fractures* (1872); and has contributed numerous reported cases, published in the *Medical and Surgical History of the War of the Rebellion* (Washington, 1870-72).

**Hudson** (ERASMUS DARWIN, JR.), A. B., M. D., b. Nov. 10, 1843, at Northampton, Mass.; graduated at the College of the City of New York in 1864, and at the College of Physicians and Surgeons, New York City, in 1867; in 1867 and 1868 was house-surgeon of Bellevue Hospital; since 1868 has been engaged in the practice of medicine; served as health inspector 1869-70; was attending physician to the class for diseases of the eye, out-door department of Bellevue Hospital, same year; was attending physician at Northwestern Dispensary 1870-72; attending physician to Trinity chapel parish and Trinity Home 1870-75; and since 1872 has been professor of principles and practice of medicine at the Woman's Medical College of the New York Infirmary. He has published *Report of Pulse and Respiration of Infants in Elliot's Obstetric Clinic* (1872), and monograph on *The Prevention and Early Arrest of Pulmonary Phthisis*. He is a contributor to *Johnson's Universal Cyclopedia*.

**Hudson** (FREDERIC), b. at Quincy, Mass., Apr. 25, 1819; was educated in Boston; was for thirty years on the editorial staff of the New York Herald. Author of *Journalism in the U. S.* D. Oct. 21, 1875.

**Hudson** (GEORGE), b. at York, England, about 1800; commenced life as a draper. He made a large fortune in railway speculations during the railway excitement of 1845-46, was known as the "railway king," and was regarded in England and France as an oracle on the subject of railway operations. He was a member of Parliament from 1845 to 1859, and was three times elected lord mayor of York. After exercising influence in every branch of society, he d. in reduced circumstances Dec. 14, 1871.

**Hudson** (HENRY or HENDRIK), an English discoverer of whose birth and early history nothing is known. In 1607 he made a voyage in search of the North-west passage. In 1608 he sailed to Nova Zembla, and in 1609, in the service of the Dutch India Company, he sailed in the Half Moon for Davis' Straits; but reached Cape Cod, went to Chesapeake Bay, discovered the Hudson River, up which he sailed as far as where Albany stands. In 1610 he sailed again in an English ship, discovered Hudson's Strait and Hudson's Bay, in which he wintered; but



after suffering many hardships his crew became mutinous and set him, with his son John and seven infirm sailors, adrift in a shallop; after which he was never heard of. A part of his crew arrived in England in 1611. Hudson published *Direc. Voyages and Northern Discoveries* (1607) and *A Second Voyage* (1608). (See GEO. ASHLEY'S monograph *Hakluyt Soc.*, 1899, and J. MEREDITH READ, JR.'S, *Inquiry concerning Hudson* (1866).)

**Hudson** (HENRY NORMAN), b. in Cornwall, Vt., Jan. 28, 1814; was bred a farmer and coachmaker; graduated in 1840 at Middlebury College; he afterwards taught in Kentucky, Alabama, and elsewhere, and became a successful lecturer on Shakespeare. In 1849 he was ordained a priest of the Protestant Episcopal Church; was for a time editor of the *Churchman*; rector of a church at Litchfield, Conn., 1859-60, and was an army chaplain during the civil war. He has published *Lectures on Shakespeare* (2 vols., 1848), an edition of Shakespeare (11 vols., 1850-57), *A Chapman's Conquest of the Promised Land* (Butler, 1863), *School Shakespeare* (1870), *Shakespeare, his Life, etc.* (1872), *Sermons* (1874).

**Hudson River**, called also **North River** in its lower course, is one of the noblest of American streams. It rises some 3000 feet above tide-water in Essex co., N. Y., among the Adirondacks. After a rapid and devious course among the mountains, it is joined by the Schroon River, and 10 miles farther on by the Sacondaga. Thence its course is generally eastward to Sandy Hill, from which point it flows almost due S. to its mouth. The Batten Kill and Hoosick join it from the E. At Cohoes it receives the Mohawk, which more than doubles its volume. Three miles below, at Troy, it becomes a navigable tidal stream. Above this it is chiefly noteworthy for its romantic scenery and its noble and unflinching water-power. But it is proposed to open slack-water navigation, by means of locks and dams, to Fort Edward. The largest affluent received below Troy is the Walkill. The tidal rise at Albany is only one foot, and below this point there are some obstructions to rapid navigation, the most noteworthy of which is the "Overslaugh" or bar at Castleton. To remedy these difficulties the U. S. have expended over \$1,500,000 (besides large State appropriations in deepening and dredging channels, building dykes, revetments, and the like, and the work is not yet complete. There are also 21 lighthouses and lighted beacons owned by the general government upon the banks of this river. The appropriations have been almost entirely expended above the city of Hudson, where the obstructions cease. The river is navigable 117 miles to this city for ships of the first class, and to Troy, 166 miles, for steamers and schooners. Thirty miles below Troy the river approaches the remarkably fine scenery of the Catskill Mountains. At Newburgh, 60 miles from New York, the Hudson enters the Highlands, through whose impressive scenery it flows for 20 miles. Below Verplank's Point the river expands into Haverstraw Bay and the Tappan Sea, a noble, lake-like expansion. Below, the western bank of the river is marked by the Palisades, a precipice of lofty trap-rock, at some points 500 feet high. The fisheries of the Hudson are of considerable importance. Shad, bass, and sturgeon are extensively taken, and several species of fish native to the St. Lawrence basin have naturalized themselves in the Hudson since the opening of the Champlain and Erie canals. It is probable that the Hudson was never a salmon stream, but some attempts have been made to stock it with *Salmo salar* and *S. quinnat*, the true and the California salmon. The Erie Canal connects the river with Lake Erie, the Champlain Canal with Lake Champlain, the Delaware and Hudson with the Pennsylvania coal-regions. The river is thus the thoroughfare for large numbers of canal and freight boats to and from New York and the neighboring cities. Its passenger steamers are not excelled in splendor by any vessels afloat, and for size and speed they take a high rank. The waters of the Hudson enter the inner bay of New York, flowing between New York City and Jersey City on the E. and W. respectively. The river, with its canal connections, has done much to make New York what it is industrially and commercially. It is about 300 miles in length. It was named in honor of Henry Hudson, its first European explorer.

**Hudson's Bay**, a great landlocked sea of British North America, 800 miles long from N. to S., and 600 miles across, lying between 51° and 64° N. lat. and 78° and 95° W. lon. It is so much obstructed by ice that in winter it is not navigable. At no time is its navigation safe or easy. It has many islands and shoals. Of late there is a considerable summer whale-fishery within its limits. Area, 300,000 square miles. Hudson's Strait is its outlet to the Atlantic.

**Hudson's Bay Company**, the last of the great English commercial corporations, was chartered May 2, 1670, by Charles II., and censured to exercise its monopoly June 23,

1870, after 200 years of authority in the northern parts of North America. For many years after its foundation the French were in possession of Canada. The North-west Company of Montreal was a formidable rival from 1783 to 1821, when the younger company was merged into the older. The principal trade of the company was in furs, and it was uniformly a profitable trade. It originally possessed a proprietorship and a monopoly of trade throughout Rupert's Land, as the land whose streams flow into Hudson's Bay was called. This name was derived from the famous Prince Rupert, the principal original incorporator. In 1821 this jurisdiction (with the original authority to govern and also to make war upon savage nations) was extended westward to the Pacific—the authority for the new territory to last only for periods of twenty years by royal license. From 1849 to 1859, Vancouver's Island was also licensed to this company. After 1859 the company had no monopoly W. of the Rocky Mountains. In 1868 the company was authorized by act of the British Parliament to surrender its powers and rights to the Crown and incorporate its territories with the Dominion of Canada. In 1869 this was carried out, and in 1870 the full transfer was accomplished.

**Hudson's Strait**, connecting Hudson's Bay with Davis's Strait and the Atlantic Ocean, in British North America, is situated between 60° and 64° N. lat. and 65° and 77° W. lon. It is 450 miles long, and its breadth averages 100 miles, the narrowest point being 60 miles.

**Hué**, the capital of Anam, on the Hué, near its entrance into the China Sea. In the beginning of the present century it was regularly fortified by French engineers, and it is generally well built, but it is accessible only to small vessels, on account of the shallowness of its harbor. Pop. 100,000.

**Huel'va**, town of Southern Spain, the capital of the province of Huelva, at the junction of the Odiel and the Tinto. It is a handsome town, but unhealthy on account of the salt-marshes in its vicinity. It has a lively coasting-trade, especially in fruits. Pop. 8423.

**Huerfano**, county of Southern Colorado, lying principally E. of the main Rocky Mountain range. Area, about 1600 square miles. It is well watered, and contains the Huerfano Park. The raising of cattle and wool is a leading pursuit. Cap. Walsenburg. Pop. 2250.

**Huert'a, de la** (VICENTE GARCIA), b. at Zalra, in Estremadura, in 1729, and d. in 1797 in Madrid, where he held the office of first librarian of the royal library. In the hot contest which took place at that time in the Spanish literature between the adherents of the French influence and the defenders of the old Spanish taste, Huerta headed the latter party, and exercised a considerable influence, both by his tragedy, *Raquel*, which was first produced in Madrid in 1778, and made a great success, and by his collection of the best works of the elder Spanish dramatists (17 vols., 1784-85). He also published two volumes of poems, *Obras Poéticas* (1778-79).

**Hues'ca**, town of Spain, the capital of the province of the same name, on the Isuela. It is beautifully situated on a plain covered with vineyards and olive-forests, and has many interesting buildings, among which are a Gothic cathedral built in 1400, a university founded in 1354 (not now in operation), and a circus for bull-fighting. It is a bishop's see. Pop. 10,069.

**Hues'car**, town of Spain, in the province of Granada, on the Guardal. It has some manufactures of linen goods. Pop. 7332.

**Huet'** (FRANÇOIS), b. at Villeau, department of Eure-et-Loire, Dec., 1814; d. July 1, 1869, at Paris, where he requested to be buried *citoyennet*—that is, without the accompaniment of any religious ceremonies. Huet was one of the precursors of Dollinger, Hyacinthe, and other Old Catholics, though his own doctrine, which found some adherents in France, bore the name of Neo-Catholicism, was opposed to the ultra dictates of the Vatican, and claimed to have realized the alliance of reason with religion. Huet was a pupil or disciple of Ronsard, Domergue, and held a professorship in the University of Ghent. About 1865 returned to Paris, and was tutor to Prince Milan Obrenovitch, whom he accompanied to Servia when the prince was elevated to the throne. Huet has published *Catholicism, or True Romanism of Sciences, Social and Political*, *Essays on the Catholic Religion*, etc. (L. X. AGARD).

**Huet** (PIERRE DANIEL), b. at Caen Feb. 8, 1630, and educated by the Jesuits; accompanied, in 1652, Bochart to the court of Queen Christine of Sweden; was in 1670 appointed sub-governor under Bossuet to the dauphin; took holy orders in 1676; became bishop of Avranches in 1692; retired in 1699 first to Caen, and then to the house of the Jesuits in Paris; and d. there Jan. 26, 1721. As a young man he cultivated polite literature, composed a romance.



*Diane de Castro*, published *Carmina Latina et Græca* (1664), and wrote *Sur l'Origine des Romains* (1679). He was also an adherent of the Cartesian philosophy, but afterwards became one of its adversaries: *Censura Philosophiæ Cartesianæ* (1689) and *Mémoires pour servir à l'Histoire du Cartésianisme* (1692). The most prominent of his other writings are—*Demonstratio Empphica* (1679), *Histoire du Commerce et de la Navigation des Anciens* (1716), a book still of great value, and *Comentarios de Rebus ad eam pertinentibus* (1718), lately translated by Nizard.

**Hu'ey**, tp. of Calhoun co., Ark. Pop. 153.

**Hu'efeland** (CHRISTOPHER WILHELM), b. Aug. 12, 1762, at Langensalza, in Thuringia; studied medicine at the universities of Jena and Göttingen; was appointed a professor in medicine at the University of Jena in 1793, and removed in 1798 to Berlin, where in 1809, on the establishment of the new university, he became professor in special pathology and therapeutics; d. Aug. 25, 1836. He was a noble and kind-hearted man, of sound and comprehensive views, and, with the exception of his *Enchiridion medicum, oder Abohandlung zur medicin. Praxis* (1826), most of his writings have a generally instructive, philanthropical, rather than a scientific character, such as *Makrobiotik oder die Kunst, das menschliche Leben zu verlängern* (1796), *Guter Rath an Mütter über die wichtigsten Punkte der physischen Erziehung der Kinder* (1799), etc. These books were often republished, and exercised a beneficial influence.

**Huff**, tp. of Spencer co., Ind. Pop. 1569.

**Huff's Creek**, tp. of Wyoming co., W. Va. P. 342.

**Hug** (JOHANN LEONHARD), b. at Constance June 1, 1765; an eminent Roman Catholic theologian and professor, author of numerous learned works in biblical criticism, of which the best known is an *Introduction to the Study of the N. T.* (1808; Eng. trans. 1827). D. Mar. 11, 1846.

**Hu'gel, von** (KARL ALEXANDER ANSELM), BAIRO, b. at Ratisbon Apr. 25, 1796; studied law at Heidelberg 1811; entered the Austrian army in 1813, and was employed in different diplomatic missions; retired in 1824 to devote himself exclusively to the study of natural science; undertook (1831-37) very extensive travels through Western and Southern Asia; and d. at Brussels June 2, 1870. He wrote *Kosmos und das Reich der Nixen* (4 vols., 1810-12) and *Das Becken von Kabul* (2 vols., 1831-32). His rich collections in ethnography and natural science were bought by the Austrian government and incorporated with the collections of Vienna.

**Huger** (BENJAMIN), b. at Santee, St. James parish, S. C., Nov. 22, 1805; graduated at West Point, and entered the army as second lieutenant of artillery July, 1825; served on topographical and ordnance duty till May 1, 1832, when he was promoted to be captain of ordnance. In the war with Mexico he was chief of ordnance and artillery with Gen. Scott's army, being in charge of the siege-train at Vera Cruz, and present at the battles of Cerro Gordo, Molino del Rey, Chapultepec, and final capture of the city of Mexico. For gallant conduct in battle he was brevetted major, lieutenant-colonel, and colonel, and was presented with a sword of honor by the State of South Carolina. From 1848 to 1861 he commanded various arsenals, and was employed on important board duties. In Apr., 1861, being at that time a major of ordnance, he resigned his commission and espoused the Southern cause. He was made a major-general of the Confederate army, and bore a prominent but unsuccessful part in the early days of the civil war. Since 1869 he was engaged in farming in Virginia. D. at Charleston, S. C., Dec., 1877.

**Hug'gins**, tp. of Gentry co., Mo. Pop. 1112.

**Huggins** (WILLIAM), F. R. S., D. C. L., LL.D., b. in London Feb. 7, 1824; was educated at the City School and by private instructors, giving much attention to the experimental study of the physical sciences and to astronomy; in 1852 was made a member of the Microscopical Society, and became a student of biology; in 1855 established a private astronomical observatory, where after 1862 he gave great attention to spectroscopic observations upon the heavenly bodies, with important results, especially with respect to the discovery of the direction and rate of the proper motions of the fixed stars.

**Hughes**, post-v. of Arapahoe co., Col., at the junction of the Denver Pacific and the Boulder Valley R. Rs., 19 miles N. of Denver.

**Hughes**, post-tp. of Nodaway co., Mo. Pop. 1420.

**Hughes** (BALL), b. in London Jan. 19, 1804; d. in Boston, Mass., Mar. 5, 1868; studied with Edward Hodge Bailey, and while a student won prizes awarded by the Royal Academy, and other silver and gold medals; made busts of George IV. and the dukes of York, Sussex, and Cambridge; came to New York in 1829; made the marble

statue of Hamilton—the first work of the kind done in America—for the Merchants' Exchange, which was destroyed by fire in 1835; also the high relief of Bishop Hobart in Trinity church; the casts of *Little Nell* and *Uncle Toby* in the Boston Athenæum are his work, and the bronze statue of Dr. Bowditch in the cemetery of Mt. Auburn. Other works from his studio are a bust of Washington Irving, a statuette of Gen. Warren, a *Crucifixion*, a model for an equestrian statue of Washington. He was a man of various ingenuity, a lecturer on art as well as an artist.

O. B. FROTHINGHAM.

**Hughes** (Most Rev. JOHN), D. D., b. at Annaboghan, co. Tyrone, Ireland, June 24, 1797; emigrated to America in 1817, and worked for a time as a gardener and nurseryman; was educated at Mt. St. Mary's College, Emmitsburg, Md., which he entered in 1819, and where he sustained himself for a time by the care of the college garden. Here he won the lifelong esteem of Drs. Dubois and Bruté, both afterwards bishops. In 1825 he was ordained a deacon of the Roman Catholic Church, and in the same year a priest. He had (1826-38) pastoral charges in Philadelphia, where he founded St. John's Asylum in 1829, and established *The Catholic Herald* in 1833. In 1838 he was made bishop of Basilopolis in partibus, and coadjutor to Bishop Dubois of New York, and in 1842 he became bishop of New York. In 1839 he founded St. John's College, Fordham. In 1850 he was made archbishop of New York. In 1861-62 he was a special agent of the U. S. in Europe, and in 1863 publicly addressed the draft-rioters in New York with a view of dissuading them from violence. He d. Jan. 3, 1864. Archbishop Hughes early attracted much attention by his controversial correspondence with Rev. John Breckinridge in 1833-35. In 1839-42 he was prominent in the struggle of the Roman Catholics against the public school system of New York, and in 1851 had a famous controversy with the Hon. Erasmus Brooks respecting the tenure of church property. Personally he was a kindly and genial man. His writings, nearly complete, have been published in two vols. 8vo. (See his *Life* by J. R. G. HASSARD, 1866.)

**Hughes** (THOMAS), Q. C., b. Oct. 20, 1823, at Newbury, Berks, Eng.; was educated at Rugby and at Oriol College, Oxford, where he graduated in 1845; studied at Lincoln's Inn; was called to the bar in 1848; became queen's counsel in 1869; was in Parliament from Lambeth 1865-68, from Frome 1869-74. Author of *Tom Brown's School Days* (1856), *Scouring of the White Horse* (1858), *Tom Brown at Oxford* (1861), *Alfred the Great* (1869), etc. Is (1874) principal of the College for Workingmen and Women, London, and prominent in practical reforms and questions of social science.

**Hughesville**, post-b. of Lycoming co., Pa., in Wolf tp., 19 miles E. of Williamsport. It has a large lumber trade. Pop. 456.

**Hughs**, county of Dakota, having the Missouri River as its S. W. boundary. It is not organized. Area, about 700 square miles.

**Hughs**, tp. of Tuscaloosa co., Ala. Pop. 637.

**Hu'go** (VICTOR MARIE), VICOMTE, b. at Besançon Feb. 26, 1802. His father was an officer in the army of Napoleon; his mother came from La Vendée, and was a staunch royalist. In his childhood he led a rather errant life, moving from France to Italy, and from Italy to Spain, but he received, nevertheless, an excellent education. In 1817 an ode he addressed to the Academy, *Sur les Avantages de l'Étude*, was highly commended by that institution, and in 1818 he gave up his professional education to devote himself exclusively to literature. He was eminently successful. In 1840, after publishing his novels, *Han d'Islande* (1823), *Bug-Jargal* (1826), and *Notre Dame de Paris* (1831), his dramas, *Cromwell* (1827), *Marion Delorme* (1831), *Le Roi s'amuse* (1832), *Lucrèce Borgia* (1833), *Ruy Blas* (1838), and *Hernani* (1839), and the two celebrated volumes of lyrical poems, *Les Feuilles d'Automne* (1831) and *Les Chants de Crepuscule* (1835), he stood as the founder of a new literary school in his country, and was acknowledged as the greatest living poet of France, perhaps of Europe. In 1823, Louis XVIII. gave him a pension; in 1845, Louis Philippe created him a peer of France; and in 1848 he was elected a representative of the city of Paris both to the constituent and to the legislative assembly. When, in 1851, Napoleon banished him from France, he took up his residence on the island of Guernsey, and in his exile he wrote *La Légende des siècles* (1859), *Les Misérables* (1862), *Les Travailleurs de la Mer* (1866), *L'Homme qui rit* (1869), and *Quatre-vingt-treize*, which works have extended his fame, though without strengthening it. During the latter part of his life a marked change has taken place in his social views. He first changed from a royalist into a worshipper of Napoleon, and when he came in actual contact with politics he became a republican with a peculiar touch of socialism. The



influence which this change exercised on his literary productions was not good. His political writings, *Napoléon le Petit* and *Les Châtiments*, are nearly worthless; his talent broke down completely under his ire. And whenever his social views become visible in his romances and poems the effect is painful; his ideas are obscure, because they are based not on understanding, but on sympathy, and his sympathy with the mass, the poor, the depressed, the persecuted, is offensive to the reader, because it is violent and exaggerated. Of far greater and much more beneficial influence was the change which early in his life took place in his artistic views. He began a classicist, and he became the founder of the romantic school; Madame de Staël and Chateaubriand wrought this change in him. The supreme law of the classical school was, the idea shall be beautiful and the expressions shall be polished; literature is a mirror of good society. Against this maxim Victor Hugo proclaims that the idea shall be true and the expression natural; literature is a mirror of nature. And although he had to fight an authority of 200 years' standing, he carried his point, and made his principles an actual influence in French literature—not, like Goethe, by the magic of a fresh and rich sensibility, for his taste is narrow and even a little coarse, but by dint of a brilliant, creative power. His imagination is his talent. His poems lack the moving warmth of a full heart. His dramas lack the magical presence of a complete characterization. His romances are like turbulent seas, formless expanses of colossal forms. And yet in all his writings, even the latest and weakest, he gives pictures of nature in uproar and of man in passion which delight by their truth as much as they astonish by their grandeur. The limits of his genius would never have been visible but for the faults of his method. Although in the famous preface to *Cromwell*, he tells us that *order* is the principle of freedom in art, *regularity* that of thralldom, yet his own method is too often a dead mechanical regularity. Both his plans of composition and his delineations of characters show it, and his style more than shows it; it cries it out aloud. There are whole pages in his books in which his "brilliant" antitheses sound like the monotonous, ever-recurring grating of a plane, and which tell too plainly that brilliancy, especially of style, is something which can be made by machinery.

CLEMENS PETERSEN.

**Hu'guenot**, tp. of Powhatan co., Va. Pop. 2527.

**Huguenots**, the name by which in the sixteenth century the Roman Catholics designated the adherents of the Calvinistic Reformation in France. It is of doubtful origin, some deriving it from the German *Edelgassen*, others from the words *Huc nos*, with which one of the earliest public documents of French Protestantism begins, and others again from *Hugo* (or *Hugues*) Capet, the first king of the Bourbon dynasty. Prof. Mahn (who quotes fifteen derivations) connects the name with *Hugues*, an obscure heretic. After the consolidation of the Reformation in France, it fell into disuse, and the Protestant establishment of that country is now known under the name of the Reformed Church of France. Protestantism was not introduced into France from Germany. There were from olden times dissenting elements in the Gallican Church, especially in the southern parts of the country, where the Visigoths had settled. The Visigoths were Arians, and in the course of time one sect after the other arose in these regions and protested against the authority of the pope and the doctrines of the Roman Catholic Church; as, for instance, the Albigenses. The general commotion which at the end of the fifteenth and in the beginning of the sixteenth century took place within the Roman Catholic Church itself was strongly felt in France, and showed itself even at the Sorbonne, which, next to the pope, was the highest theological authority in Christendom. But in France, at the court of Queen Marguerite of Navarre, this movement partly assumed a merely literary form, and became a simple assertion of independence rather than a protest, until Calvin with his iron hands grasped the somewhat vague tendency and gave it a more striking stamp and a more decided direction than it received anywhere else. Francis I. tried to stop the movement, and Huguenots were burned. But during the reign of Henry II. (1547-59) Protestantism was rather favored, and at his death there existed a Protestant party of great political power; and a religious war began which lasted almost without interruption to the end of the century, was renewed in the following, and did not finally subside until the spirit of tolerance, the best acquisition of the eighteenth century, made religious persecutions an impossibility in France. At the head of the Roman Catholic party stood the famous family of the Guises, represented by Duke Francis and the cardinal of Lorraine, at the head of the Protestants stood the family of Bourbon, represented by the king of Navarre and the prince of Conde. Between the two parties the royal power, represented first by Cath-

arine of Medici, last by Cardinal Richelieu, occupied an intermediate position, using with great art the one to crush the other. Francis II., a son of Henry II. and Catharine of Medici, married in 1558 Mary Stuart, a niece of the cardinal of Lorraine. He was only fifteen years old when in 1559 he ascended the throne, and with him the Guises were brought to the court and came into power. Their arrogance, ambition, and audacity caused immediately the formation of a Protestant party, and the war began. Next year (1560) Francis died, and in order to curb the Guises, Catharine, regent during the minority of her second son, Charles IX., favored the Protestants. The edict of Jan. 17, 1562, gave them freedom of conscience and a limited liberty of worship, and to these rights were added several fortified cities, among which was Rochelle, as places of safety, by the peace of St. Germain-en-Laye, Aug. 8, 1570—a peace which for a moment stopped the war that was still raging in spite of all edicts and treaties. Catharine, however, meant by no means to tolerate Protestantism in her realm. She hated it as an abominable heresy, and she began to fear the party since, during the preceding wars, she saw how it was supported from England with money and from Germany with troops. Immediately after the peace of St. Germain-en-Laye she concluded an alliance with the Guises, which resulted in the massacre on the night of St. Bartholomew (Aug. 25, 1572) of 5000 Protestants—among whom was Coligny, their leader—in Paris, and 30,000 in the provinces. The Protestants fled to their places of safety, and the war began again; but the royal army was repelled from Rochelle, and when in 1574 the duke of Alençon, the youngest son of Catharine, and a large party of the Roman Catholic nobility, allied themselves with the Protestants against the queen and the Guises, the cause of the Reformation stood better than ever before. Treaties of peace were concluded and broken several times, but when (in 1584) Henry of Navarre, the head of the Protestant party, became heir-apparent to the French throne on the death of the duke of Anjou, it came at last to a final battle. The Guises now openly avowed that they aspired to the crown of France, and the king, Henry III., had both Duke Henry and Cardinal Louis murdered at Blois in 1588. Pursued by the Roman Catholic party, he then fled to the Protestant camp, but next year he was himself killed by a monk, and Henry IV. ascended the throne. Henry entered the Roman Catholic Church from political reasons, but by the Edict of Nantes in 1598 the position of the Reformed Church in France became finally settled and secured, and there was peace for about twenty years. But the Protestants possessed in their places of safety and in their right of assembling a political power which it was difficult for the royal authority to consent to; and when the idea of the absolute power of royalty found an adequate representative in Cardinal Richelieu, a change in the political position of the Protestants was unavoidable. The war lasted from 1624 to 1629. On Oct. 28, 1628, Rochelle was taken after a siege of fourteen months; of its 24,000 inhabitants only 4000 were left; the rest had fallen or perished from hunger. Their other strongholds were also taken, but their freedom of conscience, and even their liberty of worship, were respected; Richelieu's measures were purely political. Once more, however, the Protestants of France had to experience persecutions on account of their religion. Louis XIV. and Madame Maintenon, who was herself bred a Protestant, were both very devout, and after the death of Colbert (1684) their devotion showed itself in the harshest and most cruel measures against the Protestants. Their churches were destroyed and their property confiscated; bands of soldiers, accompanied by fanatical monks, scoured the country, and such as would not renounce their religion were exiled or killed. Some fled to the Cévennes, where they were butchered; others to Switzerland, Holland, and England. In the three years following immediately after the Revocation of the Edict of Nantes (Oct. 23, 1685) France is said to have lost nearly 1,000,000 inhabitants. Louis XV. also tried to do something "to the glory of God," and issued in 1724 an edict which declared the Protestant baptism and marriage invalid; but the edict caused such an indignation, even among the Roman Catholics, that it had to be revoked. By the *Code Napoléon*, the *Chartes* of 1814 and 1830, and the constitutions of 1848 and 1872, the social and political position of the Protestants in France has been made equal to that of the Roman Catholics, and during the last twenty years their spiritual life has developed with great energy and exercised a considerable influence on the Protestant churches of other countries. (FÉLIX, *Histoire des Protestants de France*; HANAU, *La France Protestante*.)

CLEMENS PETERSEN.

**Huiets**, tp. of Edgemoor co., S. C. Pop. 2505.

**Hulin'**, or **Hullin** (PIERRE AUGUSTIN), COUNT, b. at Paris Sept. 6, 1758; enlisted in the army in 1771; distin-



guished himself at the storming of the Bastille July 14, 1789; was appointed captain of the national guard Oct. 8, same year, but became suspicious to Robespierre on account of his moderation, and was imprisoned. Liberated at the fall of Robespierre, he entered the Italian army; was made a brigadier-general in 1803; presided over the court-martial which sentenced the duke of Enghien to death Mar. 24, 1804; was military governor of Vienna in 1806, of Berlin in 1807, of Paris in 1812, and was created a count in 1808. On the restoration of the Bourbons he was banished from France in 1816, but allowed to return in 1819; and d. in Paris, blind, Jan. 9, 1841. In 1823 he published *Expositions offertes aux hommes: importante au sujet de la commission militaire instituee en l'an XII. pour juger le duc d'Enghien*.

**Hull, or Kingston-on-Hull**, one of the commercial centres of England, is situated in the East riding of Yorkshire, at the influx of the Hull into the Humber, and is defended by a citadel, commanding the entrance of the Hull roads, and by two forts lower down the Humber, at the village of High Paul. The most remarkable of its public buildings are the church of the Holy Trinity, the oldest brick building in England, erected in 1312, and the church of St. Mary, Lowgate; of its monuments, an equestrian statue of William III., standing in the market-place, and a statue of Wilberforce, raised on a fluted Doric column 80 feet high. It has many benevolent and good educational institutions, a Latin and a medical school, a school of navigation, a botanical garden, museum, and several associations for science and art. Its manufactures are quite considerable, especially of linen and cotton goods, cordage, machinery, chemicals, leather, sugar, and pottery. In its docks, which comprise an area of more than 87½ acres, much shipbuilding is carried on; in 1870, 584 vessels, of 71,865 tons burden, were owned at Hull. But it is more especially its commerce which gives Hull its great importance. Nearly all the traffic between England and Northern Europe is carried on through this port. It is connected by regular steamship lines with St. Petersburg, Königsberg, Stettin, Copenhagen, Gothenburg, Hamburg, Bremen, Amsterdam, Rotterdam, Antwerp, and Havre. Linen and cotton goods, hardware, machinery, iron, and coal are exported; corn, cotton, flax, hemp, timber, and bones are imported. In 1871, 3417 vessels, of 1,188,841 tons, entered the harbor, and 2911, of 1,044,158 tons, cleared it. The total value of imports was in the same year £15,976,095; of exports, £27,587,076. Pop. 84,699 in 1851; 97,661 in 1861; 123,111 in 1871.

**Hull**, a thriving v. of Ottawa co., Quebec, nearly opposite the city of Ottawa, with which it is connected by a suspension bridge. It has a very great water-power, and manufactures immense quantities of lumber and some woollen goods, cooperage, axes, etc. There are valuable iron-mines in the vicinity. Pop. of sub-district, 8318.

**Hull**, a v. of Aviston tp., Clinton co., Ill., on the Ohio and Mississippi R. R., 25 miles W. of Sandoval. Pop. 300.

**Hull**, post-tp. of Plymouth co., Mass., consisting of a peninsula connected with the mainland by a long isthmus called Nantasket Beach. It is 9 miles S. E. of Boston, and is an attractive summer resort. Pop. 261.

**Hull**, tp. of Portage co., Wis. Pop. 621.

**Hull** (ASBURY), son of Hope, b. in Washington, Wilkes co., Ga., Jan. 30, 1797; graduated at the State University 1814; was for more than forty years secretary and treasurer of the board of trustees of the same; was often a member of the legislature, and repeatedly Speaker of the House; was a member of the secession convention of 1861, but declined its presidency. He was a man of a high order of talent and spotless purity of character. D. at his residence in Athens Jan. 25, 1866. A. H. STEPHENS.

**Hull** (HENRY), son of Hope, b. in Washington, Wilkes co., Ga., Oct. 20, 1798; graduated at the State University 1815; studied medicine, and rose to distinction in its practice; afterwards was professor of mathematics in his alma mater from 1830 to 1846, when he resigned, and has since devoted his time to literary and scientific pursuits. A. H. STEPHENS.

**Hull** (HOPE), one of the founders of Methodism in Georgia (son of an Englishman of the same name), b. in Worcester co., Md., Mar. 13, 1763; moved to Georgia, and established a high school at Washington in the latter part of the last century. He was a man of great usefulness and distinction in his day, and made an impression upon the times in Georgia that will remain for generations to come. D. near Athens, Ga., Oct. 4, 1818. A. H. STEPHENS.

**Hull** (ISAAC), b. at Derby, Conn., Mar. 9, 1775, the son of a Revolutionary officer; became a mariner, and when nineteen years of age was master of a merchant ship in the London trade; became lieutenant U. S. navy 1799;

was made first lieutenant of the Constitution frigate 1801; distinguished himself by valor and skill against the French on the coast of Hayti; served with distinction in the Barbary expeditions; sailed from Annapolis in command of the Constitution July 12, 1812, and for three days was chased by a British squadron of five ships, from which he escaped by bold and ingenious seamanship. On Aug. 19 he encountered the frigate *Guerrière*, Capt. Dacres, one of his late pursuers, and fought her for half an hour at close quarters, when she surrendered, but was so much cut up that she had to be burned. For this, the first naval advantage of the war, Hull received a gold medal from Congress; was afterwards made a naval commissioner, and had command of various navy-yards. D. Phila. Feb. 13, 1843.

**Hull** (WILLIAM), b. at Derby, Conn., June 24, 1753; graduated at Yale 1772; studied divinity one year; went to Litchfield Law School, and in 1775 was admitted to the bar; served with distinction throughout the Revolutionary war, in which he rose from the rank of captain to that of colonel; became a very successful lawyer of Newton, Mass.; was major-general of militia in Shay's insurrection; commissioner to treat with the Indians of Upper Canada 1793; was very prominent in the public affairs of Massachusetts, in which State he became a judge of common pleas; governor of Michigan Territory 1805-14. As brigadier-general commanding the army of the North-west he surrendered Detroit to Gen. Brock, for which he was court-martialed, found guilty of cowardice, and sentenced (1814) to be shot, but was pardoned in consideration of his age and former services. He published *The Campaign of the Northwest Army* (1824). D. at Newton, Mass., Nov. 29, 1825. (See his *Life*, by MARIA CAMPBELL and JAMES FREEMAN CLARKE (1848), in which Hull's character is fully vindicated.)

**Hull** (WILLIAM HOPE), son of Asbury, b. in Athens, Ga., Feb. 2, 1820; graduated at the State University 1838; studied law; was clerical solicitor-general of the western judicial circuit; held many positions of public trust; was assistant in the U. S. attorney-general's office during Mr. Buchanan's administration. When Georgia passed her ordinance of secession he returned to his native State and resumed his profession. D. in New York City Sept. 13, 1877. A. H. STEPHENS.

**Hul'lah** (JOHN), b. at Worcester, Eng., in 1812; drew general attention in 1836 by his comic opera, *The Village Coquettes*, and began in 1835 to work for the establishment of popular singing schools in England after the French model. Having met with eminent success in this undertaking, he was appointed musical inspector for the United Kingdom and leader of the orchestra and chorus of the Royal Academy of Music in London.

**Hulmeville**, post-v. of Bucks co., Pa., 20 miles from Philadelphia. It contains a school, 2 churches, a large cotton and grist mill, 1 newspaper, 3 building associations and several societies, a steam-laundry, stores, etc. Pop. about 400. WILLIAM TILTON, Ed. "HULMEVILLE BEACON."

**Hulse'an Lectures**, a number of lectures, not exceeding six and not less than four annually, delivered at the University of Cambridge, explanatory of the evidences of Christianity and of the difficulties of Scripture. There are also a Hulsean professorship of divinity, a Hulsean prize and scholarships, etc. These were founded by the Rev. John Hulse (1708-90) in a will of 200 pages closely written, with nine codicils.

**Humane Society** (Royal). See RESUSCITATION, by B. HOWARD, A. M., M. D.

**Humanitarians**, a name which sometimes designates that school of Unitarians who consider Jesus Christ to have been a mere man, without superhuman attributes. It also sometimes designates the professors of the so-called "religion of humanity."

**Hum'ber**, the estuary of the Trent and the Ouse, having its entrance on the E. coast of England, in lat. 53° 38' N. Its average breadth is between 2 and 3 miles, and it is navigable for the largest vessels up to Hull, 22 miles from its mouth.

**Humbert'**, prince of Piedmont, crown prince of Italy, b. Mar. 14, 1844. He is a good soldier; took part in the wars of 1859 and 1866; commanded a division in 1866, and covered the retreat of the Italian army after the battle of Custoza. He is married to the princess Margaret of Savoy. Became king of Italy Jan. 9, 1878. A. NIEMANN.

**Hum'ble-bee**, a name common to the hymenopterous insects of the genus *Bombus*, nearly fifty species of which are known to live in North America alone, besides numerous Old World species. The mother-bee hibernates, and in the spring selects a place for her nest in a wet, mossy place, or in a mouse's nest, or under a stump. She collects pollen, mixes honey with it, laying her eggs in the mass from time to time, and meanwhile busily adding to her store of food.



From the egg to the perfect insect the transformation is very gradual. The larvae eat out cells in the pollen mass, spinning a lining of silk, which the old bee fortifies with wax. The young bees come forth from time to time and add to the stores. There are many ways, among so many species, of constructing the nest. The males, females, and working bees appear to live together in harmony. The aggregate number of insects in one community is usually very small as compared with the number in one swarm of honey-bees. The humble-bee is beset by numerous parasitic insects. Foxes, skunks, and bears, as well as boys, know well how to extract the sweet treasures of the humble-bee from the earth; for, though the sting is severe, most species of humble-bees are less active in attack or defence than honey bees, hornets, and yellow wasps.

**Humboldt**, county of the N. W. of California, bounded on the W. by the Pacific Ocean. Area, about 2800 square miles. Its climate is cool and moist, its surface broken, and covered with forests of enormous redwood and other trees. Cattle, wool, potatoes, lumber, and grain are staple products. Petroleum is found. Cap. Eureka. Pop. 6410.

**Humboldt**, county of N. W. Central Iowa. Area, 432 square miles. Its surface is varied, its soil productive and well watered. Coal, iron, gypsum, and limestone are found. Grain is the staple agricultural product. It is traversed by the Des Moines Valley R. R. Cap. Dakota. Pop. 2596.

**Humboldt**, county of Nevada, bounded on the N. by Oregon. Area, 16,500 square miles. It contains numbers of lakes and streams having no connection with the sea. Most of the surface is arid and broken desert-land, which in some parts yields pasture. The county affords silver, gold, sulphur, and other minerals. It is traversed by the Humboldt River and the Central Pacific R. R. Cap. Winnemucca. Pop. (exclusive of Indians), 1916.

**Humboldt**, tp. of Coles co., Ill. Pop. 2023.

**Humboldt**, tp. and post-v. of Humboldt co., Ia., 17 miles N. of Fort Dodge, settled by a colony from Western New York, their original constitution forbidding the existence of either liquor or gaming saloons, which has been rigidly enforced to the present time. It is the seat of Humboldt College, and has 1 church, 2 mills, 1 newspaper, 1 hotel, stores, shops, etc. The Des Moines River furnishes ample water-power, not utilized to any extent. The village contains several fine parks. Pop. 334.

GEORGE ELLIOTT, ED. "KOSMOS."

**Humboldt**, post-v. and tp. of Allen co., Kan., on the Neosho River and on the Leavenworth Lawrence and Galveston and the Missouri Kansas and Texas R. Rs., 86 miles by rail S. of Lawrence. It has a weekly and a monthly periodical, some fine business-houses, a bank, and manufactures of cigars, etc. The river is crossed here by a bridge. Pop. 1202; of tp. 2055.

**Humboldt**, post-v. of Marquette co., Mich., on the Marquette Houghton and Ontonagon R. R., 27 miles W. of Marquette, in the iron-region.

**Humboldt**, tp. and post-v. of Richardson co., Neb., on the Atchison and Nebraska R. R., 21 miles N. W. of Falls City. Pop. 605.

**Humboldt**, a station of the Central Pacific R. R., 122 miles N. E. of San Francisco, Cal., is in Humboldt co., Nev. Pop. of Humboldt tp. 136.

**Humboldt**, post-v. of Gibson co., Tenn., 128 miles W. of Nashville, at the crossing of the Mobile and Ohio and Memphis and Louisville R. Rs. It contains an Odd Fellows' female institute and Masonic high school, 6 churches, and several large mills and shops. It has 1 newspaper. Pop. about 2000.

D. L. RIVERS, ED. "JOURNAL."

**Humboldt**, tp. of Brown co., Wis. Pop. 735.

**Humboldt, von** (FRIEDRICH HEINRICH ALEXANDER), BARON, b. Sept. 14, 1769, at Berlin, of a wealthy family, received, together with his elder brother, Karl Wilhelm, a most careful education in his home under the direction of his mother, his father having died very early. In 1787 he studied at the University of Frankfurt on the Oder, and after spending the following year in Berlin, occupied in the study of the technology of manufactures and the Greek language, he passed two years at the University of Göttingen, studying philology under Heyne and natural history under Blumenbach. His first published work, *Ueber die Bausysteme Rheins* (Berlin, 1790), belongs to this period. After a rapid journey through Belgium, Holland, England, and France, in company with George Foster, he settled for some time in Hamburg, studied the modern languages with great zeal, and heard lectures on banking and bookkeeping, having determined to devote himself to commercial pursuits. His passion for studies, especially of nature, was too strong, however, and in 1791 he entered the celebrated mining school at Freiberg, where he studied under Werner

and Leopold von Buch, and where he wrote his interesting essay on the *Flora Sibirica* and *Flora Siberica*, which appeared in 1793. From 1792 to 1797 he occupied a superior position as a mining officer at Bayreuth, at the same time exploring and conducting mines, making observations and experiments in almost every field of natural science, studying history and philology, making geognostic journeys, filling diplomatic missions, and finishing his great work *Ueber die geogr. u. phys. Beschaffenheit der Erde* (Berlin, 1797), which book is still admired, in spite of the subsequent progress of physiological knowledge, on account of the correctness of its observations, the ingeniousness of its experiments, and the general validity of its conclusions. On the death of his mother (in 1797) he determined to gratify his desire and make a scientific journey in the tropical zones. He had prepared himself for the task through several years. He mastered a great number of living languages; he understood how to use all kinds of scientific instruments; he was thoroughly familiar with the present state of all branches of natural science; he had a large experience in scientific travelling and in making observations and experiments; he had health and he had money. He first planned a tour to Egypt with Lord Bristol; then he determined to join the expedition of Baudin which the Directory of France sent out; then he thought of accompanying the Swedish consul, Skjöldebrand, to Tunis; but all these plans failed. It was the generosity of the Spanish government which at last brought him to America. On June 5, 1799, he started from Corunna; on Aug. 3, 1804, he returned to Bordeaux. He spent five years in the Spanish colonies of Central and South America, walking, riding on horseback, sailing, rowing, always carrying along with him a whole caravan with helpers and instruments. The world had not seen anything like it since the days when Alexander the Great fitted out a scientific expedition for Aristotle. And the results corresponded to the preparations. Humboldt brought back with him an immense store of the most valuable scientific materials, astronomical determinations of localities, barometric measurements, meteorologic, climatologic, and magnetic observations, maps, profiles of mountains, herbariums, etc. He settled in Paris as the scientific centre of the world, and, although frequently engaged in scientific travels or diplomatic missions, he resided here from 1803 to 1827, occupied with the arrangement and publication of his scientific acquisitions, which appeared successively during this period in twenty-nine volumes, written in French and translated into German, and accompanied by upwards of 2000 exquisite illustrations. The world was astonished. The information was new, exceedingly attractive, ranging over the whole field of natural science; and it was correct. New ideas were started, the geography of plants, the isothermal lines, etc.; new impulses were received by every branch of science; nay, an influence was felt even in poetry and art. In 1827 he removed to Berlin at the solicitation of the king, and resided in his native city for the rest of his life, occupying himself with diplomatic offices of a lighter description and the most severe studies. The two remarkable events of this period of his life were the Russian expedition to Central Asia and the publication of his *Kosmos*. In 1829 the Russian emperor Nicholas fitted out a most magnificent expedition, which he placed under the direction of Humboldt, and which went through Moscow, Kasan, and Tobolsk to the Atlas Mountains and the Chinese frontier, and thence back to the Caspian Sea. The results of this journey Humboldt communicated in his *Asie Centrale* (3 vols., Paris, 1843). The first volume of *Kosmos* appeared in 1845; the fourth and last was not published till after the death of the author, May 6, 1859. *Kosmos* is Humboldt's chief work, the most perfect and the most characteristic. It gives a striking and attractive description of the numberless varieties of forms which the world contains, but this multitude it gathers under total views, and represents the world as one consistent existence; and there is no mysticism or sentimentality in the representation. There is only clear generalization. It is a wonderful book, stupendous in its learning, admirable in its case. But it is a popular book, rather than a scientific one, and although we suppose that science, prior to having produced such a work, it occasioned a swarm of imitations which had better have remained unwritten. There is a peculiarity with Humboldt which posterity must remember in order not to be unjust to him. "With him ends a great period in the history of science," says Agassiz; "and that is just his peculiarity; he was the end of a period, not the beginning. He was the plastic, forming power which finishes, not the world, breaking into which starts." (See KLEMP, *Alexander von Humboldt, ein biographisches Denkmal*, 1859.)

CLEMENS PETERSEN.



**Humboldt, von** (KARL WILHELM), BARON, brother of the preceding, b. at Potsdam June 22, 1767. After finishing his studies of philology and philosophy at Göttingen, he lived alternately at Erlurt, Weimar, Jena, and Berlin in intimate intercourse with Schiller, Goethe, F. H. Jacobi, and other celebrities of his time, and on the Thuringian estates of his wife, the spirited Karoline von Dacheröden, whom he married in 1791. From 1797 to 1799 he resided with his family in Paris, whence he made a journey into Spain, spending his time partly in literary occupations, poetical and critical, of a lighter description, partly in penetrating and exhaustive linguistic studies. In 1801 he was appointed Prussian ambassador to the court of Rome, but returned in 1808 to Berlin as minister of the interior, in which office he developed great activity for the reorganization of the Prussian state, more especially for the establishment of the University of Berlin. In 1810 he went as minister plenipotentiary to Vienna, and he played a conspicuous part in the immense diplomatic stir which accompanied and followed the fall of Napoleon. He sat at the congresses of Prague, Chatillon, Vienna, and Aix-la-Chapelle; he signed the treaty of Paris, and represented Prussia in the first German diet. He was a member of the Prussian council of state up to 1819; and he exercised a great and beneficial influence on the development of German affairs. His influence was preventive, however, rather than productive. As a statesman he possessed great business capacity, industry, clearness, and tact, and he entertained liberal and even large views; but he had no invention, hardly any ideas. His noble sentiments made him an ally of everything noble, and the respect which his character, his connections, and his talents commanded prevented much evil from taking place; but there is hardly anything positive which can be called his work. In general literature he occupied a similar position. He was a man of exquisite taste, of warm interest, of ready sympathy, and his correspondence with Schiller, Goethe, and others shows how he brought light and elevation along with him wherever he went. But his poems, his criticisms, his letters, have only historical interest. The influence died out with the man. Not so, however, with his scientific works. His merits in the establishment and development of the science of comparative philology are lasting as they are great, and his linguistic researches are in many points both ingenious and exhaustive. His principal works in this line are—*Berichtungen und Zusätze zu Adelungs Mittheilungen über die enttübische oder baskische Sprache* (1817); *Prüfung der Untersuchungen über die Uebewohner Hispaniens vermittelst der baskischen Sprache* (1821); *Ueber Dualis* (1828); *Ueber die Verwandtschaft der Ortsadverbien mit dem Pronomen* (1830); *Ueber die Kawi Sprache* (1833–40); *Vocabulaire inédit de la langue Tatieme* (1843), etc. This great and even brilliant scientific activity began after his removal from office. The Prussian king, like the other German princes, broke the promise of a representative constitution which he had given during the war against Napoleon, and under the pretext of putting down demagogism he persecuted liberty. Humboldt understood the manoeuvre, and fought against it with all his power. Suddenly (Dec. 31, 1819) he was dismissed in a signal manner. He afterwards lived on his estate of Tegel at the Lake of Spandau, where he d. Apr. 8, 1855. (See SCHLESIER, *Erinnerungen an Wilhelm von Humboldt*, 1846.) CLEMENS PETERSEN.

**Humboldt River**, the longest river of Nevada, rises in Elko co., and flows 384 miles in a generally S. W. course. Its waters are alkaline, being charged with soda. It is nowhere many yards in width, and is generally fordable. Its banks have clumps of willows and other vegetation, and there are some fertile alluvial plains. It finally ends in Humboldt Sink, "a marshy spot in a sandy plain," not really a lake except in high stages of the river. The river is chiefly remarkable as furnishing the only E. and W. valley through this region, while N. and S. valleys are numerous. The Central Pacific R. R. follows its valley for many miles. The river-bottoms average a mile in width; outside of these the land is good, but needs irrigation. Numerous streams approach the Humboldt, but sink after leaving their cañons. The Little Humboldt is its largest affluent. But in high water the Reese River passes its sink and flows into the Humboldt. Some five miles above Humboldt Lake are the "Big Meadows," with an area of 5000 acres, furnishing great quantities of hay and some peat. The sink is 3920 feet above the sea-level.

**Humboldt Wells**, tp. of Elko co., Nev., on the Central Pacific R. R. (Wells Station), 669 miles N. E. of San Francisco. Here are some twenty very deep natural wells of good water, supposed to be of volcanic origin. Silver, lead, and copper ores are found and smelted here. Wood, water, and grass are abundant. Pop. of tp. 42.

**Hum'bug**, tp. of Siskiyou co., Cal. Pop. 251.

**Hume**, tp. of Whitesides co., Ill. Pop. 676.

**Hume**, tp. of Huron co., Mich., on Lake Huron. P. 475.

**Hume**, tp. and post-v. of Allegany co., N. Y. The township has several villages and very extensive water-power. Pop. of Hume or Cold Creek v. 254; of tp. 1920.

**Hume** (DAVID), the most noted of modern skeptical philosophers and a distinguished essayist and historian, b. Apr. 26, 1711, at Edinburgh. His father, Joseph Hume (or Home), a member of the Faculty of Advocates, and proprietor of the estate at Ninewells in the parish of Chirnside, Berwickshire, died leaving David still an infant. At the age of fifteen Hume entered Edinburgh University, and, although he was intended for the bar, his own inclination was toward literature, his favorite authors being Cicero, Virgil, Seneca, and Plutarch. His slender means led him at the age of twenty-three to enter mercantile life at Bristol, but after some months he resolved to pursue his literary projects, and sought cheap living and retirement in France at Rheims and La Flèche, where he composed his *Treatise on Human Nature*, which he published in 1738, after his return to England. "It fell dead-born from the press," says Hume, "without reaching such distinction as even to excite a murmur among the zealots." In 1741–42 he published the first part of his *Moral and Political Essays*, which were favorably received. In 1744 his reputation for skepticism prevented the success of his application for the chair of moral philosophy in the University of Edinburgh. In 1747 he attended Gen. St. Clair on an embassy to Vienna and Turin, where he recast the first part of his *Treatise*, and published it as an *Inquiry concerning the Human Understanding*. In 1761 he became librarian of the Advocates' Library in Edinburgh, which position he held for five years, and, availing himself of its resources, undertook his *History of England*, publishing the first volume in 1754, treating the reigns of James I. and Charles I., and bringing much obloquy upon himself for his leniency shown towards Strafford and Charles I.; but his subsequent volumes achieved great popularity for the work. His *Political Discourses*, published in 1752, obtained wide fame on the Continent, and contributed largely to the creation of the science of political economy. His *Inquiry concerning the Principles of Morals* appeared in 1752. He accepted the earl of Hertford's invitation to attend him on his embassy to Paris in 1763, and on his arrival was "loaded with civilities" by the nobility, foreign ambassadors, the savants, and the royal family. He became intimate in the circle of D'Alembert, Marmontel, Diderot, Duclos, Helvétius, Hérault, Buffon, Malesherbes, Holbach, and Turgot, and was the special favorite of the ladies. In 1767–68 he was under-secretary of state, appointed by Lord Conway, brother of the earl of Hertford, and had charge of Scottish affairs, including the patronage of the churches. He resided at Edinburgh, and was chief of a literary circle including Robertson, Blair, Lord Kames, Adam Ferguson, Adam Smith, and others. Warned by an incurable disease, he wrote his own *Life* and provided for the publication of his *Dialogues on Natural Religion*, a work written in early life, and calmly awaited death, which came Aug. 25, 1776. His philosophy is the completest statement of the ideas that produced the French Revolution, and may be regarded as the culmination of the reactionary movement towards individualism and naturalism inaugurated in the era of Bacon and Locke, and reaching its *dénouement* in the eighteenth century. It has been the stimulating cause of the notable systems since. Kant confessed that "Hume's exception to the idea of causality first interrupted my [Kant's] dogmatic slumber." Hume exposes the basis of his system thus: "All the perceptions of the human mind resolve themselves into two distinct kinds, which I call *impressions* and *ideas*. The difference betwixt them consists in the degrees of force and liveliness with which they strike upon the mind and make their way into our thought and consciousness. Those perceptions which enter with the most force and violence we may name *impressions*, and under this name include all our sensations, passions, and emotions as they make their first appearance in the soul. By *ideas*, I mean the faint images of these in thinking and reasoning." Thus, ideas are copies of impressions of individual things, and the phase of universality belonging to them is completely ignored. He consistently denies all objective validity to complex ideas, and holds the conceptions of substances, modes, and relations to be fictions of the mind. Hence, "the identity which we ascribe to the mind of man is only a fictitious one." The complex idea of cause and effect is, as Hume says, "derived from experience, which, presenting us with certain objects constantly conjoined with each other, produces such a habit of surveying them in that relation that we cannot, without a sensible violence, survey them in any other." Habit is the sole universality and necessity. Hence, the



doctrine of an Absolute First Cause is unwarranted in philosophy. Pleasure and pain form the basis of moral principles. His famous argument against miracles—invented in 1736 at La Flèche to silence a Jesuit who claimed the recent occurrence of miracles at his convent—is this: "Invariable experience is in favor of the uniformity of nature, while it is not in favor of the infallibility of human testimony; hence there is, in all cases, a greater probability of the falsity of the testimony as to the occurrence of a miracle than of the violation of a law of nature thereby implied." (For best sources of information see the *Life and Correspondence of David Hume*, by JOHN HILL BURTON, 2 vols., Edinburgh, 1846; also *My Own Life*, in vol. i. *Hist. of Eng.*, by D. HUME, Boston, 1830.) WM. T. HARRIS.

**Humerus**, the large cylindrical bone of the upper arm from the shoulder to the elbow, forming at its upper extremity a hemispherical head, which is connected with the scapula and two tuberosities for the attachment of muscles. The whole combination of the head of the humerus, the scapula, and the clavicle is also called humerus.

**Humes** (THOMAS WILLIAM), S. T. D., b. at Knoxville, Tenn., Apr. 22, 1815; graduated in 1839 at East Tennessee College (now a university); was rector of St. John's church (Protestant Episcopal) 1846-61 and 1863-69, and since 1865 has been president of East Tennessee University. Author of various published sermons and addresses.

**Humiliate Nuns**, an order of Benedictine nuns, called also **Nuns of Blasoni**, from the name of their foundress. They served as nurses, etc. In 1571 they were suppressed by Pius V. for some disorders, but a few convents, greatly decayed, still exist in Italy.

**Humiliates** (*Humiliati*), an order of canons and lay brothers following the rule of St. Benedict. They were originally lay brothers of a congregation founded about 1134. In 1151 they were reformed by St. John of Meda, and became in part canons regular of St. Benedict.

**Hummel** (JOHANN NEPOMUK), b. at Presburg Nov. 14, 1778; d. at Weimar Oct. 17, 1837. His father, a proficient and an orchestra leader, commenced his son's musical education by teaching him the violin. But the child showed little aptitude, and was thought to have no talent. He was then taught to sing and to play the piano, and in these studies his extraordinary gifts soon became manifest. In one year he acquired a skill that made him a musical prodigy. The Hummels removed to Vienna, where they found Mozart. The talented boy so interested the celebrated man that he took the lad to his own house and gave him lessons, though such work was much against Mozart's taste. At nine years of age he was so much admired by all who heard him that he and his father made a concerting tour through Germany, Denmark, and Scotland. The years 1791 and 1792 he passed in London, and there studied the pure, methodical style under Clementi. At fifteen years of age he returned home, and settled down to hard study in Vienna under his severe and exacting father. He afterwards became the pupil of Albrechtsberger for harmony, and of Salieri for singing and the principles of dramatic composition; in 1803 entered the service of Prince Nicholas Esterhazy, for whom he wrote his first mass, which was well received by Haydn. In 1811 he left the Esterhazy service, and for five years gave piano-lessons in Vienna; in 1816 was appointed chapel-master to the king of Wurtemberg; in 1820 resigned that office and became chapel-master to the grand duke of Saxe-Weimar; in 1822 obtained leave of absence to make a pedestrian tour in Russia, where he was enthusiastically received; in 1823 travelled through Holland and Belgium on his way to Paris, where the artistic world showed a worthy appreciation of his fame and genius. From Paris he returned to Weimar, which he made his permanent home. Some altercation had estranged Beethoven from Hummel. In 1827, when Beethoven's illness gave anxiety, Hummel went to Vienna, and their differences were lost in the fullest reconciliation. In 1829 he made a second visit to Paris, where, six years before, his reception had been one of the most brilliant passages in art; but now his performances were a failure. In London his presence was scarcely remarked. One other tour, in Poland, was the last of his wanderings; the rest of his life he passed quietly at Weimar.

In Hummel were three artists—the performer, the improviser, the composer—in each respect he was a genius of high order. As a performer he founded a school which is the means by which most of his noted successors have risen to eminence. His voluminous *Method* for the piano was a new and valuable creation in the field of study, classifying the difficulties of fingering and other details of piano practice. The greater volume and sonority attained by his successors made Hummel's touch appear weak and tame perhaps, but no one surpassed him in purity, regularity, and correctness of execution, or in delicate shading

and beauty of phrasing. As an improviser he was very remarkable; his inspirations, so regular in form, so finished, yet so fresh and full of unexpected fancies, seemed like meditated compositions. As a composer he is not generally appreciated by the public. Had Beethoven not been his contemporary, he probably would stand as the first composer of his age in instrumental music. In his works noble, elegant, and graceful themes are treated with the skill and experience of a consummate master. But the most perfect finish was no match for the passion and power of the unapproachable Beethoven. His most esteemed works are—the Septuor in D minor (op. 74), the quintet for piano (op. 87), the concertos in A minor (op. 85), in B minor (op. 89), in E major (op. 110), and in A flat major (op. 113), and the grand sonata for piano for four hands (op. 92). He wrote 11 dramatic compositions, including operas, ballets, and cantatas; 4 compositions for the church; 22 instrumental works, including overtures, concerted pieces for the piano, violin, violoncello; and many sonatas and other compositions for the piano. C. H. FARNHAM.

**Hummelstown**, post-b. of Dauphin co., Pa., 9 miles E. of Harrisburg, on Swatara Creek, the Union Canal, and the Philadelphia and Reading R. R.; has fine schools, a weekly newspaper, bank, 4 churches, several mills and machine-shops, brownstone saw-mill, 2 carriage manufactories, terra-cotta works, hotels, etc. Pop. 837. W. R. HENDRICKS, Pub. "Sun."

**Humming-Bird**, the name of many genera of small slender-billed American birds of the family Trochilidae. They are most numerous in species and individuals near the equator, are very numerous in Mexico, and one species is found northward in summer even in British America. This species is the *Trochilus calchuris*, the only species often seen in the Northern States. It is known as the ruby-throated humming-bird. In its flight its wings produce that well-known humming sound which is so characteristic of the family. It has been supposed to live entirely upon the honey which it is well known to gather from flowers, but it has been known to swallow spiders and other species, at least, certainly eat small insects. There can, however, be no doubt that the long bill and the slender, almost projectile tongue, which is attached to the hyoid bone in a very singular manner, are especially adapted to the collection of honey from flowers; and the sight of these brilliant little birds darting about from flower to flower with lightning speed is one we are all familiar with. Its lichen-covered nest, lined with a silky fibre, is a wonderfully neat structure. In the far North-west the *Selasphorus rufus*, a very brilliant red species, appears to replace the foregoing. To enumerate even the genera of the humming-birds would be tedious. There are some 400 species. Of these only eight or ten are ever found in the U. S. The largest known species (*Hylocharis gigas*, eight inches long) and the smallest (*Melicops minima*, whose body is barely one and a quarter inches long) are both tropical.

**Humpback Whale**, a name given by sailors to those fin-backed whales (*Balaenopteridae*) which have the dorsal fin represented by a hump or bunch, generally about the size of a man's head. They form a group, *Megapterinae*, comprising three genera, *Megaptera*, *Poseocopia*, and *Eschrichtius*. One of the best known is *Megaptera longimana*, called Johnston's humpback, found in the North Atlantic and Arctic waters. It is fierce and dangerous, but is killed for its oil, which is worth nearly as much as sperm oil. The baleen is short and poor.

**Humphrey**, post-tp. of Cattaraugus co., N. Y. P. 1065.

**Humphrey**, tp. of Darlington co., S. C. Pop. 896.

**Humphrey** (EDWARD PORTER), D. D., LL.D., eldest son of Heman, noticed below, b. at Fairfield, Conn., Feb. 10, 1808; graduated at Amherst in 1828, and at Andover in 1833; was tutor at Amherst 1832-33; from 1835 to 1836 preached at Jeffersonville, Ind.; was pastor of Second Presbyterian church in Louisville, Ky., 1835-53; was professor of ecclesiastical history in Danville (Ky.) Theological Seminary 1853-66; and in 1866 took charge of College street church in Louisville. He has published numerous discourses and review articles. Although living at the South during the war, he was loyal to the Union, and bore an important part in the reunion of the two branches (Old and New School) of the Presbyterian Church. W. S. TYLER.

**Humphrey** (HEMAN), D. D., b. in West Salisbury, Hartford co., Conn., Mar. 26, 1779; graduated at Yale College in 1805. He was pastor of the Congregational church in Fairfield, Conn., ten years; pastor of the church in Pittsfield, Mass., five years; and president of Amherst College twenty-three years (1823-46). Taking charge of that institution in its infancy, he contributed largely to its growth and prosperity, and impressed upon it much of his own character. At the same time he exerted a leading in-



fluence in the Congregational and Presbyterian churches, and in the revivals, missions, and national religious societies which had their origin in his day. He wrote often for the religious newspapers and journals, particularly *The Paupers*, *The Christian Spectator*, and *The New York Observer*. He gave to the public some twenty-five or thirty sermons and addresses on special occasions, and left, besides, published works to the number of eleven volumes. Among the pamphlets, the most celebrated was his *Parallel between Intemperance and the Slave-Trade*, which, while it struck a heavy blow at intemperance, was a scarcely less formidable indictment of slavery. Of his books, the *Tour in France, Great Britain, and Belgium*, in 2 vols., has had the widest circulation. Dr. Humphrey's accurate observation, practical wisdom, and racy style all appear to advantage in this work. D. at Pittsfield Apr. 3, 1861. (See *History of Amherst College*, by the author of this sketch, and *Memorial Sketches of Heman and Sophia Humphrey*, by Z. M. HUMPHREY and H. NEILL.) W. S. TYLER.

**Humphrey (JAMES)**, a son of Dr. Heman Humphrey, b. at Fairfield, Conn., Oct. 9, 1811; graduated at Amherst in 1831; became a lawyer of Louisville, Ky. (where he resided but one year), and of New York. He was (1858–60 and 1864–66) a member of Congress from New York. D. at Brooklyn, N. Y., June 16, 1866. W. S. TYLER.

**Humphrey (ZEPHANIAH MOORE)**, D. D., fifth son of Dr. Heman Humphrey, b. at Amherst, Mass., Aug. 30, 1824; graduated at Amherst College 1843, and at Andover Theological Seminary 1849; a popular preacher and pastor of churches at Racine and Milwaukee, Wis., 1850–59; of First Presbyterian church, Chicago, 1859–65; of Calvary Presbyterian church, Philadelphia, 1868–75; is now professor of ecclesiastical history and church polity at Lane Theological Seminary, Cincinnati, O.; was connected with the New School branch of the Presbyterian Church before the reunion of 1869; contributed his influence to the reunion, and was elected moderator of the reunited Church at Chicago in 1871.

**Humphreys**, county of N. W. Central Tennessee. Area, 550 square miles. It has the Tennessee River for its western boundary, and is traversed by the Nashville and North-western R. R. It is a fertile and undulating region. Cattle, corn, and tobacco are staple products. Cap. War-erly. Pop. 9326.

**Humphreys (ANDREW ATKINSON)**, LL.D., b. at Philadelphia, Pa., Nov. 2, 1810; graduated at the U. S. Military Academy, and appointed second lieutenant of artillery July 1, 1831; began his military career with a season of garrison duty at Fort Moultrie, S. C.; thereafter employed on varied service, including a period in the Cherokee Nation and an eight months' active campaign in Florida, participating in several actions against the Seminoles, until Sept., 1836, when he resigned his commission. Returned to the service of the government as civil engineer the following year, when his health was restored, and reappointed in the army July 7, 1838, as first lieutenant topographical engineers; promoted to be captain 1848, major Aug., 1861, serving during this time on harbor improvements; again actively engaged for eight months in Florida war, and for five years (1844–49) in charge of the Coast Survey office at Washington. In Nov., 1850, he commenced the topographic and hydrographic survey of the delta of the Mississippi, directed by Congress for the purpose of determining the most practicable plan for securing it from inundation, as well as for deepening the channels of the river. Compelled by sickness in 1851 to relinquish charge of this work, he visited Europe, and from a personal examination of its river-deltas informed himself of the knowledge there acquired by the experience of centuries as to methods of protection against inundation. Returning in 1854, he was assigned to special service to determine the most practicable and economical route for a railroad from the Mississippi River to the Pacific Ocean, upon which he continued until 1861, meanwhile serving on the lighthouse board and on various commissions, and in 1857 resumed the survey of the delta of the Mississippi, which shortly after his retirement from the work in 1851 had been discontinued, Lieut. Abbot being assigned to personal direction of the work. The valuable report upon the Physics and Hydraulics of the Mississippi River was submitted in Aug., 1861, having been hastened to a close by the outbreak of civil war. In Dec., 1861, Humphreys, now major, was assigned to duty on the staff of Gen. McClellan, and upon the transfer of the Army of the Potomac to the Virginia Peninsula was appointed its chief topographical engineer, serving as such throughout the campaign, having been promoted, however, to be colonel, A. A. D. C., Mar., and brigadier-general of volunteers Apr., 1862. Upon the return of Gen. McClellan to the command of the Army of the Potomac, Gen. Humphreys was (Sept. 13, 1862) assigned to command a division of new troops attached to

the 5th corps as 3d division, and followed the army, making a night march of 26 miles from Monocacy Bridge, joining it at Antietam on the morning of Sept. 18; made reconnaissance from Sharpsburg to Lectown Oct. 16–17; engaged at Fredericksburg, Dec., 1862, the battle closing with the assault of his division on the "stone wall" at Marye Heights; in command of his division at Chancellorsville, the time of service of which expiring soon after, he was (May 20) assigned to the 2d division 3d corps, which he commanded with great ability at Gettysburg, extricating it from its perilous position, though with great loss; on July 8 was promoted to be major-general of volunteers and appointed chief of staff to the commanding general Army of the Potomac, which important and responsible duty he performed with great credit until assigned to the command of the 2d army corps, Nov. 25, 1864, a period when, though the close was nigh, much hard fighting remained to be done. In the stirring events before Petersburg and subsequent pursuit of the Confederate army the 2d corps continued to bear an important part, up to the final action at Farmville Apr. 7, its commander winning the brevet of major-general U. S. A. for Sailor's Creek, Apr. 6, 1865. Continued in the volunteer service until Aug. 31, 1866, during the first half of the year engaged on plans for the relief of the alluvial region of the Mississippi from inundation; Aug. 8, 1866, appointed chief of engineers, U. S. army, with the rank of brigadier-general, which position he still retains (1875). In addition to the high duties of his office has served on the light-house board and on various commissions concerning important engineering works. Is also member of various American and foreign scientific societies. G. C. SIMMONS.

**Humphreys (DAVID)**, LL.D., b. at Derby, Conn., in 1752; entered the army as a captain at the beginning of the Revolutionary war; was appointed aide-de-camp to Washington in 1780; accompanied Jefferson to France in 1780 as secretary of legation; went in 1794 to Lisbon, and in 1797 to Madrid, as ambassador, and returned to America in 1802. He was one of the first to introduce merino sheep to this country, and established a large woollen and cotton factory in Derby. During the war of 1812 he commanded the militia of Connecticut, and d. at New Haven Feb. 21, 1818. While residing at Hartford (1786–88) he published, together with Hopkins, Barlow, and Trumbull, the *Anarchiad*. The most prominent of his other poems are—*An Address to the Armies of the U. S.* (1782), *The Future Glory of the U. S.*, *The Love of Country*, and *The Death of Washington*. He also wrote a *Life of Putnam* in 1798. His works were collected and published in New York in 1790 and 1804.

**Humphreys (HENRY NOEL)**, b. at Birmingham in 1810; resided for several years on the Continent, especially in Rome; and published in 1840 his first work, the descriptions to W. B. Cooke's *Views in Rome*. Together with I. O. Westwood, he published in the same year *British Butterflies, and their Transformations and British Moths, and their Transformations*. Among his other publications are—*Ancient Coins and Medals* in 1850, *The Coinage of the British Empire* in 1854, and a number of anonymous novels.

**Humphry (WILLIAM GILSON)**, M. A., b. in 1815; graduated in 1837 at Cambridge; was Hulsean lecturer at that university in 1849–50; and was nominated vicar to St. Martin-in-the-Fields, London, 1855. His Hulsean lectures were on *The Doctrine of a Future State* and *The Early Progress of the Gospel*. He has also written *A Commentary on the Book of the Acts of the Apostles*, *The Character of St. Paul* in 1858, *Theophilus of Antioch*, etc.

**Humus** [Ger. *Humus*; Fr. *humus*; from Lat. *humus*, "moist earth" (soil)]; **Humic Acid** [Ger. *Huminsäure*; Fr. *acide humique*]; **Ulmic** [Ger. *Ulm*; Fr. *ulmaie*; from Lat. *ulmus*, the "elm tree"]; **Ulmic Acid** [Ger. *Ulmensäure*; Fr. *acide ulmique*]; **Geic Acid** [Ger. *Geisäure*; Fr. *acide géique*; from Gr. *γῆ* or *Γαῖα*, the "earth"]; **Crenic** and **Apocrenic Acids** [Ger. *Quellsäure* and *Quellsäure*; Fr. *acides crénique* and *apocrenique*; from Gr. *κρήνη*, a "well" or "spring"]; **Nitrohumic Acids**, **Silico-nitrohumic Compounds**, **Peat**, etc. This large class of substances—comprising the proximate or more immediate products of decay, fermentation, and cremacausis of plant-tissues, under subaerial or subaqueous agencies, or both—presents great chemical difficulties in its exact investigation. It has therefore, notwithstanding its essential importance in connection with several sciences and arts—including plant physiology, plant nutrition, chemical geology, agriculture, water-supply, etc.—received, so far, the attention of but few chemists. Fortunately, these few include some of the greatest and most reliable names, such as Berzelius, Mulder, Berthelot, Paul Thénard, etc.; so that our knowledge, imperfect and incomplete as it is, has especial value. The ulmic and humic substances found in soil and vegetable "mould," rotten wood, peat, etc. were chiefly investigated by Mulder about 1840–45;



the crenic and apocrenic compounds by Berzelius about the same period, and later also by Mulder; while the highly important relations of the humic substances to *silica* were announced only five years since by Paul Thénard, and are but obscurely known.

*Ulmine*.—This is the name given by Mulder to that portion of brown decaying or decayed vegetable matter, such as rotten wood, peat, etc., which is insoluble in water, acids, and alkalis. The name *ulmine* originated with Klaproth, who applied it to what was probably a gummy exudation from an elm tree. The propriety of its use here is not evident. Mulder found also that cane-sugar, when boiled with acids, air being absent, yielded brown substances so similar in composition and chemical characters that he prepared most of his ulmine and ulmic acid for investigation in this way. Mulder's analyses of ulmine, both from peat and from sugar, yielded him the formula (new notation)  $C_{20}H_{16}O_7$ : which it will be useful to us to reduce to an expression "isologous" (having the same carbon-number) with those now most commonly in use for cellulose, the proximate plant-constituent from which natural ulmine is generally, or at least chiefly, formed—and for sucrose.

Sucrose (cane-sugar)..... $C_{12}H_{22}O_{11}$ .

Cellulose..... $C_{12}H_{20}O_{10}$ .

Ulmine..... $C_{12}H_{16}O_{12}$ .

There seems small probability that this so called ulmine is composed of a single definite compound, and it is doubtless a mixture of two or more.

The illustrious Berthelot published in 1869 some curious experiments with Mulder's ulmine from sugar, consisting in the application thereto of his new synthetic method of *hydrogenation*, by heating to  $275^{\circ}C$ . under pressure, with concentrated hydriodic acid. (*Bulletin de la Société Chimique de Paris*, Apr., 1869, p. 281.) The ulmine was changed almost entirely into liquid hydrocarbons, from which he obtained, by fractional distillation, the principal one, boiling at about  $200^{\circ}$ , which gave him the composition  $C_{12}H_{26}$ . He calls it *hydruret of duodecylene*. This is evidently a saturated hydrocarbon, homologous with marsh-gas,  $C_nH_{2n+2}$ . Like the paraffines and other petroleum-hydrocarbons, he found it to be indifferent to the action of the most powerful reagents. These facts have an obvious bearing on the true theory of petroleum-genesis.

*Ulmic Acid*.—This is the portion of brown peat, rotten wood, sugar rotted by hot acids, etc., which is soluble in alkalis. Mulder's formula, amended, is  $C_{20}H_{14}O_6$ , or reducing, as before, to an isologue of cellulose,  $C_{12}H_7.4O_{3.6}$ . This is much more likely to be a definite compound than ulmine, and it will be observed that it differs from cellulose by not very far from  $6H_2O$ , which difference, if exact, would give for ulmic acid (doubling the formula)  $C_{24}H_{16}O_8$ , and would make the action of the acid one of simple dehydration, as usual. Another chemist, named Stein, has since made analyses of ulmine and ulmic acid, and claims that they are isomeric, both corresponding to  $C_{24}H_{18}O_9$ . Ulmic acid, precipitated from alkaline solutions by a mineral acid, is a brownish jelly, which, as soon as the precipitating acid is washed out, begins to dissolve in the wash-water. Its perfect solubility in pure water and in alkalis is partly impaired by strong desiccation, ulmine being probably formed. Nitric acid converts it into formic and oxalic acids, and into *apocrenic acid of ammonia*. Concentrated muriatic acid, without access of air, converts it into ulmine. A number of *ulmates* were described by Mulder.

*Humus or Humine*.—Mulder makes this to be a product of oxidation of ulmine, with separation of water. His derivation of humine from ulmine may be thus expressed:  $C_{12}H_{16}O_{12} + O_6 = 0.3H_2O + C_{12}H_5O_{15}$  = humine. Humine is also obtained directly from sugar by long boiling with acids in the presence of air, and dissolving out the ulmic and humic acids formed from the humine by an alkali. It is converted by strong alkalis into humic acid.

*Humic Acid* ( $C_{12}H_7.2O_{4.6}$ ).—Black peat contains humic acid in combination with ammonia, a compound so strong that boiling with sodic carbonate will not decompose it, but only dissolve it to a double humate of soda and ammonia. Potash expels the ammonia, but with destruction of the humic acid. Mulder appears to have obtained pure humic acid only artificially, by long boiling of sugar 8 parts, sulphuric monohydrate 2, and water 20, dissolving the dark-brown product in potash, and precipitating with muriatic acid—a brownish-black slimy mass, which when dry is insoluble in water, black, jet-like, amorphous, tasteless, and inodorous. Nitric acid converts it into apocrenate of ammonia, with formation of formic and oxalic acids. Concentrated sulphuric acid, without air, forms a new black substance of curious properties, not named by Mulder. Mulder makes the remarkable statement that this humic acid, wholly free from nitrogen, exposed in a moist place for six months to the air, is then found to contain

considerable ammonia; inferring that during its oxidation the aerial nitrogen is caused to combine with the hydrogen of the humic acid, and presumably also that in soils this same process of ammonia-genesis must proceed by virtue of their contained humic acid. Boussingault's experiments have appeared to disprove this; but F. H. Storer has shown (*Bulletin of the Bussey Agricultural Institution*, 1871, pp. 262-268) that Boussingault's experiments were not conclusive, and has reopened a number of questions connected with this subject; inasmuch that a re-examination of the original researches of Mulder seems desirable. Mulder found rotten willow-wood to be composed, in part, of humate of ammonia, evolving ammonia with potash. In black garden-mould humic acid exists also as humate of ammonia, with crenic and apocrenic salts, and is difficult to isolate. From such soils Mulder obtained his *geic acid*, which he makes to be  $C_{12}H_7.2O_{4.2}$ .

*Crenic and Apocrenic Acids*.—Berzelius discovered these two compounds together in a mineral spring in Sweden, whence these names. They are now known to be common products of vegetable decay. Mulder first found them in soils, as above stated. They are also found in some iron ochres and bog ores; and Berzelius recommends their preparation from these latter by boiling with potash, adding acetic acid and acetate of copper, which precipitates brown apocrenate of copper. On filtering, saturating with carbonate of ammonia, and adding cupric acetate again in excess, the greenish-white crenate of copper goes down completely on warming. For the composition of these acids Berzelius's analyses afford

Crenic acid..... $C_{24}H_{30}O_{19}$ .

Apocrenic acid..... $C_{24}H_{34}O_{18}$ .

Mulder states that they cannot be obtained wholly free from ammonia. Crenic acid, isolated from the cupric crenate by sulphohydric acid, and dried, forms a hard, transparent, yellowish, amorphous, inodorous mass, of acid and astringent taste, soluble in all proportions in water and alcohol. Its aqueous solution absorbs oxygen, producing apocrenic acid; dissolves in cold nitric acid without reaction, and is apparently not much acted on by the boiling acid. Apocrenic acid is dark in color, dissolves with brown color in water, also in alcohol, not in ether; has an acid reaction on litmus, but its taste is astringent, like tannin, and not sour. Sal-ammoniac and muriatic acid both precipitate it from aqueous solution as dark-brown flocks.

A recent experimenter, M. W. Detmer, reports that he could not accomplish the absorption by the roots of plants, or by a seaweed, of solutions of humic acid or of soluble humates, but that crenic acid, on the contrary, was readily absorbed. He attributes this to the possession, by the humic compounds, of a *colloid* nature; and he concludes that humic matters in the soil must pass by oxidation into crenates and apocrenates before nourishing plants. According to a very possible hypothesis, however, these humus-matters merely act as ammonia-providers for the roots, without any absorption thereinto on their own part, but by forming ammonia from the air. If this be their function, their incapacity of absorption by the roots becomes merely a provision to secure their continuance of action.

*Humic Matters and Silica*.—In 1870, M. Paul Thénard made a communication to the French Academy of Sciences of a merely preliminary kind, which appears to promise an era in the history of this subject, although it appears to have awakened little attention. (*Comptes Rendus*, vol. lxx, p. 1412.) He claimed to have discovered that by certain modes of fixing ammonia in humic compounds by substitution (as in the formation of ethylamine, for example), he had formed at least four new compounds of the humic type which had the power to dissolve great quantities of silica. These bodies possess a remarkable fixity, not completely losing their nitrogen at temperatures between  $1000^{\circ}$  and  $1200^{\circ}C$ . These new compounds, which he calls nitro-humic acids (*acides azhumiques*), contain from 7.5 to 24 per cent. of nitrogen, and the proportions of silica which they are able to take up are proportional to these numbers. There are thus formed new acids, which he calls silico-nitrohumic (*silico-azhumiques*) acids. His nitrohumic acids exist naturally in small proportion in soils. In his brief discussion of the subject he maintains that the silica which is always found in solution in the colored liquids that leach from soils (as had been shown analytically by M. M. Verdeil and Rieler) has entered into solution in the form of his silico-nitrohumic acids; also distinctly favoring the view that the *nitrogen of the air* enters here into the process for the behoof of vegetation.

*Peat*.—It is manifest that the above facts have an intimate bearing upon the origin, history, composition, nature and properties of the common material known by this name. Peat, according to the circumstances of its formation or subsequent exposure to aerial oxidation, will contain either ulmic or humic compounds, or both, in admixture with



more or less of unaltered cellulose. These compounds will contain more or less ammonia already in combination—even if the ammonia-making power be denied to it—and hence should have its value, greater or less, as an agricultural agent. The discussion of peat as a fuel, the conditions of its growth and formation, with other points relating to peat, will be elsewhere treated of. HENRY WURTZ.

**Hun'dred** [perhaps because originally supposed to contain a hundred families], a division of many English counties, is stated to have been first made by King Alfred. Some of the counties have no hundreds, but have wapentakes, wards, or other similar divisions. The counties of Delaware are likewise divided into hundreds.

**Huner'ic** ['Ονώριος], the second king of the Vandalic empire in Africa, reigned from 477 to 484 A. D. He was a son of Genserich, and married to a daughter of the emperor Valentinian. He was cruel and cowardly, and became most noted for the persecutions which he raised against the orthodox Christians.

**Hunfal'vy** (PÁL), b. Mar. 12, 1810, at Nagy-Szalok, in Hungary; studied law; was appointed professor in jurisprudence in 1842 at the academy of Kásmark; sat in the Hungarian diet 1848-49, and has lived since in Pesth. By his philological and ethnological researches he has defined the position of the Hungarian language in the Uro-Altaic family, and explained its relations to the Finnish and Turkish. In 1856 he founded *Magyar Nyelvészeti*, a periodical for the Hungarian language, in Pesth; in 1861 he gave a *Cheestomathia Fennica*.—His brother, JÁNOS HUNFALVY, b. at Gross-Schlagendorf June 8, 1820, became professor of statistics and history at Kásmark in 1846; took part in the Hungarian rising in 1848, and lives since 1853 in Buda as professor of history at the Polytechnic School. He has written a *Universal History* (1862), a *Geography of Hungary* (3 vols., 1863-66), etc.

**Hunga'rian Grass**, an annual grass much sown as a forage-plant, is merely a variety of *Setaria Germanica*, the common millet. It is valuable for its quick, luxuriant growth on even poor soils, and is much relished by horses and cattle; but if overfed it appears to act as a diuretic, and is hence by many considered injurious to horses. If fed in reasonable quantity, it is very nutritious and quite harmless. It gives a good weight of excellent hay.

**Hung'ary**, in the wider sense of the word, meaning the countries of the Hungarian crown, consists of Hungary proper, Transylvania, Croatia, and Slavonia, and comprises an area of 98,717 square miles, with a population of 15,509,455. It forms an independent state, the kingdom of Hungary, and constitutes one part of the Austrian empire, the Transleithan kingdom, being connected with the German and Slavic countries, which form the other, the Cisleithan part of the empire, by a common dynasty, a common army and navy, and a common representation in foreign countries. The emperor of Austria bears the title of king of Hungary, and governs the kingdom of Hungary by a responsible ministry and a diet, which assembles annually and consists of 473 members, of whom 359 are returned from Hungary proper, 96 from Transylvania, and 18 from Croatia and Slavonia.

Hungary, in the narrower sense of the word, meaning Hungary proper, comprises an area of 68,583 square miles, with 11,530,397 inhabitants, of whom, with respect to races, 4,950,000 are Magyars, 2,380,000 Slavi, 1,470,000 Roumanians, 1,430,000 Germans, and the rest belonging to other different nationalities; and with respect to religion, 5,933,813 are Roman Catholics, 2,607,983 Protestants, 2,395,818 belong to the Greek Church, and 517,338 are Jews.

The surface of the country presents a vast plain sloping down from the Carpathian Mountains, which form the northern boundary, and the Alps, which cover the southern frontier districts towards the Danube, which, with its powerful affluents, the Theiss, the Drave, and the Save, traverses it and drains the soil. The soil of this plain is in some places sandy, almost desert-like, in others, especially along the Theiss, swampy and marshy, but generally it is extremely fertile, and by the rapid progress of agriculture the unproductive portions of the soil are annually diminished. The climate has also its drawbacks. The winters are often severe and protracted; the summers are often very hot, and droughts and destructive hailstorms are not unfrequent. But in general it is agreeable, healthful, and favorable to agricultural pursuits. Of the soil, one-third is covered with splendid oak forests, in which large flocks of swine are fed, and which literally swarm with pheasants, partridges, deer, stags, wild-boars, and wolves. Another third is under tillage, and although agriculture, in spite of recent progress, is still in a backward state, between 60,000,000 and 70,000,000 bushels of wheat of first quality are annually raised over the demand for home consumption. The remaining portion is partly occupied by meadows, where

large herds of cattle, sheep, and horses of superior quality are reared, partly by gardens, orchards, and fields of flax and hemp, and partly by vineyards, which produce the finest wines and in sufficient quantity to supply the half of Europe. No less abundant is the mineral wealth of the country. The supply of rock-salt is inexhaustible; and of other useful minerals there were produced in 1858, 44,000 ounces of gold, 48,000 ounces of silver, 6300 cwt. of quick-silver, 27,000 cwt. of lead, 36,750 cwt. of copper, 1,575,000 cwt. of iron, and over 7,000,000 cwt. of coal. What Hungary lacks to become one of the richest countries in the world are, first, the tools of modern civilization—namely, associations to create capital, machinery to cheapen production, and railways to carry the products into the market—and then a little more of that spirit which understands how to use these tools, a little more of that modern spirit which prefers the bustle and energy of enterprise to the half-dreamy enchantment of the imagination.

Hungary is inhabited by several distinct races speaking several distinct languages, but the predominant race is the Magyar, a high-spirited, proud, and generous people, richly gifted in every respect, in body strong, mentally bright, and possessed of an inexhaustible energy. They came into Hungary at the close of the ninth century. The country had been a Roman possession, forming parts of the two provinces of Pannonia and Dacia. After the fall of the Roman empire it was overrun by different nations, among which the Huns and the Avars sustained themselves on the soil for the longest period, and are supposed to have given the country its name. At the close of the ninth century it was divided into many small kingdoms, and Wallachs, Bulgarians, and Germans formed a large portion of the population. The Magyars are a Turanian people, allied to the Turks and to the Finns. For a long time they dwelt first in Caucasus, and then in the region between the Don and the Dniester, but in 887 they descended under Arpad into the plain of the Danube, and after ten years' fighting they conquered the country and ruled from the summits of the Carpathian Mountains to the foot of the Styrian Alps. Their history falls into three periods—under the dynasty of the Arpads to 1301; under the elective monarchy from 1301 to 1526, and under the dynasty of the house of Hapsburg from 1526 to our time—but during its whole course, and in spite of the many splendid deeds and great achievements which it contains, its general character throughout is a peculiar backwardness, tending either to enslave the nation by indolence or to break it into factions. The most remarkable of the Arpad dynasty was Stephen I., from 997 to 1038. He was crowned by Pope Sylvester II. in 1000 as king of Hungary, and received the title of "His Apostolic Majesty" (which since that time has been the title of the Hungarian kings) as a reward for his exertions in behalf of the Church. Under him Christianity was established among the people, the country was divided into bishoprics, and schools were founded for classical and theological learning. But it was also under him that Latin became not only the official language of the Hungarian government, but also the only acknowledged vehicle of Hungarian civilization; and this pitiful mistake, this great calamity, stood unremedied for nearly 800 years, and affected the people like a somniferous potion. During the next period the elements of faction were grafted on the nation. Of all forms of government, the elective monarchy is the worst. People think it a privilege to choose for their king him whom they like. But that privilege is a curse. If a king were elected only for a limited time, the election would be a privilege, for then it would be possible for those interests which were defeated at the election to live and work on as a party. But as soon as the king is elected for life the party, defeated at the election, immediately becomes a faction. Furthermore, the elective monarchy gave the Hungarian nobility an opportunity of carrying changes into the constitution of the country which made it possible for them to depress the peasantry into serfdom, and prevent the formation of a powerful third estate living independent in the cities; and the nobility did not forget to utilize the opportunity. The most backward period, however, is that under the government of the house of Hapsburg. Twice the Hungarians saved this house from utter ruin—first, under Maria Theresa, when all Europe felt a desire to divide her dominions; and a second time, under Francis, when Napoleon hesitated whether he would let this family cease to reign, or whether he would marry one of its daughters. But this fidelity has more than once been rewarded with infamous treachery. Up to the days of the present emperor it was always the policy of Austria to try to dissolve the Hungarian constitution, and recast the Hungarian nation in German moulds. The effect of this policy was just opposite to what was intended; it brought the different estates of the Hungarian people, the haughty nobility and the poor serfs, nearer together, and that political movement in modern



civilization which demands equal participation in the government for all citizens of the state, equal taxation of all the members of the society, equal acknowledgment of all religious denominations, and absolute abrogation of all privileges and monopolies, was in Hungary brought about by the nobility itself. A constitution dictated by this spirit, abolishing feudality, enacting a new election law, and proclaiming the liberty of the press, was sanctioned by the diet and by the Austrian emperor in 1848, but at the very same time the Austrian government in Vienna began agitating, through its agents, the German, Slavic, and Roumanian races living in Hungary, against the Magyars, and it succeeded in creating such an uproar and confusion in the country that the abrogation of the free constitution by Russian arms and the establishment of an unmixed despotism seemed the only means by which to procure order. The relations between Hungary and Austria were very near an open rupture when the revolution of Feb., 1848, broke out in Paris, and occasioned a similar rising in Vienna. On Mar. 13, Prince Metternich fell, and with him the old régime. The emperor Ferdinand acceded in principle to all the demands of the Hungarians. An independent Hungarian ministry was formed under the presidency of Count Batthyányi; Kossuth and Deák were among its members, and the Diet of Presburg dissolved after sanctioning the necessary measures for the convocation of a national assembly at Pesth in July. It can hardly be doubted, however, that the Austrian government began to undermine this agreement almost from the very moment it made it. The Slavonian, Roumanian, and German parts of the population of Hungary were jealous of the predominance of the Magyars. The Germans and Slavonians of Hungary proper protested against the separation from Austria, and Transylvania and Croatia demanded the same independence of the Hungarian crown as Hungary of the Austrian. This movement was stirred up by secret emissaries from Vienna, and in some cases—as, for instance, in the election of Jellachich as ban of Croatia, and his defiant opposition to the Hungarian government—it was openly encouraged. Soon a war of races broke out with fury within the boundaries of Hungary. The national assembly convened in July, and, fired by the eloquence of Kossuth, it promptly agreed on measures for the suppression of the Slavonian rebellion: 42,000,000 florins were granted, 200,000 troops were levied, the Honvéds were formed, the fortresses equipped, etc. But from this time the central government at Vienna made greater and greater difficulties. It declared a separation between Hungary and Austria in military and financial respects an impossibility, and it continued to employ the Hungarian troops for the suppression of the insurrection in its Italian provinces. At last it plainly refused to sanction the measures of the national assembly, and Jellachich crossed the Drave. In September the cabinet of Batthyányi resigned, and a committee of defence under the presidency of Kossuth was formed. A vigorous resistance against the Slavonians on the one side and the central Austrian government on the other was organized; Jellachich was defeated; and when a new rising took place in October at Vienna, the Hungarian cause seemed to have won. But in December the emperor Ferdinand abdicated; Francis Joseph acceded to the throne; the Austrian arms were successful in Lombardy; and in the spring of 1849 an Austrian army under Prince Windischgrätz entered Hungary, demanding unconditional obedience to the Austrian authority. The national assembly, which had moved from Pesth to Debreczin, declared the house of Hapsburg deposed, chose Kossuth governor-general of the country, and a deadly struggle commenced. The various successes, the military heroism, and the political confusion with which it was carried on are described in the articles on BEM, DEMBINSKI, GÖRGÉI, KLAFFKA, KOS-SUTH, etc. It was decided by the intervention of Russia. One Russian corps under Paniutine entered Hungary from the W., another under Liders from the E., while a third army, numbering 130,000 men, under Paskewich, entered the Hungarian plain from the N., Aug. 13, 1849. Görgöi surrendered at Világos; Kossuth, Moszáros, and others fled to Turkey; and many of the richest and noblest men of the nation became scattered all over the world. Batthyányi, Kis, and others were executed, and all the dungeons of the empire were filled. Thus Austrian order was once more restored. Nevertheless, in spite of the terrible defeat, the resistance of the Hungarian people was by no means broken. An opposition against the Austrian rule was soon formed on a broader basis and with a clearer consciousness, and the demands for the constitution of 1848 became louder and louder every year. At last, after the battle of Sadowa (July 3, 1866), and the entire separation of Austria from Germany, the Austrian government felt compelled to submit. In Feb., 1867, an independent Hungarian ministry was formed under the leader-

ship of Count Andrassy, and in December of the same year the final emancipation of the Hungarian crown on the basis of the constitution of 1848 was accomplished. There still reigns a good deal of confusion and some strife in the relations of the country, both within and without, but, generally speaking, the country is now rapidly progressing in material as well as intellectual respects.

When in the ninth century the Magyars settled in the Hungarian plain, their language was already fixed, and seems to have undergone comparatively few and unimportant changes. The foreign words it has adopted, Latin, Greek, Slavic, German, and Turkish, have been thoroughly remodelled. It belongs to the Turanian family, is nearest akin to the Turkish and Finnish, and resembles the latter closely in its phonetic system, especially in its vocalization and in its grammatical formations. It has, however, in its compound sibilants *cs* and *cz*, and generally in its accent, when spoken with passion, something weird and wild which the Finnish has not, and which sounds very strange to a Saxon ear. It is spoken, at present, in four dialects—the Gyüri, on the Raab; the Bihari, on the Theiss; the Palóc, in the Mátra Mountains; and the Székely, in Transylvania. The last is said to be somewhat mixed with Tartar words, the third to contain most ancient words, but the difference between them and the written language is not great. It was not, however, until the latter part of the eighteenth century that this language became a truly literary language and the bearer of a national civilization. With the introduction of Christianity, about 1000, Latin became the language not only of the Church and its service, but also of the law and all court proceedings. There were monasteries and ecclesiastical seminaries in Hungary in the eleventh century; in the twelfth, Magyars frequented the universities of Paris and Bologna; and in the thirteenth, they founded libraries and schools at home. But all communication with Western Europe, and, indeed, the whole process of civilization, was carried on in the Latin language, and the national tongue, so far as it appeared in public, was confined to the camp and the tavern. In this a change took place with the Reformation, which was introduced into Hungary from Bohemia. Translations of the Bible occur as early as 1382, but in the sixteenth they became frequent: Komjáti (1533), Pesti (1526), Sylvester (1541), Heltai (1546), Székely (1548), Melius (1565), etc. The chronicle of the country was written in the native tongue by Székely (1559), Temesvári (1569), and Heltai (1572). Hymns, and even popular songs, were produced. The development stopped very soon, however, here as in Germany and the Scandinavian countries, though from different causes. The accession of the house of Hapsburg to the Hungarian throne after the death of Louis II. in 1526, confirmed Latin as the official language of the country. The Reformation itself spread German widely among the middle classes to the detriment of the native tongue, and after the introduction of the Jesuits in 1561 the Magyar language was looked upon as a cover for heresy. In the seventeenth and the first part of the eighteenth century Latin predominated more than ever. The first regular newspaper of the country, started in 1721, was published in Latin. It was the school reforms of Joseph II. which first awakened the popular spirit, and it was his attempt at Germanizing the people which made the awakened spirit national; the attempt was met with the most decided resistance. Laws were promulgated which introduced the Hungarian language in schools and courts of all degrees, and social life commenced to assume, in all its various branches, a most decidedly national character. In 1787, Matthias Ráth started in Presburg the first Hungarian newspaper, thereby inaugurating a journalistic literature which probably has employed greater talent and exercised a deeper influence than that of any other European country. Its most brilliant period embraces the years between 1810 and 1844, when Louis Kossuth edited the *Pesti Hírlap*, and treated all vital questions involved in the situation of the Hungarian people with a nobleness of tone and elegance of manner which actually raised the literary standard of the nation. In 1788, Kazinczy commenced his *Magyar Museum*, and although this, as well as its nearest descendants in the periodical press, was confined to the rich and educated classes, from it sprang a peculiar kind of annals of miscellaneous contents, *Ellenir*, *Emlék*, etc., which became very popular. In 1793, Raday established a national theatre in Pesth; in 1817 appeared the first comedy by Károly Kósztády, and since the debut of Joseph Szigligeti as a playwright in 1834 the Magyar theatre rests principally on the national drama. In 1836, Baron Josika commenced his very prolific and successful activity as a romance writer, treating subjects of the history of the Magyars after the model of Walter Scott, and from 1842 to 1846 appeared the *History of Hungary* by Horváth. Other



fields of literature and science, especially travelling sketches and languages, have been taken up and cultivated with equal success during the course of the present century. But its true inauguration as a literary language, as the bearer of a national civilization, as the expression of a national genius, the Hungarian language received by the publication in 1817 of *Himfy's Love*, by Sándor Kisfaludy. An unbroken chain of lyrical productions or epics, with a strong lyrical tone, of different character, but generally of great merit, connects *Himfy's Love* with our days, and culminated with Sándor Petöfi. With him all inspiration from foreign ideas, all imitation of foreign models, ceased. The Magyar genius stood fully revealed, free and independent, in one of its phases, and a truly national school of poetry was formed; one of its chief members is Johann Aráry. Nor was the check which this development received from the failure of the revolution of 1848 absolute; on the contrary, after a short and merely temporary disturbance, it went on, as it seems, with renewed vigor.

CLEMENS PETERSEN.

**Hungary Neck**, tp. of Somerset co., Md., on Chesapeake Bay. Pop. 938.

**Hungary Water**, a perfume for the toilet, is simply dilute alcohol aromatized with sage, rosemary, ginger-root, or other fragrant substances, and then distilled. It has had a limited use in medicine as a stimulant.

**Hunger** [Ang. Sax. *hanger*], the craving for food, the sensation which impels animals to eat. It is an intensification of what is called the appetite. An abnormal condition of hunger is also induced in animals by the ablation of the spleen, and perhaps by the removal of other ductless glands. Hunger is probably induced normally by the general need of nutriment throughout the system, but the sensation is chiefly referred to the stomach. It may be diminished by the administration of various drugs and by the use of tobacco.

**Hunnewell**, post-v. of Jackson tp., Shelby co., Mo., on the Hannibal and St. Joseph R. R., 37 miles W. of Hannibal. Pop. 327.

**Huns**, The [Lat. *Hunni*], were an extremely savage and ugly tribe of warlike nomads, with dark complexions, small, deep-set, black eyes, broad shoulders, and flat noses. They came from the vast barren plateaus of Eastern Asia, N. of China, and while one part of them settled along the shores of the Caspian Sea, and later became known as the White Huns, the other part crossed the Volga and conquered the Alani, who became incorporated with them. In 376 they crossed the Dnieper, defeated the Goths, and drove them over the Danube into the Roman province of Pannonia. In 434, under Attila, they crossed the Danube, and the Roman emperor, Theodosius II., had no other means of stopping them than by paying them an annual tribute. When, after the death of Theodosius, the tribute ceased to be paid, Attila pushed forward and visited Gaul, where he was defeated on the Catalaunian plain, and Italy, where Pope Leo I. persuaded him to retreat. After the death of Attila the Huns dissolved and disappeared among the other barbarian tribes. The Huns were probably Tartars, perhaps of the Mongol branch, but the term appears to have been used somewhat vaguely, and to have included Turkish or Ugrian peoples, perhaps even the Magyars.

**Hunt**, county of the N. E. of Texas. Area, 935 square miles. It is a rolling country, with abundance of hardwood timber. The soil is generally fertile. Live-stock, corn, cotton, and wool are staple products. Cap. Greenville. Pop. 10,291.

**Hunt**, tp. of Scott co., Ark. Pop. 280.

**Hunt** (EDWARD B.), b. in Livingston co., N. Y., 1822; graduated at West Point Military Academy July 1, 1845, and entered the army as brevet second lieutenant of engineers; promoted to be second lieutenant Dec., 1845, first lieutenant July, 1853, captain July, 1859, and major Mar., 1863. Upon entering the army in 1845 he was ordered to New York as assistant to the board of engineers for coast defence, and served in this capacity about one year, when he was detailed for duty at West Point as assistant professor of engineering, which position he retained till 1849, when he was ordered to Boston, Mass., as assistant engineer in the construction of Fort Warren. From 1851 to 1855 he was on duty in the office of Prof. Bache, superintendent U. S. Coast Survey, and from 1855 to 1857 was engaged in the construction of fortifications and lighthouses on the coast of Rhode Island. He was transferred to Key West, Fla., in 1857, and engaged in the construction of Fort Taylor until 1862, when he was relieved, and became chief engineer of the department of the Shenandoah, which position he held but a short time, being engaged from Apr., 1862, to Oct., 1863, in the construction of fortifications in

Connecticut and Rhode Island, and during the same time on special duty under the navy department in perfecting his invention of a submarine battery (the "Sea Miner"); and it was while conducting experiments at Brooklyn, N. Y., with this device that he was overcome by escaping gas, and, falling into the hold of the vessel, was killed, Oct. 2, 1863. He was a brother of ex-Gov. Washington Hunt of New York, and a man of high scientific attainments, and earnestly devoted to his country and profession; member of several scientific associations, and a frequent contributor to various literary and scientific publications.

G. C. SIMMONS.

**Hunt** (FREEMAN), b. at Quincy, Mass., Mar. 21, 1804; entered in 1816 a printing-office in Boston; established the *Ladies' Magazine* and recommenced the publication of the *Penny Magazine*; became managing director of the Bewick Company and edited *The American Magazine*; removed in 1831 to New York, where he established *The Traveller* in 1831 and the *Merchant's Magazine* in 1839. He also published *The Library of Commerce* (1856-57) and *The Lives of American Merchants*. D. at Brooklyn Mar. 2, 1858.

**Hunt** (HELEN), a daughter of the late Prof. N. W. Fiske, b. at Amherst, Mass., in 1831, became the wife of Maj. E. B. Hunt (1822-63) of the U. S. engineers. She resides at Newport, R. I. Her *Verses by H. H.* (1871) and *Bits of Travel* (1872) have won a brilliant popularity.

**Hunt** (HENRY JACKSON), b. in Detroit, Mich. (then a Territory), Sept. 14, 1819; graduated at West Point Military Academy July 1, 1839, and entered the army as second lieutenant of artillery; promoted to be first lieutenant 1846, captain 1852, major 1861, lieutenant-colonel 1863, and colonel 1869; served on frontier and garrison duty 1839-46; in the Mexican war 1846-48, at Vera Cruz, Cerro Gordo, Churubusco, Molino del Rey (wounded), Chapultepec, and the capture of the city of Mexico (brevet captain and major). During the civil war served as aide-de-camp to Gen. McClellan, and commanded the artillery reserves of the Army of the Potomac in the Peninsular campaign of 1862, and commanded in chief the artillery of that army from Sept. 18, 1862, to the close of the war. Appointed brigadier-general of volunteers Sept. 15, 1862; brevet major-general of volunteers and brevet colonel, brigadier-general, and major-general of volunteers for gallant services in the field. Author of various reports and papers on artillery, artillery projectiles, tactics, army organization, and organization of artillery schools; member of various boards for the armament of fortifications, and president of the permanent artillery board for the army. G. C. SIMMONS.

**Hunt** (JAMES HENRY LEIGH), b. at Southgate, Middlesex, England, Oct. 19, 1784, the son of a clergyman who had been a lawyer in Philadelphia. Leigh Hunt was educated at Christ's Hospital, read law for a time, and found a place in the war office, which he left in 1808. His *Juvenilia* (poems, 1801) was published by his father, and in 1805 he became a critic for the *Notes*, a journal, and in 1808 established, with his brother John, *The Examiner*, a journal which became a power in the political world by reason of the independent course of its editors. The brothers were imprisoned (1812-15) for using language which was regarded as lacking in respect for the prince regent, but the kindness of Moore, Byron, and the Whig literati made Hunt's jail-life a very pleasant episode in his career. His best poem, *The Story of Rimini* (1816), was among the books written during his imprisonment. His literary life was one of much activity; many volumes of poems, essays, translations, and romance followed; but in spite of his industry Hunt was always very poor. In 1822 he visited Byron in Italy, and quarrelled with him, but after the latter's death published *Recollections of Byron* in 1828. Hunt performed much editorial labor, and in 1847 received a pension of £200. Hunt was a man of happy disposition, but was of a character not altogether admirable. Dickens's Harold Skimpole is believed to set forth Hunt's least admirable qualities. As a writer he had a felicitous style and an artistic way of putting things, but he wrote too often when he had nothing important to say, and most of his many books are already forgotten. Among the best are *Men, Women, and Books* (1847) and *Autobiography* (1850), edited by Thornton Hunt, his son. Leigh Hunt d. at Putney Aug. 28, 1859.

**Hunt** (JOHN), b. near Lincoln, England, June 13, 1812; joined the Wesleyan conference in 1836, and in 1838 was sent to the Fiji Islands, where for ten years he travelled and preached, introducing Christianity in many tribes. D. there in 1848, having translated the New Testament into the Fiji tongue, besides writing in English a treatise on *Entire Sanctification*.

**Hunt** (RICHARD MORRIS), b. in Brattleboro', Vt., Oct. 23, 1828; went to Europe in 1843; was a pupil at the Ecole



des Beaux Arts in Paris, and attained distinction there; was made an inspector of the building between the Louvre and the Tuileries; returned to America in 1855; devoted himself actively to his profession, and has been of service in elevating the taste for architecture at home. He has built villas in Newport, residences in Boston and New York, the Stevens' apartment-house, the Lenox Library, the Divinity College building at Yale, the Capitol extension at Washington, and is the architect of the *Tribune* building in New York. His summer residence is at Newport; in winter he lives in New York. O. B. FROTHINGHAM.

**Hunt** (ROBERT), b. at Devonport, England, Sept. 6, 1807. He is a self-educated man, but has acquired a great name, partly by his annually published *Mineral Statistics* for the United Kingdom, which he was the first to establish, partly by his researches on light, communicated to the *Transactions of the British Association*, whence resulted the discovery of several important photographic processes and a better understanding of the chemical influences of the solar rays. He is conservator of the Museum of Geology in London, and has published *Poetry of Science* (1848) and *Panthea* (1849).

**Hunt** (THOMAS), M. D., b. in Charleston, S. C., May 18, 1808; d. in New Orleans Mar. 30, 1867; graduated in the medical department of the University of Pennsylvania 1829, and in 1863 the same degree was conferred upon him by the Royal University of Havana, Cuba. He was the first professor of anatomy and physics in the medical department of the University of Louisiana 1834; then its dean, and in 1848 became professor of physiological and pathological anatomy, which he held at his death. He was also house-surgeon to the Charity Hospital; president of the Physico-Medical Society of New Orleans, and became the president of the University of Louisiana 1866. He also contributed largely to medical journals. PAUL F. EVE.

**Hunt** (THOMAS STERRY), F. R. S., LL.D., Ph. D., b. at Norwich, Conn., Sept. 5, 1826; studied medicine and chemistry, and in 1845 became assistant in chemistry to Prof. Silliman; served under Sir W. E. Logan as chemist and mineralogist for the geological survey of Canada; was in 1855 one of the English jurors at the Paris Exposition, when he received the cross of the Legion of Honor. In 1859 he was chosen a fellow of the Royal Society. He has been professor of chemistry in the University of Quebec and in McGill College, Montreal, and now (1875) holds a similar position in the Massachusetts Institute of Technology. He has written many important papers upon mineralogy, chemistry, dynamic geology, and kindred topics.

**Hunt** (WARD), LL.D., b. at Utica, N. Y., June 14, 1810; educated at Hamilton and Union Colleges, graduating in 1828; was mayor of Utica and member of the New York assembly; was judge of the court of appeals of the State of New York from 1865 to 1873, when he became justice of the Supreme Court of the U. S.

**Hunt** (WASHINGTON), b. at Windham, N. Y., Aug. 5, 1811; admitted to the bar at Lockport in 1834; appointed first judge of Niagara co. in 1836; member of Congress 1843-49; comptroller of New York 1849, and governor 1851-53. He was one of the leaders of the conservative wing of the Whig party, and when this party was dissolved he became a Democrat. He was a delegate to the Chicago Convention in 1864, and d. in New York Feb. 2, 1867.

**Hunt** (WILLIAM HOLMAN), b. in London in 1827; studied in the school of the Royal Academy, and exhibited for the first time in 1846. In the first years he generally took his subject from some poet, Kents, Bulwer, and others, but with his picture *A Converted British Family Sheltering a Christian Missionary from the Persecution of the Druids*, exhibited in 1850, a radical change had taken place, not only in his choice of subjects, but also in his style of execution; with this picture the new school of pre-Raphaelites was, if not founded, at least announced. In 1853 he painted *Our English Coast*; in 1854, *The Awakened Conscience*; and *The Light of the World*, explained in two letters by Ruskin, published in the *Times*; in 1857, *After Sunset in Egypt*; and in 1872, *The Shadow of Death*.

**Hunt** (WILLIAM MORRIS), brother of Richard M., b. in Brattleboro', Vt., Mar. 31, 1824; entered Harvard College in 1840, but did not complete his course; went to Düsseldorf in 1846; in 1848 was a pupil of Couture in Paris; returned to the U. S. in 1855, and took up his residence in Newport, but removed thence to Jamaica Plain, which is now included in Boston. Hunt was one of the first to introduce what is commonly known as the French school of art into America, but he made it his own, and used it to express original ideas. His pictures are numerous and of great variety in subject, genre-painting and portrait being his great excellence. *The Lost Kid*, *The Christies*, *Girl at the Fountain*, *Marguerite*, *Morning Star*, *Boyle Hall*, *Drummer Boy* are well known, and have most, if not all,

been reproduced in lithograph. Some of his portraits—those of Dana the poet, Chief-Justice Shaw, and several of ladies—are much admired, but in this work he was unequal, his success depending greatly on his sympathy with the sitter. For several years Mr. Hunt taught classes of ladies in Boston, and awakened enthusiasm in the study of art. D. Sept. 8, 1879. O. B. FROTHINGHAM.

**Hunter**, tp. of Edgar co., Ill. Pop. 1029.

**Hunter**, post-tp. of Greene co., N. Y., in the Catskill Mountains. It was formerly celebrated for its extensive tanneries, and is an attractive summer resort. Pop. 1524.

**Hunter**, tp. of Laurens co., S. C. Pop. 2557.

**Hunter** (DAVID), b. at Washington, D. C., July 21, 1802; graduated from the U. S. Military Academy, and entered the army as second lieutenant of infantry July, 1822; engaged for fourteen years on frontier duty, rising to the rank of captain of dragoons 1833; resigned in 1836. In 1842 he re-entered the service as paymaster, with the rank of major, on which duty he served until 1861, when (May 14) he was appointed colonel 6th U. S. Cavalry, and three days later brigadier-general of volunteers, as such commanding division at Bull Run (July 21), where he was wounded; promoted to be major-general of volunteers Aug., 1861. In May, 1862, while in command of the department of the South, he issued an order declaring slavery abolished in that department, which order was annulled by Pres. Lincoln in a proclamation. In May, 1864, Hunter succeeded Gen. Sigel in command of the department of West Virginia; the battle of Piedmont and subsequent march against Lynchburg via Lexington occurred the following month; a strong Confederate force arrived in good time to the relief of that city, however, and Hunter's ammunition giving out, he made a hasty retreat, closely pursued by the enemy. In 1865 was member of the military commission to try the conspirators engaged in the assassination of Lincoln. Retired from active service July, 1866. G. C. SIMMONS.

**Hunter** (JOHN), F. R. S., b. at Long Calderwood, near Glasgow, Scotland, July 14, 1728; youngest of ten children, of whom one was the afterwards celebrated William Hunter. John received very imperfect instruction at school; was apprenticed to a cabinetmaker; went in 1748 to study anatomy with his brother; studied at Oxford 1753-54; became a surgical pupil at St. Bartholomew's 1751, and at St. George's 1754; studied surgery under Cheselden and Pott; lectured upon anatomy 1754-59; attained great knowledge of human and comparative anatomy; served in France and Portugal as staff-surgeon 1761-63; began to practise surgery in London 1763; was made F. R. S. 1797, in consequence of the publication of important papers containing new discoveries in pathology and physiology; became surgeon to St. George's Hospital 1768; surgeon extraordinary to the king 1776; surgeon-general of the forces and inspector-general of hospitals 1790. D. in London Oct. 16, 1793. John Hunter was the boldest and best operator of his time, an anatomist of marvellous knowledge, and one of the fathers of zoological science. His style as a speaker and writer was bad, owing to his defective early training. His manners were coarse and repulsive and his temper violent, but he possessed many strong and noble moral qualities. He was one of the founders of the modern school of surgery. Author of *Natural Hist. of the Human Teeth* (1771-78), *On Venereal Disease* (1786), *Observations on Certain Parts of the Animal Economy* (1786), *On the Blood, Inflammation, and Gunshot Wounds* (1794). He was the collector of the great Hunterian Museum, chiefly of pathological and anatomical specimens, purchased by the British government and presented to the Royal College of Surgeons.

**Hunter** (JOHN KELSE), b. at Dunkeith, Ayrshire, Dec. 15, 1802; was at first a cobbler, and afterwards a portrait-painter of repute. He published *The Retrospect of an Artist's Life* (1867), *Life-Studies of Character* (1870), the last highly valued as containing fresh information upon the persons and places celebrated by Burns, Tannahill, and other Scottish poets. D. at Pollockshield Feb. 3, 1874.

**Hunter** (JOHN W.), b. in Bedford (now in Brooklyn), N. Y., Oct. 15, 1807; became a clerk in the New York custom house 1831; was assistant auditor there 1837-60; was long prominent in the educational affairs of Brooklyn, and was an officer of the Dime Savings Bank; chosen to Congress in 1866, and in 1874 became mayor of Brooklyn.

**Hunter** (JOSEPH). See APPENDIX.

**Hunter** (ROBERT MERLE TALLAFERRO), b. in Essex co., Va., Apr. 21, 1809, and was educated at the University of Virginia and the Winchester Law School; member of the Virginia house of delegates; was a member of Congress 1837-41 and 1845-47, taking a prominent position, and being Speaker 1839-41. He was (1847-61) a U. S. Senator



from Virginia, chairman of finance committee, and was afterwards Confederate secretary of state, and still later a member of the Confederate Senate, and was one of the commissioners who met Pres. Lincoln and Mr. Seward at the Hampton Roads conference in Feb., 1865.

**Hunter** (WILLIAM), M. D., F. R. S., elder brother of John Hunter, was b. at Long Calderwood, Scotland, May 23, 1718; studied at Glasgow University 1732-37, with a view to the ministry; became the medical pupil of Cullen; studied medicine in Edinburgh and London, whither he went in 1741; began to lecture on surgery and anatomy 1746; acquired a wide fame as a surgeon and accoucheur, devoting himself after 1749 chiefly to the practice of obstetrics; took his degree at Glasgow 1750; became physician to the queen 1764; F. R. S. 1767; professor of anatomy 1770; president of the College of Physicians 1781; associate of the Academy of Sciences, Paris, 1782. D. in London Mar. 30, 1783. His splendid collection of anatomical and pathological specimens, coins, books, etc. is now the Hunterian Museum of the University of Glasgow; it was partly collected by John Hunter, from whom he was for many years estranged. William Hunter surpassed his brother in scholarship and courtesy, but was not his equal in professional ability. His principal published works were *Medical Commentaries* (1762-64) and the splendid *Anatomia Humani Uteri Gravid* (1774).

**Hunter** (WILLIAM), D. D., b. May 26, 1811, in the county of Antrim, Ireland; brought to the U. S. in 1817, he entered Madison College in 1830. In 1833 he began his ministry in connection with the Pittsburg (Pa.) conference. He has edited the *Pittsburg Conference Journal*, also the *Pittsburg Christian Advocate* (M. E.), and was presiding elder in the Clarksburg (Pa.) and Beaver (Pa.) districts. In 1855 he became Kramer professor of Hebrew and biblical literature in Allegheny College, Pa. In 1870 he returned to pastoral work, and in 1872 to religious journalism, being then re-elected as editor of the *Christian Advocate*. He was the author of several books of hymns and spiritual songs, and of a poem on *American Methodism, a Plea for Unity*. Some of his devotional songs have obtained a wide popularity, and are sung in many lands. They have been translated into various languages, as the Bulgarian, several dialects of India, Africa, Ceylon, and China. D. at Cleveland, O., Oct. 18, 1877.

A. STEVENS.

**Hunter** (WILLIAM), LL.D., b. at Newport Nov. 26, 1774; graduated at Brown University in 1791; studied medicine for some time under his celebrated kinsman, John Hunter, in London, but left this study and adopted that of law, and was admitted to practise in Newport on his return in 1795. He was member of Congress 1799-1811, and U. S. Senator 1811-21. From 1834 to 1845 he was *chargé d'affaires* and minister plenipotentiary to Brazil. D. at Newport Dec. 3, 1849.

**Hunterdon**, county of New Jersey, bounded on the S. W. by the Delaware River. Area, about 400 square miles. A part of its surface is broken, but its soil is generally very fertile. Cattle, grain, fruit, and wool are staple products. It has manufactures of metallic wares, flour, harnesses, carriages, lumber, and other goods, and is traversed by the Central R. R. of New Jersey, the Belvidere Delaware, and other railroads. Cap. Flemington. Pop. 36,963.

**Hunter's**, tp. of Tehama co., Cal. Pop. 40.

**Hunter's Hill**, tp. of Gates co., N. C. Pop. 1461.

**Hunter's Point**, the S. W. portion of LONG ISLAND CITY (which see), Queens co., N. Y. Pop. 1596.

**Huntersville**, a v. of Spring Creek tp., Miami co., O. Pop. 233.

**Huntersville**, post-v., county-seat of Pocahontas co., W. Va., on a fine plateau, 40 miles N. by E. of White Sulphur Springs, a station of the Chesapeake and Ohio R. R.

**Hunting**, like war, is coeval in origin with man. "Before it was a pleasure," says E. Blaise, "hunting was a necessity," since people were urged to it not only by hunger, but by the need of protecting themselves from wild beasts. But though King David was respected for skill in the field, it is evident that of all people the Jews were least inclined to the chase, owing to their being religiously trained to avoid almost all amusements, as savoring of Gentilism. But among Greeks and Romans hunting became sacred, Apollo and Diana being its chief patrons, while even its subordinate departments had each a tutelary deity. Pollux presiding over the training of horses for the chase, Orion of assembling dogs in packs, and Hippolytus of snares and toils. The influence of hunting on culture has been very great, and, with a few drawbacks, very beneficial to man. It is exhilarating, and in most forms very conducive to health, as it induces much exposure to fresh air and involves exercise in many forms; in fact, it may be assumed as a broad principle that those races which take

no interest in field-sports, and thereby become unfamiliar with Nature in her wilder forms, are generally cowardly and depraved. It is said that the chase induces cruelty, but it has been remarked that the Romans as they left off hunting became more sanguinary in their games, and the French, who ridicule "*le sport*," and say that an Englishman always remarks if the weather is fine that "one ought to kill something," are themselves much bloodier and more vindictive in their political outbursts and punishments. This is also true of the Chinese.

A subject whose history is as old as that of humanity, and which embraces the taking of almost all animals, from the hare to the elephant, cannot be even sketched within our limit, and we shall therefore simply speak of what is at the present day chiefly understood by hunting, or that branch of it which involves such an outlay of capital as to have almost entirely appropriated the word to itself. This is the pursuit of the deer, fox, and hare on horseback, which in Great Britain probably costs more every year than all the games of ancient Rome did in the same time. The ancient Britons, in fact, were vigorous sportsmen, and Strabo informs us that their dogs for deer were exported to the Continent, and particularly to Gaul. The Saxons were far more addicted to hunting than the Romans, and at an early period established those forest-restrictions which play such an important part in English history, and which, in fact, did much to develop the art into that earnest form which in England is a serious part of most country gentlemen's lives. As early as the ninth century, says Strutt, and probably long before, hunting constituted an essential part of the education of a young nobleman. Alfred the Great, according to Asserius, was most carefully trained in all the branches of the art, and excelled in them before he was twelve years old. It is somewhat remarkable that antiquaries more familiar with MSS. than with nature have doubted whether horses were ever employed in hunting previous to the Norman Conquest, since it is not probable that people who, as we know, had horses both good and fleet, would dismount in order to chase a deer or fox. The very fact that fox-hunting was a special amusement among the Saxons would indicate its pursuit on horseback. The fondness of every Saxon for the chase, and the feeling which appears to be innate with men that animals *feræ naturæ* are common property, led to much resistance to forest-laws through the Middle Ages, and incredible suffering. Hundreds of villages were destroyed by the Norman kings to make immense parks; and so severe were the penalties enforced for poaching that it was commonly said that one might kill a man with more impunity than a deer. This spirit of pre-emption and resistance has continued to the present day in England, and it is not many years since Mr. Thomas Carlyle discovered that England had "more game-laws than poor-laws." Robin Hood and his followers were in a great measure the result of forest-laws. Through the Middle Ages hunting increased in importance, in luxurious details, and, so to speak, in science. It had from remote times possessed a literature. Aristotle had at the command of Alexander the Great written on field-sports, and the *Cynegeticus* (a treatise on dogs and hunting) of Xenophon may still be read with pleasure. The Roman writers on hunting embrace Pliny, Horace, Cicero, Virgil, Seneca, and Justin. Early in the fourteenth century England had several treatises on the subject. That of William Twici, huntsman-in-chief to Edward II., written in Norman French, also exists in an English translation. In it the poet-sportsman thus speaks of animals:

"And for to sette young hunters in the way  
To venery, I cast me first to go  
Of which four bestes be that is to say,  
The hare, the herte, the wulf, and the wild boor.  
But then there ben other bestes fyve of the chase,  
The buck the first, the seconde is the do;  
The fox the third, which hath ever hard grace;  
The forth the martyn, and the last the roe."

As these beasts disappeared or became rare, the fox gradually rose to be the first in consequence. "Nimrod" (Charles James Apperly) observes that it was about 150 years ago when the fox was first considered an animal of the higher chase. *Hudibras*, he observes, has a great deal about the hare, but not one word about the fox, and in Somerville's poem of the *Chace*, very little is said of the latter, but a great deal of the hare and deer. The reason for this is that in England then, as now on the Continent, the value of the game, especially as an edible, was always considered. This has entirely disappeared at present; all that is cared for in the fox is his "brush," while "puss" (the hare) generally goes "to the dogs." Chaucer gave in his time a spirited picture of an improvised foot fox-hunt:

"Aha the fox, and after him they ran,  
And she with stavys many another man.  
Ran Coll our dog, and Talbot and Gerland,  
And Malkin with her distaff in her hand."



Ran cow and calf, and eke the veray hogges,  
So ferred were for barking of the dogges,  
And shouting of the men, and women eke,  
They rounen so, hem thought her hertes brake."

The first fox hunting was with so-called "treacher dogs," which one authority declares were an assembly of any and everything in dog shape, but it is more probable that they were of the breed of broken-haired harriers which still abound in Wales, and are an excellent dog. Blaine states that "the first real steady pack of foxhounds" was that of Thomas Fownes, Esq., of Stepleton in Dorsetshire, in 1730. "They were," says a writer of 1818, "as handsome and fully as complete in every respect as most celebrated packs of the present day"—an assertion which of itself indicates that good packs had existed long before; and "Nimrod" tells us that a pack of foxhounds was kept by Lord Arundel in 1690, and this pack subsequently contributed materially to the celebrated Quorndon Hounds. But this Arundel pack—as its excellence proves—was probably far from being the first in England. With the great improvement in dogs in modern times, and the constant efforts to secure better horses, the system of hunting has changed, and instead of sounding the horn at cock-crow, as soon as they could see to ride, ten, eleven, or even twelve o'clock is now the hour for huntsmen's assembling. In fact, in the old time gentlemen were often obliged to ride many miles before daybreak, but now the horses are sent by "rail," while the rider takes the same conveyance. In the old time hares and foxes were rare, but now they are so carefully preserved that hunters are sure of them. In fact, foxes are often imported from the Continent when they become scarce in any part of England, and the writer knows of a gentleman who recently brought a number to Ireland. He also knows of another gentleman who, having been suspected of shooting or poisoning a troublesome fox, was completely cut by the whole country and shunned like a felon. The change in horses for hunting has also been very great. A century ago the hunter was a half-breed animal, of great strength and handsome, powerful frame—"a complete snaffle-bridle horse, and a standing as well as a flying leaper." He had great endurance. At present the thoroughbred, as shown in the "cock-tail," or three-fourths pure blood, delicate but fleet, is gradually taking the place of the true hunter. The expense of hunting has accordingly been increased in proportion to these changes. A thoroughbred horse, though he can for a short time perform greater feats of speed, and in fact of leaping, is soon disabled, and must be kept from three to seven days quiet after a hunt. Gentlemen who can afford it have two and even three horses brought for them to a hunt. In short, hunting, like all other sports, is rapidly assuming in England an intensely artificial and highly elaborate character, entirely foreign to the spirit of the chase as expressed by poets and understood by the world at large. In old times the buckskin breeches, well stained and worn, were characteristic of hunting, but the ideal rider at a "meet" at present is an elegant in primrose kid gloves and snow-white cords. His hounds run faster, his horses leap, it is said, higher than did those of old, but to one who has, like the writer, hunted both buffalo in America and foxes and hares in England, the latter compares with the former as a walk down Bond street in the season does with a pedestrian tour among the Alps. Hunting in England, notwithstanding the ostentation of expense which is rapidly reducing it more to a matter of money and style than is popularly supposed, is still of incalculable benefit, since it practically familiarizes hundreds of thousands of people with good riding in its truest and fullest sense. The man has always a physical—we may say a nervous—superiority who can without an emotion clear hedge and ditch or keep the saddle all day in a thorough chase. Were it not for hunting many gentlemen would never get beyond a trot on the highway, and that familiarity with the horse in all his best qualities which makes a man's manner would be lost. It is amusing to observe the manner in which the rules of sport are carried out in foreign countries. It is not long since a gentleman twenty-five years a resident in India, and an experienced tiger hunter, assured the writer that any one known to have killed a tiger-cub would be "cut" by every gentleman in his part of the country. It is but just to say that there has been of late a strong reaction against this spirit of selfish cruelty, both in India and England. The extent to which hunting is pursued may be judged from the fact that during the week beginning with Nov. 28, 1874, 170 packs were advertised to run in Great Britain, and that these met from two to four times during the week. Fifty pounds is the lowest price for an ordinary hunting-horse; at many meets the average would be £150. In 1840 a writer estimated the average cost of fourteen hunters at £700; at the same time, he wrote that including these horses the annual expense of a pack, but not including the

value of the hounds, would be £2235. It would be safe to double this sum at present. A few years later "Nimrod" tells us that ten couple of hounds were sold for 1000 guineas, and that Lord Middleton had many hounds for which he would not take 200 guineas apiece. Strangers can, however, join in a hunt at moderate expense. A "tolerably fair," though seldom a really good, horse may be hired at a livery stable for £1 to follow the harriers, and £2 for the fox-hounds. During the hunt an official will demand from him from five to ten shillings as the regular fee. Stag-hounds are larger than fox-hounds; otherwise they are nearly the same. The harrier, used for hunting hares, "is the next remove after the stag or fox-hound from the talbot," or old English hunting-dog. There are three prominent varieties. The modern harrier is little more than a dwarf fox hound. The beagle is a very small hound, used almost entirely for hares, and is frequently, if not generally, followed on foot. CHARLES G. LELAND.

**Huntingburg**, post-v. of Dubois co., Ind., has manufactures of flour, lumber, carriages, wagons, woollens, furniture, tobacco, saddlery, etc.; a weekly newspaper (German), numerous stores, a fine school-house, 5 churches; is situated in a region abounding in block and canal coal, plumbago, iron ores, fine potter's clay, mineral paints, lime, and sandstone, and is the centre of four projected railroads. Tobacco is extensively produced here, as well as grain, fruits, etc. E. PICKHARDT, PROP. "SIGNAL."

**Huntingdon**, borough of England, the capital of the county of Huntingdon, on the left bank of the Ouse. The house in which Oliver Cromwell was born still stands. Pop. of parliamentary borough, 6605.

**Huntingdon**, a fertile county of Quebec, Canada, the westernmost of the counties S. of the St. Lawrence. Cap. Huntingdon. Pop. 16,304.

**Huntingdon**, post-v., cap. of Huntingdon co., Quebec, Canada, 50 miles S. W. of Montreal, in a good agricultural region, has manufactures of farm-implements, castings, lumber, etc., an academy, a weekly newspaper, and a convent. Pop. of sub-district, 763.

**Huntingdon**, county of S. Central Pennsylvania. Area, 730 square miles. It is traversed by grand mountain-ranges, but has very fertile valleys. Bituminous coal, iron ore, and limestone are abundant. Metallic wares, leather, carriages, flour, and furniture are among the leading articles of manufacture. Cattle, grain, and wool are staple products. It is traversed by the Juniata River and the Pennsylvania and the Huntingdon and Broad Top R. Rs. Cap. Huntingdon. Pop. 31,251.

**Huntingdon**, post-b., cap. of Huntingdon co., Pa., on the Juniata, at the junction of the Huntingdon and Broad Top R. R. with the Pennsylvania R. R., 104 miles W. of Harrisburg. It has a national and a private bank, 1 religious and 4 secular newspapers, 2 planing-mills, gas-works, manufactures of brooms, boots and shoes, furniture, etc., car-works, an academy, a select school, and 8 churches, and is in a region abounding in iron, lead, coal, fire-clay, limestone, and fine timber. Pop. 3034.

A. B. BRUMBAUGH, LIT. ED. "JOURNAL" AND "PILGRIM."

**Huntingdon**, post-v., cap. of Carroll co., Tenn., on the Nashville Chattanooga and St. Louis R. R. It has a weekly and semi-weekly newspaper. Pop. 609.

**Huntingdon** (SELENA), COUNTESS OF, daughter of Washington Shirley, Earl Ferrers, b. 1707, and became distinguished in the religious history of the time in which she lived. In 1728 she was married to Theophilus Hastings, earl of Huntingdon, a man of great religious zeal, who died Oct. 13, 1746. Numerous children were the fruit of this marriage, of whom four died young. Whether owing to this affliction or not, the countess became a very devout and zealous Christian; and as at this time the revivals under Wesley and Whitefield were at their height, a strong religious excitement existed in England. The countess inclined to the Calvinistic tenets of Whitefield, whom she made her private chaplain, and she became the leader of Calvinistic Methodism in England, and her followers were known as the "Countess of Huntingdon's Connection." Her large means were devoted to the dissemination of her religious views, and to this end she built and maintained a college at Trevecca, Wales, for the education of Calvinistic ministers; she also built chapels throughout England, and provided for their support. It is said that in all she erected 64 chapels, the finest of which is at Bath, for the management of which she bequeathed the bulk of her fortune in trust. D. June 17, 1791.

**Huntingdonshire**, county of England, bounded by the counties of Cambridge, Bedford, and Northampton. It contains 229,544 acres of low, mostly level or slightly hilly ground, watered by the Ouse and the Nene, and well adapted to agriculture. Pop. 64,250.



**Hunting Quarter**, tp. of Carteret co., N. C. P. 945.

**Huntington**, county of the N. E. of Indiana. Area, 400 square miles. It is very fertile and generally level. Cattle, grain, wool, and lumber are staple products. It is traversed by the Toledo Wabash and Western R. R. Cap. Huntington. Pop. 19,036.

**Huntington**, tp. of Elmore co., Ala. Pop. 1317.

**Huntington**, tp. and post-v. of Fairfield co., Conn., 15 miles W. of New Haven. Pop. 1527.

**Huntington**, city, tp., cap. of Huntington co., Ind., on the Toledo Wabash and Western R. R. and the Wabash and Erie Canal, 24 miles S. W. of Fort Wayne and 118 miles S. W. of Toledo. It contains 12 factories working wood into various shapes, 2 iron-foundries, 1 national and 1 private bank, 8 churches, 2 newspapers, a free graded school, a public-school building costing \$50,000, the usual number of stores, and is the dépot for a large lime-burning region operating 30 kilns. A library, reading-room, and museum are being established in connection with the public school. The city is built on both banks of Little River. Pop. of city, 2925; of tp. 4449.

JOHN F. MOSES, ED. OF "INDIANA HERALD."

**Huntington**, tp. and post-v. of Hampshire co., Mass., on the Boston and Albany R. R., 119 miles W. S. W. of Boston. It has extensive water-power, and manufactures of paper, flannels, etc. There are 4 churches. Pop. 1156.

**Huntington**, post-v. and tp. of Suffolk co., N. Y., on Long Island R. R., 38 miles from New York, with which it is also connected by steamboat the greater part of the year. It has 8 churches, a union graded school building which cost \$20,000, 2 weekly newspapers, and some manufactures and trade. About 30,000,000 bricks are annually made in the vicinity. Pop. 2433; of tp. 10,704.

G. H. SHEPARD, ED. "LONG ISLANDER."

**Huntington**, tp. of Brown co., O. Pop. 3020.

**Huntington**, tp. of Gallia co., O. Pop. 1609.

**Huntington**, post-tp. of Lorain co., O. Pop. 834.

**Huntington**, tp. of Ross co., O. Pop. 2367.

**Huntington**, tp. of Adams co., Pa. Pop. 1595.

**Huntington**, tp. of Luzerne co., Pa. Pop. 1847.

**Huntington**, post-tp. of Chittenden co., Vt., 19 miles W. of Montpelier, has manufactures of lumber. Pop. 864.

**Huntington**, city of Cabell co., West Va., on Ohio River, and on Chesapeake and Ohio R. R., was founded in 1871, and has extensive manufactures. It is the seat of Marshall College, has 2 public schools, 9 churches, 3 hotels, and 2 newspapers. J. J. GILBERT, ED. "ADVERTISER."

**Huntington** (COLLIS POTTER), b. at Harwinton, Conn., Oct. 22, 1821; received a common-school education, and became interested early in life in the management of railroads; is president of the Southern Pacific Railroad Co.; vice-president of the Central Pacific Railroad Co.; trustee of the Atlantic and Pacific Telegraph Co., and a director of the Occidental and Oriental Steamship Co. J. B. BISHOP.

**Huntington** (C. S.), U. S. N., b. Jan. 2, 1841, in Illinois; graduated at the Naval Academy in 1861; became a lieutenant in 1862, a lieutenant-commander in 1866; was in several actions on the Mississippi River in 1863 while serving on board the Monongahela, and in 1864, at the battle of Mobile Bay, owing to the wounding of Commander Mullany, was for a while in command of the Oneida, during which period he distinguished himself for his coolness and bravery.

FOXHALL A. PARKER.

**Huntington** (DANIEL), b. in New York Oct. 14, 1816; educated at Hamilton College; was first stimulated to the pursuit of art by Charles L. Elliot, whom he met while a student; in 1835 began to study under Morse; later was a pupil of Inman; in 1836 travelled and sketched in the Highlands of the Hudson; in 1839 went to Italy and painted figure-pieces; returned to New York, painted portraits and commenced illustrations of the *Pilgrim's Progress*, which failure of eyesight compelled him to discontinue; revisited Europe in 1844, and painted other composition pictures, which added to his fame; on his return resumed the painting of portraits, but found time to execute two or three historical pieces, *Henry VIII.* and *Catherine Parr, Mary Signing the Death-warrant of Lady Jane Grey*, and *Lady Jane Grey in the Tower*. For many years past his permanent residence has been in New York, where his reputation is very high. Huntington has been successful in several fields of art. He has painted mountain scenery, marine views, landscapes, historical compositions, cabinet and genre pictures, groups and figures of fancy, ideal heads, subjects of religious story and sentiment; but his most distinguished work is in portraiture. Among his numerous sitters have been Bishop McIlvaine, Dr. Muhlen-

berg, Gulian Verplanck, Chancellor Kent, Lord Morpeth, Sir Charles Eastlake, Agassiz, Bryant, Lincoln, R. B. Minurn—names that suggest a wide and eminent fame. Huntington's most ambitious picture is *The Republican Court in the Time of Washington*. It contains sixty-four figures, all portraits of men and women celebrated in the Revolutionary epoch—some copied from original paintings by Malbone, Stuart, Copley, or less known artists, others constructed by the aid of family lineaments and traditions—the whole grouped as naturally as the conditions allowed. The picture is owned by A. T. Stewart. Mr. Huntington has been greatly honored by his profession and by the public. In 1850 a special exhibition was made in New York of all the pictures of his that could be collected, the best known artists and citizens joining to make the tribute worthily expressive of their regard. On May 14, 1862, he was elected president of the National Academy of Design, a position to which none but artists of recognized ability are chosen.

O. B. FROTHINGHAM.

**Huntington** (Right Rev. FREDERIC DAN), D. D., b. at Hadley, Mass., May 28, 1819; graduated at Amherst in 1839 and at the Cambridge Divinity School in 1842. Entering the Unitarian ministry, he held a pastorate in Boston 1842–55, when he became Plummer professor of Christian morals and preacher to Harvard University. In 1859 he took orders in the Episcopal Church; in 1861 was one of the founders of the *Church Monthly*; and in 1869 was consecrated bishop of Central New York. He has published 2 vols. of sermons, one of lectures on *Human Society* (1860), and *Lessons on the Parables*, and other works.

**Huntington** (JEDIDIAH VINCENT), M. D., b. in New York Jan. 20, 1815; was educated at Yale College and the University of New York, where he graduated in 1835; graduated M. D. at the University of Pennsylvania 1838; was professor of mental philosophy in St. John's College, near Flushing, N. Y., for three years; rector of a Protestant Episcopal church in Middlebury, Vt.; in Europe 1846–49; became a Roman Catholic in 1850; was editor of the *Metropolitan*, Baltimore, 1853–54; founded and edited (1855–57) the *Leader*, St. Louis; author of *Poems* (1842), *Lady Alice*, a novel (1849), *Alban*, *The Forest* (1852), *The Pretty Plate* (1852), *Rosemary* (1850), *Blonde and Brunette* (1858), *America Discovered* (1853), a poem, and some translations from the French. D. at Pau, France, Mar. 10, 1862. He was a brother of Daniel Huntington, the artist.

**Huntington** (SAMUEL), LL.D., a signer of the Declaration of Independence, b. at Windham, Conn., July 3, 1731; learned the trade of a cooper; became in 1758 a lawyer of Norwich, Conn.; held many important offices; was a member of the Continental Congress 1776–83, and its president 1779–81; judge of the Connecticut superior court 1774–84; its chief-justice 1784; lieutenant-governor of Connecticut 1785; governor 1786–96. He received the honorary degree of LL.D. from Yale in 1787. D. at Norwich, Conn., Jan. 5, 1796.

**Huntington** (SAMUEL), a nephew of Gov. Samuel Huntington (1731–96), b. at Coventry, Conn., Oct. 4, 1765; graduated at Yale in 1785; became a lawyer in 1793; settled near Painesville, O., in 1800; was a judge of the common pleas court 1802–03; of the superior court in 1803, and afterwards chief-justice; governor of Ohio 1808–10; a colonel and paymaster in the war of 1812–14. He was also a member of the first constitutional convention of Ohio, and Speaker of the first State senate. D. at Painesville, O., June 8, 1817.

**Huntington City**, post-v. of Prince George co., Md., 16 miles from Washington, D. C., at the junction of the Baltimore and Potomac and the Bowie and Pope's Creek R. Rs.; has 2 hotels, a weekly newspaper, railroad machine-shops; is situated in a farming and tobacco-growing region.

J. W. SCOTT, ED. "HUNTINGTONIAN."

**Huntley Grove**, post-v. of Grafton tp., McHenry co., Ill., on the Galena division of the Chicago and North-western R. R., 7 miles N. W. of Elgin.

**Huntoon** (JONATHAN G.), b. at Unity, N. H., in 1781; removed to Maine, of which State he was governor 1830–31. D. at Fairfield, Me., Oct. 14, 1851.

**Huntsburg**, post-tp. of Geauga co., O. Pop. 824.

**Huntsville**, city, cap. of Madison co., Ala., the "Queen city of the mountains," is one of the most beautiful, thriving, and important towns in the State. It stands upon the bench of a mountain which is a spur of the Cumberland Mountains; is on the Memphis and Charleston R. R.; has a brass and iron foundry, railroad machine-shops, planing mills, fire department, gas and water works, a national and a savings bank, a female college (Methodist), a female seminary (Presbyterian), 9 churches, 3 weekly newspapers, and fine public and private buildings. It has a large spring, which supplies a copious stream,



tributary to the Tennessee, 10 miles distant. Pop. 1907; of tp., exclusive of city, 3511.

G. M. JOHNSTON, ED. AND PUB. "ADVOCATE."

**Huntsville**, post-v., county-seat of Madison co., Ark. Pop. 224.

**Huntsville**, post-tp. of Schuyler co., Ill. Pop. 1228.

**Huntsville**, post v. of Madison co., Ind., on the Cleveland Columbus Cincinnati and Indianapolis R. R., and in Fall Creek tp. Pop. 202.

**Huntsville**, a. v. of West River tp., Randolph co., Ind. Pop. 130.

**Huntsville**, post-v., cap. of Randolph co., Mo., on the St. Louis Kansas City and Northern R. R., 153 miles from St. Louis. It has a college for both sexes, important coal-mines, a woollen-mill, machine-shop, flouring-mill, public high school, 4 churches, 2 hotels, 2 newspapers, etc.

BOGIE & HUNTER, PUBLS. "HERALD."

**Huntsville**, tp. of Rockingham co., N. C. Pop. 1880.

**Huntsville**, post-v. of McArthur tp., Logan co., O., on the Cincinnati Sandusky and Cleveland R. R. Pop. 322.

**Huntsville**, post-v., county-seat of Scott co., Tenn., on New River. Pop. 85.

**Huntsville**, city, cap. of Walker co., Tex., 200 miles S. E. of Austin, on a branch of the Houston and Great Northern R. R. It is the seat of the State penitentiary, in which are manufactured elegant furniture, cotton and woollen goods, boots, wagons, buggies, etc. There are 8 churches. It is the seat of Austin College (Presbyterian) and Andrew Female Seminary; has 2 steam corn-mills and cotton-gins, a newspaper, hotels, 3 brickyards, and a large tannery. Here Gen. Sam Houston was buried. Chief business, shipping cotton. Pop. 1599. G. ROBINSON, ED. "ITEM."

**Hunyády** (János), b. in Hungary at the close of the fourteenth century, but the year and the place of his birth, as well as his parentage and the origin of his surname, *Corvinus*, are unknown. Under Sigismund and Albert he acquired great fame by the valor and military skill with which he fought against the Turks, at that time the terror of Europe; and by Albert he was made governor of the Hungarian provinces S. of the Danube. In 1439, Albert d., and Vladislas, king of Poland, was elected king of Hungary. Under his reign the arms of Hunyady were still more successful. He drove the Turks behind the Balkan, and compelled them to conclude an armistice of ten years (July 12, 1441). But Vladislas broke this armistice, and the result was the battle of Varna, in which the Hungarians were totally routed and the king fell (Nov. 10, 1444). During the minority of Ladislas, a son of Albert, who was elected king of Hungary in 1444, Hunyady governed the country, and he showed no less ability as a statesman than as a warrior. He kept order in the country; and although in his contests with the Turks he met with some severe reverses—as, for instance, in the three days' battle of Kossova, Oct. 17, 1448—he nevertheless succeeded in checking their progress and preventing them from overrunning the whole of Europe. His most brilliant exploit was the attack on the Turkish camp at Belgrad (July 14, 1456). Mohammed II. had laid siege to this city with an army of 150,000 men and 300 cannons. But with a far inferior force Hunyady compelled him to break up the siege and draw back, leaving behind him all his artillery. Shortly after Hunyady died. Of his two sons, the oldest, Ladislas, was beheaded at Buda for having killed Count Cilley, a personal enemy of his father; the younger, Matthias Corvinus, was educated by Georg Podiebrad of Bohemia, and became king of Hungary after Ladislas.

**Hupch'**, or **Hoopech**, province of Central China, between lat. 29° and 33° N., and between lon. 108° and 116° E., traversed by the river Yang-tze-Kiang. Area, 70,450 square miles. Pop. 28,000,000. It is the most fertile province of the Chinese empire, and no corner of it is left uncultivated. Cap. Woo-Chang.

**Hup'feld** (HERMANN), b. at Marburg Mar. 31, 1796; d. Apr. 24, 1866; was successively professor at Marburg and Halle, where he succeeded to the chair of Oriental languages on the death of Gesenius, 1843. His most important work is a *Commentary on the Psalms* (4 vols., 1833-62), which is remarkable for its originality and scholarship. An English translation is now (187-) in process of preparation.

**Hupp** (JOHN C.), M. D., b. in Washington co., Pa., Nov. 24, 1819; graduated at Washington College, Pa.; took the degree of M. D. from the Jefferson Medical College, Philadelphia, 1847, and settled in Wheeling, Va., where he now resides. He has contributed largely to the *Medical and Surgical Reporter* of Philadelphia; has now a large practice in West Virginia and Ohio. PAUL F. EVE.

**Hu'ra**, or **Sand-box Tree** (*Hura crepitans*, order Euphorbiaceæ), a native of tropical America. When the

seed is ripe the woody capsule bursts with a loud report. It was once customary to make sand-boxes of the unripe woody fruit, and it is related that these boxes would sometimes spontaneously explode after being used for years. The seeds are sharply purgative.

**Hurd** (RICHARD), D. D., b. in Staffordshire, England, in 1720; educated at Emmanuel College, Cambridge, where he took his degree in 1742, and continued to reside till 1757, when he was appointed rector of Thureaston, in Leicestershire, where he remained until 1765, when he was chosen preacher of Lincoln's Inn; promoted to the archdeaconry of Gloucester in 1767, and to the bishopric of Lichfield and Coventry in 1775, from whence he was transferred in 1781 to that of Worcester, where he continued until his death, declining the offer of the archbishopric of Canterbury on the death of Dr. Cornwallis in 1783. He was the lifelong friend and admirer of Bishop Warburton, whose biographer he also was, and wrote numerous pamphlets vindicatory of Warburton's views. Of his writings, which were very numerous, the most prominent are his *Dialogues*, *Letters on Romance and Chivalry*, *English Commentary on the Epistle of Horace on the Art of Poetry*, *Twelve Discourses on the Prophecies*, his *Sermons*, and the *Life* of Bishop Warburton. D. in 1808.

**Hurdle**, a flat rectangular framework of stakes and wattles employed for fencing material by European farmers, and sometimes used in warfare in the construction of earthworks. Hurdles are often set up in the race-course for horses to leap over.

**Hurdwar'**, a small town of Hindostan, situated in lat. 29° 57' N. and lon. 77° 14' E., at an elevation of 1024 feet above the sea, on the spot where the Ganges bursts from the hill-country into the plain of Hindostan. During the latter part of March and the beginning of April this place is yearly visited by more than 200,000 pilgrims, who come to make their ablutions in the holy water, and on some occasions the number of visitors is said to increase to 2,000,000. A large fair is held here at the same time, to which the products of all the neighboring countries are brought. Pop. 5000.

**Hur'dy-gurdy**, a musical instrument of the stringed kind, formerly much used by the European peasantry, but now seldom seen except in the hands of Savoyard boys, who play it in the streets. It consists of a flat sounding-board, connected by tolerably deep ribs to a back of the same size and shape. It has four strings of gut, which are put into vibration by the edge of a wooden wheel turned by a handle. It is suited only to very simple melodies.

**Hurl'burt**, tp. of Logan co., Ill. Pop. 476.

**Hurl'but** (STEPHEN A.), b. at Charleston, S. C., Nov. 29, 1815; received a liberal education, studied law, and was admitted to the bar in 1837; removed to Illinois and settled in Belvidere. In 1847 he was elected to the State constitutional convention as a Whig; Presidential elector on the Whig ticket 1848; member of the State legislature 1859, 1861, and 1867, and Presidential elector on the Republican ticket 1868. During the civil war he was appointed in May, 1861, a brigadier-general of volunteers, commanding a division at the battle of Pittsburg Landing; promoted to be major-general of volunteers Sept., 1862, and commanded the 16th army corps and department of the Gulf. In 1869 he was appointed minister resident to the U. S. of Colombia, which office he held till 1872; elected member of the 43d Congress from the 4th district of Illinois. G. C. SIMMONS.

**Hurlbut** (WILLIAM HENRY), b. in Charleston, S. C., July 3, 1827. He was graduated at Harvard College in 1847, at Harvard Divinity School in 1849; went the same year to the University of Berlin, and the next year to Rome and Paris. In 1852 he entered Harvard Law School, and in 1853 went to the West Indies; in 1854 published *Pictures of Cuba*; in 1855 joined the staff of Putnam's Magazine and the *African*; in 1856 went to England; in 1857 joined the *New York Times*; in 1858 travelled through England, Germany, and Russia; in 1862 joined the *New York World*; spent 1866-67 in travelling through Mexico, Austria, Hungary, and Italy; visited Suez in 1869; the Ecumenical Council at Rome in 1870, Santo Domingo in 1871; revisited Mexico in 1871, and again in 1872; in 1873 visited Spanish America, to Cape Horn, returning by Montevideo, Brazil, Portugal, and England. Author of *Gau Eden* (1854), *Gen. McClellan and the Conduct of the War* (1864), etc. J. B. BISHOP.

**Hur'ley**, post tp. of Ulster co., N. Y., has extensive quarries of flagging and building-stone. Pop. 2987.

**Hu'ron**, county of Ontario, Canada, on the E. side of Lake Huron. Area, 1392 square miles. The soil is very productive, and the scenery often picturesque. There are 2 ridings. The county is intersected by a branch of the Grand Trunk Railway. Cap. Goderich. Pop. 66,165.



**Huron**, county of Michigan, having Lake Huron upon the N. and E. and Saginaw Bay upon the W. Area, about 830 square miles. It is mostly covered with pine forests. Lumber and grain are staple products. Cap. Port Austin. Pop. 9049.

**Huron**, county of the N. of Ohio. Area, 464 square miles. It is level, fertile, and well cultivated. Cattle, grain, wool, and fruit are produced. The manufactures include lumber, carriages, harnesses, cooperage, etc. It is traversed by the Cleveland and Columbus, the Sandusky Mansfield and Newark, and the Cleveland and Toledo R. Rs. Cap. Norwalk. Pop. 28,522.

**Huron**, post-tp. of Des Moines co., Ia. Pop. 807.

**Huron**, tp. of Houghton co., Mich. Pop. 769.

**Huron**, tp. of Huron co., Mich. It contains the post-v. of Huron City, on Lake Huron. Pop. 403.

**Huron**, tp. of Wayne co., Mich. Pop. 1263.

**Huron**, post-tp. of Wayne co., N. Y., on Lake Ontario. Pop. 2000.

**Huron**, post-v. of Erie co., O., on Lake Erie and on the Lake Shore R. R., 8 miles S. E. of Sandusky at the mouth of Huron River. It has a good trade, the river serving as a harbor. Pop. 697; of Huron tp. 1483.

**Huron Indians, or Wyandots**, a tribe of Iroquois stock. They anciently occupied a large area in Canada, from Montreal westward. Having joined the Roman Catholics, they were set upon by the Six Nations, and, with the Eries, were nearly exterminated by them in 1636. A large party of them took refuge on St. Joseph's Island, and there perished by hunger. A party of them settled at Ancienne Lorette, in Lower Canada, where some 250 of their descendants remain. A large body settled S. of Lake Superior, whence they were expelled by the Dakotas. We next find them in Detroit, and then about Sandusky and N. of Lake Erie. In 1764 they could muster 300 fighting-men. They served against the U. S. in 1812-15. In 1832 they were removed to a point near the mouth of the Kansas River. They numbered in 1832, 687; in 1836, 575; in 1847, 687; in 1860, 435; in 1870, 222. This loss is partly owing to the adoption of U. S. citizenship by a portion of the tribe. This portion is generally prosperous; the others by no means so. Their reservation of 20,000 acres is in the Indian Territory, between the Shawnee and Seneca Indians. Those of the U. S. bear the name of Wyandots, the name by which they called themselves, while their long-separated brethren of Canada are still called Hurons.

**Huron, Lake**, the third in area of the great lakes of the St. Lawrence Basin. Its area is 23,800 square miles. It lies between the State of Michigan on the W. and the province of Ontario, which bounds it on the E. Lake Huron has more bays and good harbors than any other of the great lakes. The principal bay is Georgian Bay or Lake Manitoulin, in Canadian territory. Near the entrance to this bay is a chain of islands, of which the principal is Great Manitoulin, a rocky and thinly inhabited region. Lakes Superior and Michigan exceed it in area. The river St. Mary connects it with the former, and Mackinac Straits with the latter, while its outlet is the river St. Clair. Lake Huron averages about 1000 feet deep, the maximum being about 1800 feet. Its waters are clear and cold, and abound in fish, of which the white-fish is commercially the most important. The lake is subject to severe storms. The season of navigation extends from about May 1st to about Dec. 5th. Its surface is 574 feet above the sea-level. The lake receives the waters of numerous streams, which are mostly not very large.

**Hurricane**, tp. of Bradley co., Ark. Pop. 689.

**Hurricane**, tp. of Greene co., Ark. Pop. 385.

**Hurricane**, post-tp. of Saline co., Ark. Pop. 390.

**Hurricane**, tp. of Fayette co., Ill. Pop. 1333.

**Hurricane**, post-tp. of Montgomery co., Ill. P. 724.

**Hurricane**, tp. of Carroll co., Mo. Pop. 2285.

**Hurricane**, tp. of Lincoln co., Mo. Pop. 3712.

**Hurricane** [originally a Carib word signifying a "high wind"] is distinguishable from cyclones, storms, etc., by its extreme fury and sudden change in character. It is not necessarily rotatory, as in a cyclone, or spiral, as in whirlwinds, but may partake of all or any of these characteristics. Hurricanes are unknown in the polar regions; of frequent occurrence in the torrid zone, where they are especially violent; and occasionally occur in the temperate zone, either independently or on their transit from the torrid zone. They are generally accompanied by rain, thunder, and lightning. In the Pacific and Northern Indian oceans and the China Sea they are called typhoons, but possess the same distinctive elements as the hurricanes of the districts bounded by the Atlantic and Southern In-

dian oceans. The premonitory indications of a hurricane are a peculiar haziness of atmosphere, a general and ominous stillness or calmness of wind and tide, and a peculiar feeling of physical lassitude or indolence. The barometer falls sensibly, and gradually increasing winds from some unexpected quarters of the compass arise. The hurricane arrives at its climax of strength in from four to twenty-four hours, when the opposing currents of wind, rain, etc. subside as gradually as they commenced, leaving a sad wreck of property and life behind. In violence the hurricane exceeds the force of the strongest waves. The highest hurricane winds on the British coast are recorded to have attained a velocity of 130 miles per hour. In reference to hurricane-tracks, their course appears to be, in the North Atlantic Ocean, southerly, to the N. of the Windward Islands; northwardly, over Newfoundland. Very few hurricanes occur in the South Atlantic Ocean. The most frequently visited portions of the U. S. are the coasts of Georgia and South Carolina. The origin and cause of the hurricanes of the Atlantic Ocean are but little known; they have occurred in the neighborhood of Florida when a cold N. wind has conflicted with the warm, moist air of the Gulf and ocean. They have also occurred in the western portion of the Gulf of Mexico after the presence of a Texan norther. The great proportion of the Atlantic hurricanes (both as to number, extent, and violence) originate between the Windward Islands and the African coast, moving along the American coast on its route to Iceland and Norway. (See WINDS.)

**Hurst** (JOHN F.), D. D., b. Aug. 17, 1834, in Dorchester co., Md.; educated at Dickinson College, Carlisle, Pa., and Halle University, Germany; entered the Methodist ministry in 1858, and in 1866 went to Germany to take charge of the theological instruction in the Martin Mission Institute, Bremen. He remained five years in Germany, during which time he visited all the leading European countries, and in 1870 made the tour of the East. In the same year he accepted the professorship of historical theology in the Drew Theological Seminary, Madison, N. J., made vacant by the death of Rev. Dr. B. H. Nadal. In May, 1873, he was elected president of the same seminary, a position which he still occupies, retaining his connection, however, with the chair of ecclesiastical history. Author of translations of Hagenbach's *History of the Church in the Eighteenth and Nineteenth Centuries* (2 vols.), Lange's *Commentary on Romans*, Van Oosterzee's *Lectures on John's Gospel*, and of an original *History of Rationalism*, *Outlines of Bible and Church History*, and *Martyrs to the Tract Cause*. He has in preparation a *History of the Church*, which will cover the entire period down to the present day.

**Hurter, von** (FRIEDRICH EMANUEL), b. at Schaffhausen Mar. 19, 1787; studied theology at Göttingen; was appointed minister at Schaffhausen in 1824, but resigned his office in 1841, and embraced Catholicism in 1844. In 1846 he settled at Vienna, and was appointed historiographer to the emperor of Austria. D. at Gratz Aug. 27, 1865. The principal of his works are—*Geschichte des ostgothischen Königs Theodorich und seiner Regierung* (1807), *Geschichte Papst Innocenz III. und seiner Zeitgenossen* (1834-42), *Geschichte Kaiser Ferdinand II. und seiner Elften* (1830-57), *Die Befreiung der Katholischen Kirche in der Schweiz seit dem Jahre 1834* (1842-43), and *Geburt und Wiedergeburt* (1845).

**Hurtesville**, post-tp. of Russell co., Ala. Pop. 1440.

**Husband and Wife**. See MARRIAGE, by PROF. J. N. POMEROY, LL.D.

**Husbandry, Patrons of**. See PATRONS OF HUSBANDRY, by L. P. BROCKETT, A. M., M. D.

**Husbands** (HERMAN), b. in Pennsylvania, but removed to Orange co., N. C., where he became a member of the legislature and leader of the Regulators, of which party he published a full account in 1770. On May 16, 1771, a conflict took place between Gov. Tryon and the Regulators; the latter were defeated, and Husbands fled to Pennsylvania. In 1778 he was a member of the legislature there; was concerned in the whisky insurrection in 1794, and associated with Gallatin, Brackenridge, and others as a committee of safety. Having been imprisoned for a short time in Philadelphia, he determined to return home, but d. on the way, Mar., 1795.

**Huschke** (GEORG PHILIPP EDWARD), b. at Münden June 26, 1801; studied 1817 at Göttingen, and was appointed professor of jurisprudence at the University of Breslau in 1827. His principal writings are—*Studien des römischen Rechts* (1840), *Gaius* (1855), *Die Iugischen Tafeln* (1859).

**Hush**, town of Roumania (Moldavia), has a Greek bishop, a normal school, and is a place of commercial importance. Pop. variously estimated at from 4000 to 16,000.



**Hus'kisson** (WILLIAM), b. at Birch-Moreton, Worestershire, England, Mar. 11, 1770; resided as a student in Paris 1788-92, where he was a member of the Société de 1789, a moderate republican club, and at the same time was private secretary to Lord Gower, the British minister. He witnessed the destruction of the Bastille and opposed the issue of the assignats. In 1793, Pitt appointed him an under-secretary for war and for the colonies; in 1796 he entered Parliament; became secretary of the treasury 1804; commissioner of woods and forests 1814; member of the finance committee 1819; president of the board of trade and treasurer of the navy 1823; was colonial secretary 1827-29. On the occasion of the opening of the Liverpool and Manchester Railway (Sept. 15, 1830) he was struck by one of the engines, and d. on the same day. Huskisson's brilliant state papers, his ability in public affairs, and his liberal principles, which had great influence upon the course of reform in England, entitle him to a permanent place in history; but throughout his public life he had to contend with the strong prejudices of the English people, who generally regarded him as a dangerous innovator, with deep designs against the interests of society.

**Huss** (JOHN), b. in 1373 at Hussinetz, in Southern Bohemia, near the Bavarian frontier; entered in 1389 the University of Prague, where he took the degree of M. A. in 1396, and began to give lectures on theology and philosophy in 1398. In 1401 he became president of the faculty of theology, and in 1409 rector of the university. In philosophy he was a realist, and in opposition to the German professors, who were nominalists. By reviving an old ordinance of Charles IV., which gave the native students four votes in all discussions of university matters, and the foreign only one, he caused a rupture, and the Polish, Saxon, and Bavarian students, with their professors, 5000 in number, left the university. But those remaining, consisting chiefly of native Bohemians, drew so much the more closely around him, and in his contest with the Church, which now began to grow hot, the university was one of his principal supports. In 1400 he had taken holy orders, and in 1402 he was appointed preacher at the Bethlehem chapel at Prague. He delivered his sermons in the Bohemian language, and gathered immense audiences. He was a mild and kind-hearted man, with a pure, spiritual enthusiasm, but his sympathy with the suffering and downtrodden was impassioned, and his opposition to vice, falsehood, and abuse was fierce. In a short time he became the idol of the lower classes of Prague, and at court he was high in favor; he was the confessor of Queen Sophia, and King Wenceslaus was his friend. Nor was he at first met with enmity by the Church, though his denunciations of the false doctrines in her teaching and the vices in her discipline were very loud. But by degrees Archbishop Sbynko of Prague became frightened at the commotion which Huss's preaching caused, and as he knew the connection existing between the ideas of Huss and the writings of Wycliffe, he ordered all books by the latter to be deposited in his palace, and appealed to the pope. Alexander V. sent a bull against Wycliffe and all who held his opinions, and Sbynko had the books, 200 volumes, publicly burnt. Huss protested, not against the pope, but against the measures of Sbynko, and addressed a brilliant exposition of the whole matter to the new pope, John XXIII. A committee of cardinals was appointed, and Sbynko's acts were denounced as transgressions of his legitimate power, but at the same time Huss was accused of heresy and summoned to appear before the pope. The king, the queen, the university, the magistrates of Prague, even the archbishop himself, wrote to the pope to attest the orthodoxy of Huss, but in vain; and, as he refused to appear, he was condemned and excommunicated, and a ban was placed on the city which received him within its walls. He left Prague, but the popular movements became so violent that Sbynko had to flee for his life, and Huss returned to his chapel, where his preaching against the pope and the Church became bolder and bolder; the pope was compelled to acquiesce. But in 1412, John XXIII. preached a crusade against Ladislas, who fought with Louis II. for the possession of Naples, and the pope granted indulgences to all who would take arms against Ladislas. Scandalized at seeing the head of the Church meddle in this way with secular affairs, Huss gave, in his *Quæstio de Indulgentiis sine de cunctis papa Joannis XXIII. et Contra Bullam papa Joannis XXIII.*, an exposition of the frauds and lies, doctrinal and historical, on which the whole Church establishment rested; and in clearness and conclusiveness of demonstration, and in simplicity and impressiveness of representation, these writings have perhaps never been surpassed. A new bull of ban was flung against him, but he now appealed to a general council in open opposition to the pope. Provided with a safeguard from the emperor Sigismund, he repaired to Constance, where (Nov. 19, 1414) the general council opened. He was well received

both by the pope and the prelates, and seemed even to inspire confidence. But by the intrigues of his enemies affairs soon took another turn. He was imprisoned first in the cathedral, then in a Dominican convent on an island of the Lake of Constance, then in the castle of Gottleben, where chains were put on him; and when at last (June, 1415) he actually appeared before the council, it was evident that he was condemned before he was heard. On July 6 he was sentenced, and the same day he was burnt at the stake outside of the city, and his ashes were strewn on the Rhine. Many attempts were made to persuade him to recant, but he refused, and he died singing with loud voice the *Kyrie eleison*. Of his collected works there are two editions, Strasburg (1525) and Nuremberg (1558). Of his Bohemian writings there is an edition by Erben in 1864. His letters were translated into French in 1846 by Emile de Bonnechose.

CLEMENS PETERSEN.

**Hussar'** (Hung., from *husz*, "twenty;" every twenty families were obliged to furnish a man), originally the irregular cavalry of Hungary and Croatia. The name is now applied to many light cavalry regiments in various armies. The British army (1873) had sixteen hussar regiments.

**Hus'sites** is the name of the followers of Huss. Immediately after his martyrdom they arose in Bohemia, and took a frightful revenge on the priests, monks, and prelates of the Roman Catholic Church. King Wenceslaus succeeded, however, in appeasing the storm by granting them religious freedom and appropriating a number of churches for their use. But when the king died in 1419, and the pope issued an order for the conversion of the Hussites by force, a civil war began. They assembled under the leadership of John Ziska on Mount Tabor, captured Prague, pillaged and burnt the monasteries, and defeated at Deutchebrod in 1422, and in several other minor encounters, the troops of Sigismund, the German emperor and the heir of Wenceslaus. Ziska d. in 1424, but his successor, Procopius, a former monk, was still more successful. He defeated Sigismund at Miess and Tachau, and carried the war into Austria, Bavaria, Franconia, and Saxony. Meanwhile, the Hussites had separated into two parties, the Taborites and the Calixtines. The former were the most radical, and acknowledged no doctrine which was not immediately given by the text of the Scriptures; while the latter held a more moderate position. In the beginning, however, they acted in perfect concert with each other. But in 1433 the Council of Bale succeeded in coming to an agreement with the Calixtines and in drawing them out of the contest, the result of which was that the Taborites were totally defeated at Bimischbrod in 1434. By the treaty of Iglau (1436) the emperor Sigismund granted to Bohemia both religious and political freedom, but the civil war did not cease until 1485, when King Ladislas, at the diet of Kuttenberg, solemnly confirmed the treaty of Iglau. (See BOHEMIAN BRETHREN.)

**Husson'** (JEAN HONORÉ ARISTIDE), b. at Paris July 3, 1803; studied sculpture under David, and received the first prize in 1830 for his *Theseus*, and the gold medal in 1837 for his *Guardian Angel*. His most celebrated statues are *Haidée*, in the museum of Grenoble, and *Summer and Autumn*, in the Place de la Concorde, Paris.

**Hu'sted** (JAMES W.), b. at Bedford, N. Y., Oct. 31, 1833; graduated with honors at Yale 1854; was admitted to the bar 1857; early entered public life; was chosen school commissioner for Westchester co., N. Y., in 1858; deputy superintendent of insurance department 1860; was afterwards harbor-master and then deputy captain of the port of New York; judge advocate for the 7th brigade New York National Guard, etc.; became major-general of the 5th division New York National Guard in 1873; Speaker of the assembly 1874; president of the New York State Military Association 1874; is a high official of the Masonic order and a successful lawyer. Residence, Peekskill, N. Y.

**Hu'stisdorf**, post-tp. of Dodge co., Wis. Pop. 1696.

**Hu'ston**, tp. of Blair co., Pa. Pop. 1335.

**Huston**, tp. of Centre co., Pa. Pop. 803.

**Huston**, tp. of Clearfield co., Pa. Pop. 587.

**Hu'stonville**, post-v. of Lincoln co., Ky., 33 miles S. by E. of Frankfort. Pop. 320.

**Hut'cheson** (FRANCIS), b. Aug. 8, 1694, at Drumalig, Ulster, Ireland, whither his grandfather had immigrated from Scotland; studied theology at the University of Glasgow 1712-16; lived as a public teacher in Dublin 1717-29, during which period he published *Inquiry into the Original of our Ideas of Beauty and Virtue* (1726) and *Nature and Conduct of the Passions and Affections* (1728), and was in 1729 appointed professor of moral philosophy at the University of Glasgow. He d. during a visit to Dublin Aug. 8, 1746. His *System of Moral Philosophy* was published by his son in 1755. In the history of Scottish philosophy, Hutcheson occupies a conspicuous place, though his books ceased to



be generally read soon after his death. He was strongly opposed to Locke and the whole empirical tendency of the English philosophy, and this may be considered as the pre-eminently Scottish element in his philosophy, as an anticipation of Dr. Reid. But by his own time he was, on the other hand, suspected as belonging to the "new lights," and intending to put a new face on Scotch theology; and the suspicion was right. Moral goodness he defines as the right relation between the propensities; virtue he represents as benevolence; and the whole moral state of man he rests on a sense peculiar to man, the moral sense. But the assumption of a moral sense brought him in dangerous propinquity to the opinion that man could be moral without knowing God; which opinion evidently involved that the heathen were not necessarily condemned; and for this very sentence his former teacher, Prof. John Simson, had been dismissed from the University of Glasgow in 1729. Hutcheson delivered his lectures in English, though the handbooks in logic, metaphysics, etc., which he published for the use of his classes are written in Latin.

**Hut'chins** (THOMAS), b. at Monmouth, N. J., about 1730. At an early age he entered the British military service, and became captain in the "Royal American" regiment; acted as engineer in Gen. Henry Bouquet's famous expedition against the Shawnees (1764), and participated creditably in a campaign against the Florida Indians. Being in London in 1779, his known devotion to American independence led to an imprisonment for six weeks on a charge of maintaining correspondence with Franklin, by which circumstance he is said to have lost £12,000. Soon afterward he sailed from France to Charleston, S. C., and joined the army under Gen. Greene, receiving the title of "geographer-general." He furnished the maps and plates for Dr. Smith's *Account of Bouquet's Expedition* (Phila., 1765; London, 1766); published *A Topographical Description of Virginia, Pennsylvania, Maryland, and Carolina, with maps* (London, 1778; in French, Paris, 1781); and *An Historical and Topographical Description of Louisiana and West Florida* (Phila., 1784), besides several papers in the *Transactions* of the scientific societies at Philadelphia. His geographical works were largely used by Dr. Morse in the compilation of his *American Gazetteer*. D. at Pittsburg Apr. 28, 1789.

**Hut'chinson**, county in the S. E. of Dakota. Area, about 720 square miles. It is intersected by the Dakota River. Cap. Maxwell. Pop. 37.

**Hutchinson**, city, cap. of Reno co., Kan., on the Arkansas and the Atchison Topeka and Santa Fé R. R., has a weekly newspaper, a court-house, bank, churches and schools, and is in a healthy, fertile region. Founded 1871. C. C. HUTCHINSON, Ed. "RESOURCES OF KANSAS."

**Hutchinson**, post-tp. of McLeod co., Minn. P. 440.

**Hutchinson** (ANNE), a famous religious enthusiast, founder of the Antinomian sect of New England, b. at Alford, Lincolnshire, England, in 1591, the daughter of Francis Marbury, a parish clergyman. On her mother's side she was a second cousin of the poet Dryden. In 1634 she came to Boston, Mass., to enjoy the preaching of John Cotton. Here she instituted meetings of women for the discussion of doctrinal questions, and her influence created a powerful faction and led to public disturbances. She even claimed a measure of divine inspiration. In 1637 she was banished to Rhode Island, where she was the leader of a small sect until 1642, when, after her husband's death, she removed to the Dutch colony of New Amsterdam, where (as some say near Hell Gate, or according to others near Albany) she was murdered by the Indians in 1645. Among her followers was her brother-in-law, John Wheelwright, the founder of Exeter, N. H., and Sir Harry Vane, the governor of Massachusetts, was her defender. Even John Cotton seems to have been at one time favorably inclined to her doctrine.

**Hutchinson** (JOHN), b. about 1616; married, in 1638, a daughter of Sir Allen Apsley, governor of the Tower of London, and settled on his estate at Othorpe. In the beginning of the civil war he was appointed governor of Nottingham Castle; represented Nottingham in the Parliament, and was a member of the high court of judiciary which sentenced the king to death, but retired from public life, disagreeing with Cromwell. Shortly after the Restoration he was arrested and detained in prison, first in the Tower, and then in Sandown Castle, Kent, where he d. Sept. 11, 1664.—His wife, Lucy HUTCHINSON, who survived him many years, wrote a memoir of his life, which was published in London in 1806 from the original manuscript, and is considered a valuable record of events.

**Hutchinson** (JOHN), b. at Spennithorne, Yorkshire, in 1674; d. in 1737. He was first steward and then riding purveyor to the duke of Somerset, and had dabbled a little in many different things; as, for instance, mineralogy and

Hebrew. In 1724 he published the first volume of his *Moses's Principia*, in 1727 the second, and then followed a long series of miscellaneous writings, 12 vols. in all, in which he ridiculed and reduced *ad absurdum* Newton's views of nature and expounded his own. These he professed to have extracted from the Old Testament by means of the only true and competent method of interpreting the Hebrew language, which he alone was possessed of. By itself, this maze of craziness and ignorance has nothing remarkable, but it is a curious fact that it found believers and adherents in England.

**Hutchinson** (THOMAS), b. at Boston Sept. 9, 1711; graduated at Harvard College in 1727; studied law, and served as representative for Boston in the general court for ten years; was three times Speaker; became lieutenant-governor in 1758, chief-justice in 1760, acting governor in 1769, and was commissioned full governor in 1771. Hutchinson early became obnoxious to the patriots on account of his unwavering support of all the tyrannical measures of the British ministry. In the Stamp Act riots of 1765 his house was twice attacked; on the second occasion (Aug. 26), his furniture was burned in the street and an invaluable collection of historical MSS. lost or destroyed. Brought into constant collision with the assembly and council during the stormy years preceding the Revolution, Hutchinson was the most prominent mark in America for the invectives of Otis, Bowdoin, Hancock, and the two Adams. Wearied with the conflict, he sailed for England on leave of absence June 1, 1774, and never returned to America. His services were rewarded by a pension from the Crown. Hutchinson was an accomplished scholar, and his writings are valuable sources of information for New England history. He published in 1764 and 1767 two volumes of a *History of the Province of Massachusetts Bay*, and in 1769 a *Collection of Original Papers relative to the History of the Colony of Massachusetts Bay*. A third volume of the *History*, completing the work to 1774, appeared in 1828, edited by the author's grandson, Rev. John Hutchinson. D. at Brompton, Eng., June 3, 1780.

**Hutchinson** (THOMAS JOSEPH), F. R. G. S., served as senior surgeon on the English expedition in 1854-55 to the rivers Niger, Tshadda, and Bino, and was appointed British consul in this territory in 1855; in 1861 he was transferred to Rosario in the Argentine Republic, and in 1870 to Callao. He has published *Narrative of the Niger Expedition* (1855), *Impressions of Western Africa* (1858), *Ten Years Among the Ethiopians* (1861), *Buenos Ayres* (1865), *Parana* (1868), and *Two Years in Peru* (1874).

**Hut'sonville**, post-tp. of Crawford co., Ill. Pop. 1851.

**Hut'ten, von** (ULRICH), was a kind of literary knight-errant, whose influence it would be impossible to realize unless his life were viewed in connection with a detailed description of his time. He was b. in the castle of Steckelberg, near Fulda, in the electorate of Hesse, Apr. 20, 1488, and in 1498 he was placed in a monastery in Fulda in order to become a monk. But in 1504 he fled to Erfurt, where he conversed with poets and scholars; and when, in the next year, a pestilential disease broke out and compelled him to leave the city, he went to Cologne. Here he made acquaintance with some of the most marked specimens of the *virri obscuri*—as, for instance, Hoogstraten—and also with one of their most decided opponents, Johannes Rhagius. He allied himself with the latter, and followed him in 1506 to Frankfort-on-the-Oder, where a new university was just established. Here he received the degree of M. A., and published his first poem, *Carmen in Laudem Marchie*; but in 1508 he was attacked himself by the above-mentioned disease, and for several years he wandered around in Northern Germany, experiencing many turns of fortune, courted to-day and beaten to-morrow. In 1511 he was in Wittenberg, where he published his *Ars versificatoria*, and in 1512 he went through Moravia and Bohemia, through Vienna, to Pavia, in order to study law. But after the conquest of Pavia he was plundered of all he owned, and was at last compelled by the danger of starvation to enlist in the imperial army. He left it very soon, however, and returned home to Germany, and during the two following years (1513-15) his denunciations of Ulrich, duke of Wurtemberg, and especially his defence of Reuchlin, made his name quite famous. The publication of *Epistolæ obscurorum virorum*, in the writing of which he probably bore a part, is generally considered as having furthered the cause of the Reformation. In 1515 he once more went to Italy, but returned again in 1517; was knighted by the emperor at the diet of Augsburg, and entered the service of the archbishop of Mentz. Next year, however, he retired from the court, and at this time he began the publication of the severest attacks on the pope and the clergy written in German. The pope demanded his surrender as a prisoner, and Hutten fled, first from his own



castle, and then from that of Franz von Sickingen, where he found refuge. He went to Switzerland, and here, again attacked by his old disease, he d. Aug. 23, 1523, in Ufenau, an island in Lake Zurich. A collected edition of his works was published by Böcking (1862), and a biography by Strauss (1857).

**Hut'ter** (LEONHARDT), b. at Nellingen, Bavaria, in 1563; studied theology at Strasburg, Leipsic, Heidelberg, and Jena, and was appointed in 1566 professor in Wittenberg, where he d. Oct. 23, 1616. His most prominent works are—*Concordia concors* (1614), written in defence of the Lutheran system of doctrines, which had been attacked by Hospinian in his *Concordia discors*; and *Compendium locorum theologicorum*, a Lutheran dogmatic treatise, which has been published several times; last ed. 1863.

**Hut'ton**, post-tp. of Coles co., Ill. Pop. 2196.

**Hutton**, tp. of Putnam co., West Va. Pop. 1568.

**Hutton** (CHARLES), b. at Newcastle-on-Tyne Aug. 14, 1737; lived at Newcastle as teacher from 1760 to 1773, during which period he wrote his *Treatise on Arithmetic and Book-keeping* (1764), *Treatise on Mensuration* (1771), and *Principles of Bridges and Mathematical Demonstration of the Laws of Arches* (1772); was in 1773 appointed professor of mathematics at the military academy of Woolwich, and in 1774 elected a member of the Royal Society. D. Jan. 27, 1823. Besides a number of papers in the *Transactions* of the Royal Society, in the *Philosophical Transactions*, and the *Ladies' Diary*, he published *Tables of Products and Powers of Numbers* (1781), *Mathematical Tables* (1785), *Course of Mathematics* (1798–1801), and *Recreations in Mathematics and Natural Philosophy* (4 vols., 1803).

**Hutton** (JAMES), b. in Edinburgh June 3, 1726; studied medicine in his native city, in Paris, and at Leyden, where he took the degree of M. D.; engaged after his return to England first in the manufacture of chemicals, then in agricultural pursuits, concentrating his studies on the fields of natural science, especially geology. The principal results of his researches were a *Theory of Rain*, communicated to the *Transactions* of the Royal Society of Edinburgh, and a *Theory of the Earth*, in which he claims that most geological phenomena which by Werner and his school were explained as effected by aqueous influences were produced by igneous fusion. The former is still considered a valuable contribution to the science of meteorology; by the latter (2 vols., 1795–96) he established the principle of plutonism. D. in Edinburgh Mar. 26, 1797.

**Hux'ley** (THOMAS HENRY), M. B., Ph. D., LL.D., F. R. S., b. at Ealing, Middlesex, England, May 4, 1825; became a student of Charing Cross Hospital 1842; graduated M. B., with honors, from the University of London 1845; was assistant surgeon of the royal navy 1846–53; sailed around the world in H. M. S. *Rattlesnake*, which then performed surveying service in Australasia, 1846–50; became F. R. S. 1851, in acknowledgment of the value of the observations in natural science made by him while in the naval service, concerning which he had from time to time sent papers to that society; became in 1854 professor of natural history in the School of Mines, which position he retains in 1875; Hunterian professor in the Royal College of Surgeons 1863–69; president of the Geological and the Ethnological societies 1869–70; was appointed one of the royal commissioners on scientific instruction and the advancement of science 1870; was on the London school board 1870–72; secretary of the Royal Society 1872; lord rector of the University of Aberdeen 1872; and has twice been named Fullerian professor in the Royal Institution. Prof. Huxley has for many years been one of the most laborious workers in biological science. The comparative anatomy of both vertebrate and invertebrate animals, and the systematic arrangement of organisms, have been the fields in which he has been chiefly distinguished. He has proposed several bold rearrangements of animals into new classes, orders, and has discovered some remarkable analogies in the development of vertebrate and invertebrate animals. His theory of protoplasm, his able advocacy of the Darwinian hypothesis, and the doctrine boldly advanced by him in his address before the physiological section of the British Association at its Belfast meeting in 1874, that the seemingly voluntary movements of animals, and even of men, are automatic and independent of the will, have attracted much attention. Author of *The Oceanic Hydrozoa* (1857), *Man's Place in Nature* (1863), *On the Physical Basis of Life* (1868), *Elementary Physiology* (1866), *Introduction to the Classification of Animals* (1869), *Lay Sermons*, etc. (1870), *Critiques and Addresses* (1873), and of many important scientific papers.

**Huy**, town of Belgium, in the province of Liège, at the confluence of the Hoyoux and the Maas. It is strongly fortified, and has rich coal and iron mines in its vicinity,

which is mountainous, almost alpine, in its character. Pop. 11,055.

**Huydecop'er** (BALTHASAR), b. in Amsterdam in 1695; filled for many years the office of sheriff of his native town, and d. there Sept. 21, 1778. His Latin poems and his Dutch tragedies, *Achilles*, *Asiaticus*, etc., are not now read, but his remarks on Vondel's translation of *Oedipus Metamorphoses*, and his other critical and linguistic works, started in the Netherlands the grammatical cultivation of the Dutch language.

**Huy'ghens** (CHRISTIAN), b. at the Hague Apr. 14, 1629, and educated at the universities of Leyden and Breda, where he studied law and mathematics. He made several journeys to Denmark, France, and England, and resided from 1665 to 1681, at the invitation of Colbert, at Paris, where he was made a member of the Academy of Science and had apartments assigned him in the royal library. The latter part of his life he spent at the Hague, where he d. July 8, 1695. As a mathematician, especially as a geometer, he enjoyed the greatest fame, and his papers on the calculus of probabilities and on the quadrature of a portion of a cycloid were considered masterpieces. His views on optics and mechanics also attracted great attention. He was the most able advocate of the undulatory hypothesis of light, which he developed in 1678. It was not generally adopted, by reason, probably, of the great authority of Newton, who embraced the emission hypothesis. By the later labors of Young, Fresnel, and others the doctrine of Huyghens was restated, and is now universally received. But it was more especially his astronomical discoveries which made his name celebrated. At different times in his life he was much occupied in making improvements in the construction of telescopes, and in 1656 he discovered the first satellite of Saturn, and in 1659 the ring; which discoveries he described in his *Systema Saturnium* (1659). He became still more widely known as the inventor of the pendulum clock, which he described in his *Horologium Oscillatorium* (1658). His works were published in two collections, *Opera varia* (1724) and *Opera reliqua* (1728).

**Huy'sum, van** (JAN), b. at Amsterdam in 1682; received instruction in landscape painting from his father, but devoted himself exclusively to the painting of flowers and fruits, in which *genre* he became one of the greatest masters, if not the very greatest. D. in his native city in 1749. He was proud, jealous, and of a difficult temperament; kept his knowledge of the preparation of colors and other technicalities a deep secret; worked slowly, but acquired a naturalness and life in drawing and a warmth and brilliancy of coloring which have never been surpassed. His representation of dewdrops resting on the tips of grass, of down floating in the air, or of an insect crawling over a leaf, are often too true, making an impression as if the fly were sitting on the picture and not on the flower. His paintings are found only in the greatest galleries.

**Hy'acinth** [so called from the youth Hyacinthus, slain by the quoit of Apollo; from his blood the flower was fabled to have sprung], a genus of bulbous-rooted flowering plants of the order Liliaceæ. Several species are natives of the Old World. Besides these, some species of *Muscari* (globe-hyacinths) and *Scilla*, or squill, are called hyacinths by florists. The true hyacinths of cultivation are varieties of *Hyacinthus orientalis*. There are a great many kinds produced from seed, but for ordinary culture the bulbs are planted. These bulbs come chiefly from Haarlem in the Netherlands. They do best in a rich but sandy soil. They are often planted in pots, and for house-culture they do tolerably well in hyacinth-glasses with water only. According to tradition, the petals of the hyacinth are inscribed with the Greek letters  $\alpha, \alpha$ , Apollo's exclamation of grief when he found that he had slain the beautiful Hyacinthus; or  $\omega, \omega$ , the first two letters of his name. Hence, Milton calls it "that sanguine flower inscribed with woe." Most people fail to find any such mark upon the hyacinth, and it is not certain that the hyacinth of the ancients was identical with ours. But Sprengel and others profess to have seen hyacinths with the inscription. *H. non-scriptus* is the bluebell of Great Britain. (See BLUEBELL.)

**Hyacinth**, or **Jacinth**, is a term applied to bright-colored varieties of zircon, a mineral that crystallizes in the dimetric system, and is in composition a silicate of zirconia. The hyacinth is used as a gem, and varies in color from various shades of red to orange. It is doubtful, however, whether this is the *zakkos* of the ancients, which may have been the amethyst or the sapphire.

**Hyacinthe** (CHARLES LOYSON, called FATHER), b. at Orleans in 1827; after his regular course of studies in the college of Pau he entered the ecclesiastical college of St. Sulpice. Four years after he was ordained priest, and was professor of theology in several schools. Hyacinthe was



then attached, as a working priest, to the parish of St. Sulpice in Paris, but he soon made himself a monk, and entered the convent of the Carmelites in Lyons. From 1864 till 1869 he was one of the most celebrated preachers ever heard, at Bordeaux, Nantes, and in Notre Dame of Paris. But he was then suspected of uttering too liberal religious doctrines, severely attacked by the Ultramontane papers, and finally excommunicated by the pope. Father Hyacinthe soon after (1869) made a voyage to the U.S., where he was warmly received. On his return to France he married an American lady, who bore him a son. Persecution, open and concealed, compelled him to take refuge in Switzerland, where he established an Old Catholic church at Geneva, but here he was assailed by some dissenters of his own Church, who thought he was not sufficiently radical in his doctrine, because he continued to affirm his faith in Roman Catholicism, minus the maintenance of papal infallibility and other secondary dogmas. For some time Father Hyacinthe did not preach, but he has recently found another congregation, and again begun preaching in another church at Geneva. FÉLIX AUCAGNE.

**Hyæna** [Gr. *hæna*; Lat. *hyæna*], a genus of carnivorous mammals belonging to the *Æluroidæ*, or cat-like division of the sub-order *Fissipedia*, order *Feræ*. As in the cats and dogs, the feet are digitigrade, the weight of the body being supported by the toes instead of by the whole foot, as in the bears. The dental formula is—incisors  $\begin{smallmatrix} 3-3 \\ 3-3 \end{smallmatrix}$ , canines  $\begin{smallmatrix} 1-1 \\ 1-1 \end{smallmatrix}$ , premolars  $\begin{smallmatrix} 1-1 \\ 3-3 \end{smallmatrix}$ , molars  $\begin{smallmatrix} 1-1 \\ 1-1 \end{smallmatrix}$ . The last upper tooth, or true molar, is small, transversely elongated, and tubercular; the last premolar, or successional tooth, being the sectorial or flesh tooth. In the lower jaw the true molar is the sectorial tooth. All the teeth, especially the molars, are large and strong, and set in powerful jaws, which are worked by muscles of corresponding development. The hyæna is thus fitted to obtain its living by devouring the cartilages, and even gnawing and crushing the bones of animals killed by the lion and other active predaceous beasts; and most of its subsistence is thus obtained, although it sometimes captures living prey by the chase. The auditory bullæ are destitute of the septum found in the cats. The toes are straight, with blunt, non-retractile claws. The hind legs are usually short, the tail short and bushy, and the neck provided with a short bristly mane, whence the classical name, signifying a "sow." Three living species are known; two of these are from Southern Africa—viz. the brown hyæna (*H. brunnea*), with the fur clouded, rather long, brain-case compressed, a large and deep sub-caudal gland, and the legs of nearly equal length; and the spotted hyæna (*H. crocuta*), with no sub-caudal gland, and having the hinder legs short. The striped or banded hyæna (*H. striata*) ranges over Africa and Southern Asia. The fur is striped, and there is a sub-caudal gland. The brain-case is larger than in *H. brunnea*. The cave hyæna was a large and fierce species that roamed over the continent of Europe during the Quaternary, and left, especially in the cave-deposits of England, abundant fossil remains of its own bones, mingled with those of other animals bearing unmistakable marks of its powerful teeth. This species, notwithstanding its large size, is now regarded as identical with the spotted hyæna of South Africa. No species of hyæna, recent or fossil, is yet known from the continent of America. O. C. MARSH.

**Hyænidæ** [from Gr. *hæna*, a "sow;" Lat. *hyæna*], a family of fissipede feræ belonging to the group *Æluroidæ* (distinguished by the relations of the foramina of the basis of the skull and the relations of the auditory bulla to the paroccipital and mastoid processes), having the external appearance of a dog, but with the shoulders elevated; 34 teeth (M.  $\frac{1}{2}$ ; P. M.  $\frac{3}{4}$ ; C.  $\frac{1}{2}$ ; I.  $\frac{3}{4} \times 2$ ), of which the molars are large and approximate, the true molars reduced and tubercular, and the last upper premolar sectorial and like that of the cat; the true molar of the lower jaw sectorial; the jaws and muscles thereof are very powerful. This family has been established for the well-known hyænas, of which there are two genera: (1) *Hyæna*, including species with a large sub-caudal gland, the tubercular grinders of the upper jaw enlarged and with three roots, and colored with clouded areas or bands; (2) *Crocuta*, with no sub-caudal gland, the tubercular grinders of the upper jaw small with only two roots, and the color distributed in spots. The three living recognized species of the family are confined to Africa, and two of them (*Hyæna brunnea* and *Crocuta maculata*) are restricted to South Africa. In former times, however, forms scarcely distinguishable from the living species existed in Northern Europe, and their remains have been found in abundance in caves in England, especially at Kirkdale in Yorkshire. THEODORE GILL.

**Hyæno'don** [Gr. *hæna*, a "hyæna," and *ôdon*, a "tooth"], an extinct genus of carnivorous mammals, the type of an extinct family, Hyænodontidæ, partaking, in part, of characters of the wolves, cats, and hyænas. The name was first used for a species from the Lower Miocene of France, and the genus also occurs in the Upper Eocene of that country. Dr. Leidy has also described three species from the Miocene of Dakota. The largest of these, *H. horridus*, is the largest known species of the genus, and equalled in size a large black bear. The form of the skull is intermediate between that of the wolf and that of the opossum, the brain-case being small, as in the latter animal. The temporal fossæ are large, and the lower jaw is strong. The dental formula is—incisors  $\begin{smallmatrix} 3-3 \\ 3-3 \end{smallmatrix}$ , canines  $\begin{smallmatrix} 1-1 \\ 1-1 \end{smallmatrix}$ , premolars  $\begin{smallmatrix} 3-3 \\ 3-3 \end{smallmatrix}$ , molars  $\begin{smallmatrix} 3-3 \\ 3-3 \end{smallmatrix}$ . All the true molars, both above and below, are sectorial in character, the posterior one being much larger and stronger than the other two, and the series is remarkable for the entire absence of the posterior tubercular molars usually found in Carnivores. The canines resemble those of the wolf. The *H. eructus* and *H. crucians* are smaller species, the latter a little larger than the red fox. O. C. MARSH.

**Hyænodontidæ** [from *hæna*, "hyæna," and *ôdon*, a "tooth"], a family of mammals which has generally been referred by some naturalists to the order *Feræ*, and by others to the order *Marsupialia*. They had apparently 44 teeth (M.  $\frac{3}{4}$ , P. M.  $\frac{3}{4}$ , C.  $\frac{1}{2}$ , I.  $\frac{3}{4} \times 2$ ), and the second and third, as well as first, true molars were sectorial; the last premolar of the lower jaw was enlarged. The family has been based upon the fossil remains of several species of animals which have been found in the Lower and Middle Tertiary deposits of France, and especially the Paris basin. There has been considerable diversity of opinion as to the systematic relations of these forms, but the latest original investigator, Prof. Gervais, has recently obtained casts from the interior of the cranium of one of the species, and has shown that in the former the brain was much more like that of a marsupial than that of a placental Carnivora: it further agrees with the marsupial Thylaciniids in the sectorial nature of all the true molars; but on the other hand it apparently resembled the Carnivores in the development of only six incisor teeth in each jaw, and the absence of the inflected margin of the lower jaw. THEODORE GILL.

**Hyælea** [Gr. *hæleos*, "glassy"], a genus of transparent-shelled pteropod mollusks, of which nineteen species are found in the Atlantic, Mediterranean, and East Indian waters. The mollusk has two long appendages to the mantle. *Hyælea tridentata* is the typical species. Some five or six fossil species are known.

**Hy'alite**, or **Muller's Glass**, a form of opal or hydrated silica, of glassy lustre. It occurs as an incrustation, generally in the form of pellucid drops.

**Hyannis**, post-v., seaport, and harbor of refuge on the S. side of Cape Cod, in Barnstable tp., Barnstable co., Mass., is the S. terminus of the Hyannis branch of the Cape Cod R. R., and is 79 miles from Boston. It has a national bank. Its outer harbor is protected by a breakwater. Besides a harbor-light, Hyannis has a fixed catoptric light in lat. 41° 38' 9" N., lon. 70° 16' 59" W.

**Hybernation.** See **HIBERNATION**.

**Hybrid'ity**, or **Hy'bridism** [Lat. *hybrida*, a "mongrel;" perhaps from the Gr. *hýpsis*], treats of the issue of dissimilar kinds of animals and plants, or, in other words, the offspring of parents which belong respectively to different varieties or species. Few subjects have been so much misunderstood or have given rise to so many superstitions as this. In the olden times, and indeed until quite recently, among the educated as well as among the ignorant, the grossest credulity prevailed respecting the possibility of offspring between the most dissimilar forms. Nor was this credulity always an innocent one: it has even affected the laws and customs of states. The belief prevailing that women could become pregnant from intercourse with beasts, laws have been framed condemning to death the parents who were judged guilty of the crime of such unnatural commerce. In 1543, e. g., a woman in Avignon, France, was delivered of a child which was thought to look like a dog, and this supposed resemblance was sufficient evidence that the mother had had intercourse with the dog, and she was consequently condemned, with her quadruped paramour, to die at the stake, and was accordingly executed. Although such beliefs have now been driven to more obscure quarters, they are by no means extinct, and indeed are still very prevalent; in fact, extravagant accounts of animals of mongrel origin are frequently published in the daily and weekly newspapers. It may therefore be advisable to enter into some detail, and in advance to deny the truth of most of the reports.



Under the general designation of hybrids are embraced all those forms whose parents belong to different varieties or species, whether the offspring is fertile or not. The word *hybrid* is thus essentially similar in its meaning to the Anglo-Saxon term *mongrel*, but for present use it has superseded that term, leaving the latter for the offspring between varieties, and, to a considerable extent, for figurative expressions. French writers have classified the forms embraced under this general term under three categories—viz. (1) *Métis* (mongrels); (2) *Hybrides* (hybrids); and (3) *Mulets* (mules). (1) *Métis*, originally specially employed to designate the offspring of an Indian mother by a white father, has been extended, as a generic term, to animals and plants of mixed origin—i. e. to the offspring of two races or varieties of the same species, as well as of two distinct species—and consequently to every organized being owing its origin to dissimilar parents, or to every product of a cross. (2) *Hybrid* is, in general terms, any animal or plant engendered of two different species. (3) *Mulet*, originally applied to the offspring of a mare by a jackass, is extended to embrace all those organized beings which are analogous to it, as well in mixed origin as in sterility, and also to forms characterized by their sterility, even though their origin may not be mixed, as in the case of bees, wasps, etc.; thus, infecundity is the prime element.

Such are the distinctions employed by French authors, and followed in the dictionary of the French Academy, but they are not recognized by English writers, and indeed scarcely seem to be definite enough to warrant recognition. It is only necessary to indicate that we use the word *hybrid* in the same sense as the French do *métis*. A distinctive term is, however, needed for the offspring of hybrids *inter se*, and the word *mongrel* might be extended, in accordance with analogy, to such forms.

Repeated and prolonged critical observations and experiments have amply demonstrated that fruitful union is impossible between animals or plants of widely different species (i. e. belonging to decidedly different families), and that such is only possible within comparatively narrow although uncertain limits. We may therefore at once dismiss, as utterly unworthy of belief, the many reports of offspring from such forms which have been published by even accredited writers of natural history in past times, such, e. g., as the alleged cases of hybrids between a hen and a duck; an opossum and a cat; a boar and a camel; an otter and a rabbit; an otter and a sheep; an otter and a cat; a raccoon and a cat; a bear and a hog; a bear and a dog; a cat and a rat; a monkey and a slut; and especially women and apes, dogs, or other animals. Whatever details may be given have been found to lack essential requisites, and in almost all cases the belief has had its origin in some vague external characteristics which suggested a similarity which had, however, no real existence in structure. In the name *camelopard* we have a term which is the expression of a past belief that the animal in question was a hybrid between the camel and the leopard; and such was actually claimed to be the origin of that animal by some old writers—e. g. Matthieu in the eleventh century. In the case of an alleged hybrid between a cat and a raccoon, seen at Taunton, Mass., an Angola cat was the supposed hybrid: the explanation lay in the fact that the Angola cat is a large animal with a bushy tail and color somewhat resembling the raccoon, and thus it received the name of raccoon cat; the step thence to the belief that it was the offspring of a raccoon and cat was natural; this belief at a distance became embodied in the assertion of such origin as a matter of fact: such was the basis of a statement which was fully examined into by the writer of this article. Another case was simply the result of a misconception of the meaning of authors. Geoffrey St. Hilaire and Hyatt refer to an alleged hybrid between the axis deer and a hog, and to have been recorded by Hamilton Smith and Morton, and very properly urge that such an offspring would be impossible. On referring to the two authors mentioned, however, it is evident that they simply alluded to supposed hybrids between the axine buck (*Cervulus axis*) and the hog deer (*Cervus porcinus*), designating the latter under the name "porcine species" (i. e. of deer). Geoffrey St. Hilaire interpreted the word "porcine species" to mean hog, and hence a belief quite venial (whatever may have been its basis in truth) was exaggerated into one entirely unpardonable in a scientific man. The alleged cases of hybrids between otters and other animals are doubtless the expressions of another series of facts. There is some what of a tendency among animals towards a dumb, hunched, or an out-turned position of the legs which recalls the form of an otter, as exemplified, e. g., in the timbered dog and Ancon sheep. These Ancon sheep (which have been especially referred to by Darwin in his *Origin of Species*) were also called, on account of this peculiarity, "otter sheep," and from this name was doubtless developed the report of hybrids between sheep and otters. Such has doubtless been the origin of the belief in the other otter-like animals.

Such has doubtless been the origin of the belief in the other otter-like animals.

Hybrids partake of the characteristics of their parents, and the extent to which they do so is, within a certain range, definitely fixed for those of each kind; further, the degree in which the hybrid shares the characters of the parent is determined by the sex of each species contributing to the hybrid. Thus, in the case of hybrids between horses and asses, which are the best known, we have in the mule the offspring of the mare and jackass, and in the hinny that of the stud-horse and she-ass: the mule resembles in many of its characters the ass most, but is larger, while the hinny more resembles the horse, but is smaller than the mule. These conditions will be found to affect the internal organization and external appearance, and the like is the case respecting other hybrids. Therefore, every alleged hybrid should exhibit positive evidences in its organization, as well as its external appearance, of the parentage on both sides; and if such evidences are not afforded, or if only a vague superficial similarity to some alleged species exists, while the fundamental characters are all those of another species, we are necessarily forced to conclude that the allegation as to hybridity has no real foundation, and that the external indications are illusive. The natural love of man for the marvellous prompts to a ready belief in extraordinary hybrids. Pecuniary interests are also often involved with this belief, and inducements are thus held out to propagate it. Hence are constantly arising fables respecting hybrids of various kinds.

Hybrids have been classed in various categories; e. g. (1) according to general affinities as expressed in their structure; (2) according to the degree of affinity of the parents—i. e. whether congeneric with each other or bigeneric (i. e. representatives of distinct genera); (3) according to the fertility of the progeny of the hybrids or otherwise; (4) according to the degree of prolificacy of the hybrids; and (5) according to the frequency or rarity of their occurrence. Our present purpose will be best subserved by the consideration of the species arranged according to their affinity.

Among the Primate mammals, or monkey order, numerous hybrids have been obtained by congeneric species of monkeys; e. g. (1) the common macaque or kiu (*Macacus cynomolgus*) and bonnet monkey (*Macacus sinicus*); (2) the macaque and maimon or bru (*M. nemestrinus*); and (3) the papion and chaima baboons (*C. papio* and *C. puerus*). Among the Carnivores also numerous hybrids have been obtained, the chief of which are those (1) between domestic or feral common cats and the smaller species of the countries into which they been introduced; (2) the lion and tiger; (3) the jaguar and panther; (4) common dogs and native wild species—e. g. wolves, jackals, etc.; and (5) dog and red fox. Among seals several cases have been reported of hybrids between the sea-lion (*Eumetopias stelleri*) and fur seal (*Calochirus ursinus*), but these require confirmation. Among the ungulates numerous hybrids have also been produced, among which may be especially enumerated of the horse family (Equidae) (1) the mule between the ass and mare; (2) ass and zebra; (3) ass and daw; (4) quagga and horse; (5) kiang and zebra; (6) kiang and daw; (7) kiang and ass; (8) horse and zebra; and (9) quagga and horse. Of the ox family (Bovidae), hybrids have been raised from the domestic cattle and almost all other well-known species and representatives, even of different genera (e. g. buffalo, yak, and bison), and also between these and so many other forms that specification is unnecessary. Hybrids have also been obtained from sheep and goats, and various species of each group. Among the rodents successful intercourse has been effected between the hare and rabbit; and their offspring have been advantageously raised even for the market. Among the birds hybridity is so frequent, and has been effected between such widely distinct species, and representatives of even markedly distinct genera, that inability to hybridize is rather the exception than the rule. The most notable cases are those between different generic types of the Phasianidae (common fowl, pheasants, etc.) and Anatidae (ducks, geese, etc.). Little is known respecting hybridity in reptiles or amphibians; and the only case that need be specifically alluded to is one that has very recently been procured, by Prof. Paul Gervais, between the sirenon of Mexico and the triton (*Triton cristatus*) of Europe, members of two different families. In this case young were hatched from the eggs of females of sirenon impregnated by the triton, but did not live to maturity, all having died within a short time after hatching. Among the fishes also hybridity between diverse genera have been obtained, e. g. between various species of Salmonoids and Cyprinoids. A number of very distinct forms, existing in a state of nature, have been declared by certain authors of high reputation—e. g. Stead



and Günther) to be hybrids between representatives of different genera: such are especially (1) *Carpio Kollarit*, between *Cyprinus carpio* and *Cucassius vulgaris*; (2) *Abramodopsis Leuckartii*, between species of *Abramis* and *Leuciscus*; (3) *Bliccopis abramo-rutilus*, between a species of *Abramis* and *Scardinius erythrophthalmus*; (4) *Leuciscus dolabratus*, between *Alburnus lucidus* and *Squalius cephalus*; and (5) *Chondrostoma rypsel*, between *Chondrostoma nasus* and *Telosteus Agassizii*. These, however, have not been experimentally determined to be hybrids (except, perhaps, in the case of the first), and there is still ground for skepticism.

Such are some of the best known and most characteristic cases of hybridity among the vertebrates. Among the invertebrates there are less known and determined cases, but hybrids have been obtained between different species of bees, butterflies, etc., and many intermediate forms found in a state of nature have been supposed to be hybrids. Several botanists—e. g. Gärtner, Kölreuter, Herbert, Noble, etc.—have devoted much time and attention to the subject, and their results, although affording some basis for difference of opinion, essentially coincide with the facts rehearsed as to the best known animals. The results thus far obtained from all these various departments may be summarized as follows: (1) Allied species are capable, as a rule, of pairing and producing offspring, and this capability is in indefinite ratio to the degree of their likeness. (2) Hybrids are frequently fertile with their parents when those parents are closely related to each other. (3) Hybrids are more rarely fertile among themselves, and mostly (but not always) in cases where the parents are very closely and even suspiciously related.

The degree of fertility between original species and their hybrids need not be in ratio to each other; e. g. offspring between certain species is very difficult to be obtained, but hybrids which have been once obtained may be fertile among themselves. On the other hand, certain species will pair and have progeny without difficulty, but the hybrid offspring may be nearly or absolutely (?) infertile; and this case may even occur in the same genus, as, for example, in the plant-genus *Dianthus*.

From all these facts it is plain that there is every degree of difference between absolute sterility and perfect fertility in the intercourse between different species; that, however, infertility to some degree attends sexual intercourse between different species; that fertility is certainly no evidence of specific unity. Fertility, it is equally plain, is almost impossible between species of different families, and all popular accounts to the contrary may be at once set down as destitute of a real foundation. The explanation of this want of fertility between forms that are very dissimilar is doubtless to be found in some difference of structure in the genital organs, although the differences may be so obscure as to have escaped detection till the present time. These differences, at the same time, need not necessarily be co-ordinated with other differences, at least to a greater extent than in other parts of the animal economy; and hence we may find species that differ considerably in appearance quite fertile, while others that resemble each other much more closely may be less so. There must, however, be some degree of co-ordination between the modification of the genital organs and those of the other organs and parts, and hence fertility is only possible within a certain limited range.

A noteworthy fact is that domestication and cultivation exercise an appreciable effect upon the intercourse between animals and plants of different species, and increase the degree of fertility: in a state of nature members of different species rarely pair, and hence hybrids are exceptional, and thus specific forms are perpetuated pure and undefiled; under the influence of man, however, mongrel races readily arise and are indefinitely sustained.

Before dismissing the subject it is advisable to allude to some very curious and, at first sight, inconsistent phenomena exhibited by cross-breeding. Many plants depend for impregnation upon pollen brought by insects from other individuals; and although the sexes may be combined in the same individual flower, the pollen of its stamens appears to be insufficient to impregnate its ovary. Even making allowance for the disturbing effects of manipulation, enough is known to at least indicate that there is a less degree of fertility between closely related individuals than more distant ones. The evils of close breeding are even recognized by man in the laws affecting the marriage state, as well as in his usage in the rearing of his domestic animals. It may be, therefore, that even the difficulty of obtaining hybrids fertile among themselves may be in part due to the fact that those hybrids are too closely related by consanguinity, and that the conditions for perfect experiments have thus not been completely fulfilled. Much has been done towards the elucidation of the subject, but much still remains to be done.

THEO. GILL.

**Hydas'pes**, the name by which the Greeks and Romans designated the present *JAYLUM* (which see), an affluent of the Ganges. On its banks was fought the great battle between Alexander the Great and Porus in 327 B. C.

**Hydat'id**, a morbid growth characterized by the development of a cyst, which contains an aqueous and transparent fluid, in which floats a parasitic worm, generally the *acephalocyst*. The term was formerly used to designate any encysted tumor containing a transparent liquid, but it is now restricted to that form which encloses a parasite. The organs most commonly affected by this peculiar disease are the uterus, ovaries, and liver; next frequently we find it in the breast and testicles, but rarely in other parts of the body. It generally appears as a round hard tumor, which occasions more or less pain and inconvenience; this tumor is made up of hydatids, although we sometimes have it occurring singly, when it will be proportionately large. Each parasite consists of a body and head; around the latter we find a row of teeth which are hook-like and sharp. The body is solid, and displays a number of ovoid bodies beneath its coat, which give it a speckled appearance. As the tumor increases in size, if it is near the surface, we can feel fluctuation; the pressure under the skin causes it to ulcerate, and the hydatids may thus perish. If they are situated in some internal organ, they may produce very serious complications, as peritonitis, osteitis, etc. The treatment consists in excision if they are sufficiently superficial, otherwise we can do nothing. EDWARD J. BERMINGHAM.

**Hyde**, town of England, in the county of Chester. It is a rapidly growing place, with numerous cotton-factories, and in the neighborhood are extensive coal-mines. Pop., with surroundings, 21,221.

**Hyde**, county of S. E. Central Dakota. Area, about 995 square miles. The Missouri River flows for some distance along its S. W. border.

**Hyde**, county of the E. of North Carolina, bounded on the E. and S. by Pamlico Sound. Area, 720 square miles. It abounds in marshes, lakes, and forests. Corn, rice, and forest products are the staples. Cap. Swan Quarter. Pop. 6445.

**Hyde (ALVAN)**, D. D., LL.D., b. at Franklin, Conn., Feb. 2, 1768; graduated at Dartmouth College in 1788; studied theology, and in 1792 was ordained pastor of the Congregational church at Lee, Mass., where he remained the rest of his life. He was an able and influential pastor, and a zealous friend to Williams College, of which he was for twenty-one years vice-president. Dr. Hyde published a number of sermons. D. at Lee Dec. 4, 1833.

**Hyde (AMMI BRADFORD)**, D. D., b. at Oxford, N. Y., Mar. 13, 1825; graduated at Wesleyan University in 1846; entered the Methodist Episcopal ministry; taught (1846-61) in the seminary at Cazenovia, N. Y., and in 1864 became professor of Greek in Allegheny College, Meadville, Pa.

**Hyde (ANNE)**, a daughter of Edward Hyde, earl of Clarendon, b. in 1637, and lived at the Hague as maid-of-honor to the princess of Orange, sister to Charles II. and James II. Here James, at that time duke of York, formed a liaison with her, and shortly after the restoration of his family to the throne of England in 1660 he married her clandestinely. For some time the royal family would not recognize her, and much intriguing was going on for the purpose of breaking the marriage; but Anne's perseverance at last conquered all difficulties. She was not handsome, but very prepossessing, spirited, and dignified, and she exercised a great influence on her husband. She was a Roman Catholic, and converted him. Her two daughters, however, Mary and Anne, who both became queens of England, were educated in the Protestant religion. Anne d. in 1671.

**Hyde (EDWARD)**. See CLARENDON.

**Hyde Park**, an enclosure comprising 400 acres, and extending from the western extremity of London to Kensington Gardens. When the monasteries were dissolved under Henry VIII., these grounds became the property of the Crown, and after the Restoration it became the favorite drive and promenade of London. (See LONDON.)

**Hyde Park**, post-tp. of Cook co., Ill., a southern suburb of Chicago, now under village organization. It covers 49 square miles, and includes 49 villages, towns, and hamlets; has 25 churches, 25 schools, 13 post-offices, 30 manufactories, gas and water works, and all city conveniences. Except in South Chicago, Hyde Park is chiefly inhabited by persons who do business in Chicago. Pop. in 1870, 3644; estimated pop. in 1873, 35,000.

I. L. VANSANT, ED. "SOUTH SIDE NEWS."

**Hyde Park**, post-v. and tp. of Norfolk co., Mass., 7 miles from Boston, on the river Neponset, and on the Boston and Providence and the New York and New England



R. Rs.; has a savings bank, public library, newspaper, 5 churches, excellent graded schools, and a good fire department. It is chiefly a place of residence for persons whose places of business are in Boston. Pop. 4136.

R. C. GETCHELL, ED. "GAZETTE."

**Hyde Park**, post-tp. of Wabashaw co., Minn. Pop. 380.

**Hyde Park**, tp. and post-v. of Dutchess co., N. Y., on the Hudson River and the Hudson River R. R., 5 miles N. of Poughkeepsie. The township has many splendid country-houses. The village has 4 churches, and is beautifully situated. Pop. 600; of tp. 2695.

**Hyde Park**, a portion of Scranton, Pa. (in Luzerne co.), separated from the main part of the city by the river Lackawanna. It has 8 churches (3 with Welsh services), 3 halls—Old Fellows', Masons', and Red Men's—a savings bank, 3 hotels, etc. Coal-mining is the principal industry. Hyde Park embraces the 4th and 5th wards of the city, and is built upon a hill. It has a weekly and a monthly periodical, both in the Welsh language.

W. ROBERTS, ED. OF "Y CYFALL."

**Hyde Park**, post-v., cap. of Lamoille co., Vt., on the Portland and Ogdensburg R. R., has a national bank, a newspaper, an academy, a quarry of limestone, beds of mineral paint, a copper-mine, 8 large saw-mills, besides several smaller ones, manufactures of pails, tubs, pegs, starch, and a very great water-power. There are 3 churches and 3 hotels. The manufacturing, agricultural, and commercial interests of the place are important. The township has 14 small natural lakes and numerous streams, and is a good place for fishing and as a summer resort. Pop. of tp. 1624.

C. C. MORSE, ED. "NEWSDEALER."

**Hyderabad' (or Haiderabad)**, as it is written in official English papers), the capital of the nizâm of the Deccan, the most powerful of the Indian princes under English protection. The number of inhabitants is variously given; the best source, however (Thornton, *Gazetteer of the Territories under the Government of the East India Company*, London, 1857), says 200,000. The city is situated in the centre of the plateau of the Deccan, about 520 mètres above the sea, on the Musi River, which here is nearly 160 mètres broad, and presents a magnificent prospect with its numerous mosques and surrounded by granite cliffs of a strikingly picturesque form. The larger part of the city, more especially the old city, stands on the southern bank of the Musi; on the northern is that quarter which by Englishmen is called the Princess Bazaar, and which contains the magnificent building of the English residency. This building communicates directly with the palace of the nizâm, standing on the opposite bank of the river, by a beautiful stone bridge constructed by Col. Oliphant. The building of the English residency, which was commenced in 1803, after a plan by T. Russell, and executed in grand style and with great splendor, is the most beautiful and most important structure of the city. The palace of the nizâm is badly situated, and has nothing striking about it. Among the private houses the palace of the influential minister, Salar Jung, is the most remarkable; the palace of Shumsul Umra, who is at the head of the administration together with Salar Jung, is also noteworthy. The city is principally Mohammedan, and the most prominent of its mosques are the cathedral mosque, with immensely high minarets, and the mosque of the Prophet, a structure of enormous dimensions. A very striking building is the Chahar Minar, formerly a university. Where the four principal streets cross each other it rises on four immense arches, so that the streets run below it. The city is very extensive, but contains many small and poor houses in narrow streets; it is surrounded by a wall, which, however, is too weak and insignificant to make a real fortification. The surrounding country is rich in magnificent gardens with numerous ponds, pavilions, and villas. Hyderabad was formerly the principal market for the diamonds cut in the neighboring Golconda; its manufactures of cotton and paper are still considerable; *kimkhuab*, a silk embroidered with gold, and turbans are made. A railway is projected, which will connect Hyderabad with Gulbarga on the one side and Chanda on the other.

The city was founded in the sixteenth century by Mohammed Kuli, who waged many wars with the neighboring rajahs and formed an alliance with Persia. Among his successors, Abdullah and Abu Husain are noteworthy; the latter was defeated in 1687 by Aurungzebe. The present territory of the nizâm is the same as that of the subah of the Deccan in the time of the Mogul. Area, 95,337 square miles. Pop. 10,500,000. A grandson of one of the ablest generals of Aurungzebe, Asuf Jah, made himself independent lord of the country as subadar of the Deccan in 1724, and took Hyderabad for his capital. He founded the Asuf dynasty. His successors concluded an alliance with

Dupleix, the French governor of Pondicherry, and kept a French army corps, commanded by Bussy. But on the outbreak of the war of 1756 the policy of the country changed. On Mar. 14, 1759, the first treaty was concluded with the English; the nizâm, Salabat Jung, ceded the district of Masulipatam and dismissed the French. The second treaty was concluded Nov. 12, 1766; the nizâm ceded the districts of Ellore, Guntur, and Rajamandri, and bound himself to furnish troops on the receipt of an annual subsidy of £90,000. Several wars, in which the nizâm furnished auxiliary troops to the English against Tippon and against the Pindares, and several new treaties (Sept. 1, 1798, July 13, 1799, Oct. 12, 1800, and Dec. 12, 1822), brought the nizâm more and more under English authority, and great misery came over the country. Great reforms were commenced, however, in 1853, when Salar Jung became minister. According to a treaty which the resident, Col. Low, mediated, the nizâm was to cede more land in order to get rid of all his financial obligations to the English, and only furnish 5000 men, infantry, 2000 horses, and 4 batteries. But Nasru-d-Daulah would not consent to the cession, and the treaty was not ratified until under his successor, Afzula-d-Daulah, when Salar Jung had become minister. On Dec. 31, 1860, it was determined that the nizâm, as a reward for his services during the war of 1857-58, should receive the conquered territory of Shorapur, that of the formerly ceded districts, those of Raichur Doab and Dharaseo should be restored to him, and his debt, £500,000, cancelled. The English retained only so much of the territory of the nizâm as would yield an annual revenue of £320,000, to pay for the contingent of auxiliaries which the nizâm was to furnish. This district is called Haiderabad assigned districts, or Berar, and forms a province with an area of 16,960 square miles and a population of 2,231,565. Afzula-d-Daulah d. Feb. 26, 1869, and was succeeded by Mir Mahbub Ali Khan.

AUGUST NIEMANN.

**Hyderabad**, town of British India, the capital of the district of Sind, in the presidency of Bombay, stands near the Indus, in lat. 25° 22' N., lon. 68° 28' E. It is famous for its manufactures of arms and cutlery. Pop. about 24,000.

**Hy'der A'li**, b. in 1728 at Bangalore, which his father held as a fief of the rajah of Mysore. In 1756 he inherited the fief at the death of his elder brother, and in 1759 he made himself actual ruler of Mysore, leaving to the rajah nothing but his title and a portion of the revenues. Hyder was one of the most prominent of the Mohammedan princes of India, both with respect to talent and to character. He was mild and just, and had great respect for all the inventions of a higher civilization. He encouraged agriculture, manufactures, and commerce. His army he organized on the Prussian plan, and had it commanded chiefly by European officers, but he was himself possessed of great military talent, and was eminently successful in his wars. He conquered Calicut, Bednor, Onor, and Cananor, and threw off the supremacy of the Mahrattas over Mysore. In his first war with the English he dictated peace under the walls of Madras, Apr. 15, 1769, and in the war between the English and French he sided with the latter, and fought with various success, but d. at Chitore in 1782, before the war was over; his son, Tippon Sahib, succeeded him.

**Hydra** (Polyp). See HYDROIDA.

**Hy'dra**, an island of Greece, off the E. coast of Morea, 11 miles long and 3 miles broad. Pop. in 1871, 11,684. It is high, rocky, and bare; and almost all its inhabitants live in the town of Hydra, situated on the northern coast of the island, with a good harbor. The island was uninhabited in ancient times. In the fifteenth and sixteenth centuries fugitives from Albania, Argolis, and Attica, who fled from Turkish oppression, founded the city, and it soon rose to a high degree of prosperity. Hydra is still one of the finest cities of Greece. In 1825 the population of the island was estimated at 40,000.

**Hydrac'id** [*hydrogen and acid*], a name formerly applied by chemists to those acids of which the base was supposed to be hydrogen. The generally received theories of the constitution of acids are quite at variance with those once prevalent; all acids, according to Dulong's hypothesis, being regarded as compounds of hydrogen with some radical. The term is at present used (when used at all) to designate acids formed upon the hydrochloric acid type. (See ACIDS, by C. F. CHANDLER, Ph. D., M. D., LL.D.)

**Hydran'gen** (Gr. *hēap*, "water," and *ayvōn*, a "vessel," perhaps from the fondness of the plants for water), a genus of shrubs of the order Saxifragaceæ. The U. S. has three (Southern) species, all elegant shrubs in cultivation—*H. radiata*, *arborescens*, and *speciosa*. The common hydrangea of the green house is *H. hortensis* of China. It is remarkable for the mutable color of its flowers. It requires plenty of water, and is very hardy. *H.*



*Thunbergii* furnishes leaves which are highly prized in Japan as a substitute for tea. There are other species.

**Hydrastis Canadensis**, the only known species of its genus, a ranunculaceous plant of the U. S., common in many parts, and known as puccoon, yellow root, etc., is used to a considerable extent in medicine, and has the power of dyeing a rich and permanent yellow. Its valuable tonic powers depend in part on the presence of berberin and hydrastin.

#### Hydrate of Chloral. See CHLORAL.

**Hydrate of Croton-Chloral.** By passing dry chlorine gas over pure aldehyde, there are formed hydrochloric acid and the chlorinated aldehyde of crotonic acid, or *croton-chloral* ( $C_4H_3Cl_3O$ ), a body holding the same place in the allyl group that chloral does in the ethyl. Obtained pure, it is a dense oily liquid of peculiar odor. Mixed with excess of warm water, it forms croton-chloral hydrate ( $C_4H_3Cl_3O \cdot H_2O$ ), a crystalline substance almost insoluble in cold, but soluble in hot water and in alcohol. By contact with an alkali, croton-chloral first forms a trichlorated compound, allyl-chloroform, which speedily decomposes into the bichlorated body bichlorallylene. Croton-chloral hydrate has been lately tried in medicine as a substitute for chloral-hydrate in certain cases. Its asserted advantages are a greater freedom from danger of paralyzing the heart, and a special power of producing anæsthesia—and thus relieving pain—in the parts of the head and face innervated by the fifth pair of cranial nerves. EDWARD CURTIS.

**Hydrates** [Gr. *ὕδωρ*, "water"]. This term is applied to compounds formerly supposed to contain water. According to the recent theories of chemistry, most hydrates are supposed to be compounds of hydroxyl (OH), and to be produced by the replacement of half the hydrogen in water ( $H_2O$ ). The following examples illustrate the two views:

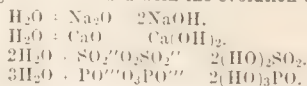
Sodic hydrate.....	$Na_2O \cdot H_2O$ .	$Na(OH)$ .
Calcic " .....	$CaO \cdot H_2O$ .	$Ca(OH)_2$ .
Bismuthic " .....	$Bi_2O_3 \cdot 3H_2O$ .	$Bi(OH)_3$ .
Aluminic " .....	$Al_2O_3 \cdot 3H_2O$ .	$Al(OH)_3$ .
Ethylalcohol .....	$(C_2H_5)_2O \cdot H_2O$ .	$C_2H_5(OH)_2$ .
Ethene " .....	$C_2H_4O \cdot H_2O$ .	$C_2H_4(OH)_2$ .
Propenyl " .....	$(C_3H_5)_2O \cdot 3H_2O$ .	$C_3H_5(OH)_3$ .
Maunite " .....	$C_6H_8O_3 \cdot 3H_2O$ .	$C_6H_8(OH)_6$ .
Nitric acid.....	$H_2O \cdot N_2O_5$ .	$(HO)NO_2$ .
Sulphuric acid.....	$H_2O \cdot SO_3$ .	$(HO)_2SO_3$ .
Phosphoric acid .....	$3H_2O \cdot P_2O_5$ .	$(HO)_3PO$ .

The formation of hydrates from water by the replacement of hydrogen is shown in the following formulas:

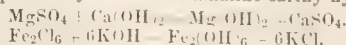
$H_2O + Na = Na(OH) + H$ .	Sodic hydrate is $Na - O - H$ .
$H_2O$ is $H - O - H$ .	Nitric acid is $H - O - NO_2$ .
$2H_2O$ is $H_2 - O_2 - H_2$ .	Calcic hydrate is $Ca - O_2 - H_2$ .
	Sulphuric acid is $H_2 - O_2 - SO_3$ .
$3H_2O$ is $H_3 - O_3 - H_3$ .	Bismuthic hydrate is $Bi - O_3 - H_3$ .
	Phosphoric acid is $H_3 - O_3 - PO$ .
$4H_2O$ is $H_4 - O_4 - H_4$ .	Stannic hydrate $Sn - O_4 - H_4$ .
$6H_2O$ is $H_6 - O_6 - H_6$ .	Ferric " $Fe_2 - O_6 - H_6$ .

(See article CHEMISTRY.)

Hydrates may be formed by—(1) The displacement of hydrogen in water, as in the case of the alkaline metals, as already shown for sodium. (2) By the direct union of the anhydrous base or acid (anhydride) with water, the combination being often attended with the evolution of heat:



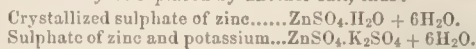
(3) By double decomposition, as when soluble metallic salts are precipitated by alkaline or alkaline earthy hydrates:



Hydrates retain their water with various degrees of force. Some, as cupric hydrate, give up water at a moderate heat; others, as calcic, ferric, and stannic hydrates, lose it at a red heat; others, as sodic and potassic hydrate, are not decomposed by any degree of heat. Tribasic phosphoric acid loses, when exposed to a red heat, first one-third, then another third, of its water, but the last third cannot be removed. (See PHOSPHORUS.)

The volatile acids exhibit peculiar relations to water. They form a series of hydrates with one, two, three, four, or more molecules of water, each hydrate being permanent under certain fixed conditions of temperature and pressure. A weaker acid under these conditions gives off water, a stronger gives off acid, till the most permanent compound alone remains. Thus, we have  $H_2O \cdot SO_3$ ,  $(H_2SO_4)$  or  $(HO)_2SO_2$ ,  $2H_2O \cdot SO_3$  and  $3H_2O \cdot SO_3$ . The hydrates of the alkaline metals, of barium, strontium, and thallium, are very

soluble in water, forming strongly alkaline solutions. Hydrate of calcium, mercury, lead, and silver are slightly soluble. The other metallic hydrates are insoluble, or nearly so. The hydrates of the acid radicals (the acids) and the alcoholic hydrates (the alcohols) are nearly all soluble, the exceptions being certain organic bodies of high molecular weights, such as palmitic, stearic, oleic acid, etc. Many compounds contain water evidently as such. Thus, crystallized baric hydrate is  $Ba(OH)_2 \cdot 4H_2O$ ; alum is  $K_2SO_4 \cdot Al_2(SO_4)_3 \cdot 24H_2O$ ; gypsum is  $CaSO_4 \cdot 2H_2O$ ; cupric sulphate is  $CuSO_4 \cdot 5H_2O$ . Most of such water is expelled by a temperature of  $100^\circ C$ ., but some salts retain a portion of this water with greater tenacity than the rest. Sulphate of zinc,  $ZnSO_4 \cdot 7H_2O$ , becomes  $ZnSO_4 \cdot H_2O$  at  $100^\circ C$ ., and retains the last  $H_2O$  till heated to  $238^\circ C$ . This last molecule of water may be replaced by another salt, thus:



The water easily expelled is called *water of crystallization*; the water in  $ZnSO_4 \cdot H_2O$  is called by Graham *constitutional water*, and such compounds are called by Liebig *hathydrates*. C. F. CHANDLER.

**Hydra, The Lernaean**, in Grecian mythology, was a monster with the body of a serpent, but with many heads, seven, nine, fifty, or even one hundred, which grew up again as often as they were cut off, and from whose mouths issued a deadly venom. It inhabited the marshes of Lerna, in Argolis, but was destroyed by Hercules.

**Hydraulic Crane**, a device by which the enormous power of the hydrostatic press is utilized in the working of derricks, cranes, etc. It is chiefly employed in Great Britain, where the "hydraulic" or hydrostatic press is a favorite means of exerting great force. In unloading and loading ships, and in filling railway cars with heavy goods, it is sometimes convenient to have a considerable number of cranes, which if managed by the direct application of steam-power would require complicated and cumbersome machinery; but a steam-engine working a hydrostatic press, with an accumulator attached, is made to work the cranes by very simple means, the necessary rapidity of motion being gained by long leverage and the use of pulleys.

**Hydraulic Elevator, or Ascenseur Édoux.** This is an invention of M. Léon Édoux of Paris, France, designed to lift weights by hydraulic pressure from level to level, though in its actual application employed only to elevate persons from story to story in public hotels or other lofty buildings. Its construction may be understood from the following description of an elevator of this kind which was in operation during the Exposition of 1867 in Paris, in the gallery of machines of the Exposition: The essential parts of this apparatus consisted of a cylinder 20 mètres (66 feet) long, sunken perpendicularly into the earth, with a plunger descending into it to the same depth, and packed water-tight at the top of the cylinder. Into this, below the packing, water, from the source from which the Exposition received its supply for general purposes, was admitted, by means of a valve which was under the control of the attendant. The piston rose under the pressure to the required height, and was maintained there by closing the valve. A car or kiosk, for the accommodation of passengers, rested on the upper extremity of the piston, and was elevated as it rose. The descent was effected by opening another valve which allowed the water to escape at the level of the earth's surface; when, the pressure being relieved, the car descended by its own weight. The diameter of the piston plunger was 0.25 mètre (10 inches), and that of the cylinder only sufficiently greater to allow free water-way. The plunger was a hollow casting, turned and polished on the exterior, and closed at the bottom. It was formed of four lengths carefully united. A strong wire cable extending through the interior from end to end firmly bound the parts together, and served as a security for holding them in position in case of the occurrence of any accident. In its ascent, the car was guided by four cast-iron columns, which formed a rectangular framework or tower around it. These columns were hollow also, affording space for the ascent and descent of heavy weights within them, by which the weight of the empty car was principally counterpoised. Chains passing over pulleys at the top connected these weights with the car at its four angles. Only sufficient preponderance was given to the car to allow it to descend without a load. The resistance to which the hydraulic pressure was opposed amounted, therefore, to little more than the weight of the varying charge. It is to be noticed, however, that as the car ascends the weight opposed to the pressure virtually increases, since the plunger, so long as it is immersed, is buoyed by the weight of an equal bulk of water. A compensation for this increase of resistance is provided by Mr. Édoux, in giving to the chains a weight per running foot equal to the eighth part



of the thus accruing increase of weight of the piston—that is to say, about 2 kilograms, or a little more than 4 pounds. There being four chains, and each chain being diminished one foot in length on the side of the car, and increased in length on the side of the counterpoise, one foot for each foot of elevation, the counterpoise is thus increased at the same time 15 kilograms, or about 34 pounds, which is equal to the simultaneous increase in the virtual weight of the piston.

The charge which an apparatus of this kind will elevate, the cross-section of the piston remaining the same, will depend on the height of the hydraulic head. If we assume the system of counterpoises to be such as to maintain the whole moving apparatus (supposed to be without a load) in equilibrium when the pressure of the head is shut off and the escape-valve is open, or with only a slight predominance of weight in favor of descent, and to do this in every part of the course, the elevating force will be found by making the proper substitutions in the expression  $F = \frac{1}{2} \pi d^2 h$ , in which  $F$  represents the force,  $d$  the diameter of the piston,  $w$  the weight of a cubic unit (metre or foot as the case may be) of water, and  $h$  the height of the head. It was stated that the reservoir from which the supply of water was received was situated at an elevation of 30 metres above the point of application. Putting, therefore,  $h = 30$ ,  $d = 0.25$ , and  $w = 1000$  kilograms, we shall obtain the result  $F = 3.14159 \times 0.0625 \times 30 \times 1000 \div 2 = 1473$  kilograms nearly. Putting the average weight of an adult at 60 kilograms, say 130 pounds, the *ascenseur* was capable of carrying up twenty-four or twenty-five persons at a time.

It will be seen that the ingenious system of counterpoises introduced by Mr. Edoux makes the height to which the charge is elevated quite independent of the height of the hydraulic head. Other considerations, however, practically limit the extent to which the system can be applied. In proportion as the length of the piston is increased it becomes necessary to increase its diameter and the thickness of its walls, in order that it may preserve a sufficient rigidity under the increasing strain and pressure to which it will be liable. Its weight will be correspondingly increased, entailing the necessity of equally increasing the weight of the chains and counterpoises. Thus the apparatus will become too ponderous to be advantageously employed. The weight of the pistons of the *ascenseurs* in the Exposition was 2100 kilograms, or more than 2 tons each. This weight exceeded, therefore, alone, not considering the cars, the whole force of elevation, by more than 600 kilograms; so that without the system of counterpoises the apparatus would not have worked at all.

On the other hand, for the ordinary purposes of a hotel elevator, it is not necessary to have a source of water by any means so high above the point of application as that which operated the *ascenseurs* of the Exposition. It is sufficient, we will suppose, that such an elevator may be capable of carrying up eight persons at a time, having a total weight of 1000 to 1100 pounds. Assuming an outside weight of 1200, and, transforming the expression above for

the value of  $h$ , we have  $h = \frac{4F}{\pi d^2 w} = \frac{4 \times 1800 \times 114}{3.14159 \times 100 \times 62.5}$

35 feet nearly, putting the diameter of the piston at 10 inches, and taking 62.5 pounds as the weight of a cubic foot of water.

If the diameter of the piston be enlarged to 12 inches, the hydraulic head required will be but twenty-four feet. Such an elevator can therefore be introduced into any house in which the water rises to a height of 35 feet, or even 24 feet, above the lowest point at which it can be conducted off after being discharged. It is desirable, of course, to have a superfluity of force, but that can abundantly be obtained in any house in which water from the public works is delivered in the third story, and communication with the public drains can be established from the basement.

Hydraulic elevators in dwellings have the advantage over mechanical contrivances for the same purpose worked by steam engines, turbines, or other motors, because of their simplicity of construction, their extreme facility of management, their perfectly smooth and silent motion, and, in general, their large superiority in point of economy in operation. The economy, however, may not be realized in large cities, where water rates are high; but the advantages are in other respects so much in favor of these elevators, especially when the security attending their use is also taken into consideration, as to justify their introduction even in cases where it might be necessary to create the hydraulic head by means of steam-pumps. If steam-power has to be used at all, it may as well be employed in elevating water as in directly operating an elevator. And if this plan is once adopted the establishment becomes in-

dependent of public waterworks, and even of natural sources altogether, after having provided a moderate original supply, since the same water may be constantly used over and over again. It will be necessary for this purpose to have a tank at the lowest level and another at the highest. And if we assume (as has been shown above to be just) a height of 35 feet to be sufficient in ordinary cases, it is not difficult to compute the work which an engine would have to perform in lifting the water required for the daily service from the lower tank to the upper.

Supposing the course of the piston to be 60 feet, and its diameter, as above, 10 inches, it will require an expenditure of about 33 cubic feet of water for each ascension. Supposing an ascension to take place every six minutes, or ten every hour, which is about the fact at the Charing Cross Hotel in London, and that the elevator is in operation eighteen hours a day—i. e. from six in the morning until twelve at night—the total daily expenditure of water will be 5940 cubic feet—say 6000—to raise which 35 feet gives a total work of 13,125,000 foot-pounds. This work a one-horse power engine would do in a little more than six hours and a half.

It would not be desirable, however, to raise the whole quantity at once, nor even desirable to have so large a quantity at a time in the tanks, since the weight of 6000 cubic feet of water would be somewhere near 190 tons. A tank capable of containing 200 cubic feet would suffice for six ascents; and if an engine should be employed constantly in raising the water as it is drawn down, one-third of a single horse-power would exceed the demand. Such an engine could probably be run at a much less cost than is paid in London for the supply of the elevator of the Charing Cross Hotel, which was stated to exceed £1 a day.

F. A. P. BARNARD.

**Hydraulic Engines.** The usual, and generally the most eligible, mode of employing water-power is to apply it to the circumference of a wheel. (See WATER-WHEEL and TURBINE.) Occasionally, however, it may be more advantageous to use it as steam is used, to act on a piston in a cylinder. This mode of application is especially adapted to the case of a small supply of water having a large fall. Hydraulic engines, like steam engines, may be either reciprocating or rotary. Some modifications are necessary in the construction of the parts, to accommodate them to the different physical properties of the denser fluid. The induction and eduction pipes, for instance, must be larger than are required for steam, and should have no abrupt angles. Freer valve-ways also are necessary; the eduction valve should open very promptly at the end of the stroke, and the induction valve should not close until the stroke is quite completed—that is to say, the influx should cease and the efflux should begin exactly at the same moment. Any material error in making the adjustments designed to accomplish this end, or any imperfect working of the machinery which prevents its attainment, will produce concussions (*coups de bélier*, "water-ram blows," as they are called by the French), which will very certainly be injurious, and which may be destructive. In the hydraulic engines which have been most extensively introduced, and most successful in practice, provision is made by relief valves or other expedients to mitigate or obviate the evil resulting from this cause; but in so far as it is possible by the adjustments of the machine itself to permit the column by which it is operated to maintain a uniform velocity, both true economy of power and durability of parts will be best consulted. In the case of steam, attention to the particulars here pointed out is not so rigidly necessary; the difference arising from the fact that steam is eminently compressible, while water is so only to a degree which for ordinary purposes may be regarded as insensible.

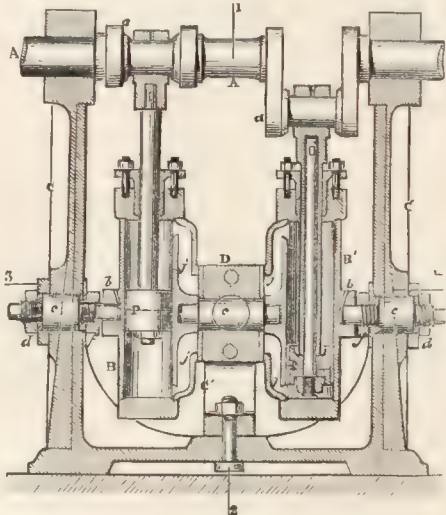
It is only in some special industries that hydraulic engines have as yet been extensively introduced. In large foundries they have been found very convenient in the working of cranes and other heavy machinery. They have also been employed occasionally for the drainage of mines. A remarkably ingenious illustration of their possible usefulness for this latter purpose may be seen at present in operation at Huelgoat, in Brittany. The great water-engine of Huelgoat, the invention of Mr. Janssén, engineer of the mines it is employed to drain, has been often described. A very full description is given by Mr. Delaunay in his *Mécanique*. This engine is simple in action, and it acts directly to lift the piston of the pump by which the water is drawn from the mines. It makes five and a half strokes per minute, the stroke being 24 metres, or more than 8 feet in length. The piston rod is 230 metres (767 feet) long, and it weighs 16,000 kilograms, say 16 tons. The power of the engine is derived from a source at a height 110 metres (360 feet) above its own level. In this case, though the direct application of the power reduces the en-



gine to its simplest form, yet the great inertia of the moving columns of water requires that their movements should be very carefully regulated. In a reciprocating engine there are moments of rest, and successive periods in which the piston moves in opposite directions. When the driving force is communicated to a machine through a crank, it is a favorable circumstance that crank-motion necessarily retards the movement of the piston toward the end of the stroke, and brings it insensibly to zero, while at the beginning of the stroke it in like manner favors gradual acceleration. But in the engine at Huelgoat, without some mechanical contrivance to reduce very gradually the volume of inflowing water toward the end of the stroke, the piston would reach the limit of its course with its maximum velocity, and the sudden arrest of its motion would produce a concussion which no strength of materials could resist. The ingenuity and the simplicity of the contrivances by which this powerful machine is made to regulate automatically its own motions, so as to prevent the occurrence of the slightest perceptible shock, has excited the highest admiration of every engineer who has examined it.

Hydraulic engines upon a smaller scale, and designed for use in the operations of ordinary industry, have been constructed in a variety of forms. Several of these—as, for instance, the hydraulic motors of Perret and Coque of France, and of Carret, Marshall & Co. and Ramsbottom of Great Britain—are described in full in the *Report on the Industrial Arts* at the Paris Exposition, by the writer of

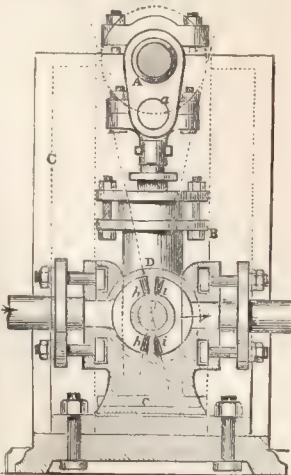
Fig. 1.



Ramsbottom's water-engine.

this article. The latter, a high-pressure engine which has rendered more important services to industry than any other of its class, is represented in elevation and partial section in Figs. 1 and 2. This engine is oscillating, and employs two cylinders operating the same working shaft by means of two cranks at right angles to each other. The cylinders are supported in a stout framework of cast iron. Fig. 1 is a section through the cylinders, which are vertical, and shows the mode of suspension of the cylinders, and the channels of induction and eduction, which are marked *j*, and which are cast with the cylinder. The dotted circles *e* and *e'* show the position of the supply and discharge pipes. Fig. 3 shows a cross-section of the cylinders and their pivots, and in this will be seen the places of attachment of the pipes just mentioned at *K* and *K'*. The pivots are of steel. Those intermediate between the cylinders are firmly fixed in the support. The external pivots admit of adjustment by means of the screws and screw-nuts *d* and *f*. Fig.

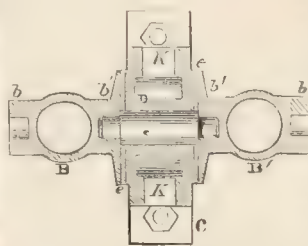
Fig. 2.



Ramsbottom's water-engine.

2, which is a section through the line 1 and 2. Fig. 1 shows the system of water-distribution. The apertures of induction and eduction are represented at *h* and *i*, and have the form of truncated circular sectors, whose centre is the centre of motion. The spaces marked *h* are divided from those marked *i* by a sectoral partition, which is of precisely the same area in cross-section as they. The apertures of admission and discharge on the side of the cylinders are also of the same form and dimensions. The surfaces of contact between the cylinders and the support *D* are perfectly plane and polished, and are made water-tight by means of the adjusting screws *d* and *f* of the pivots. When the piston is at the end of its course in either direction the cylinder will be truly vertical. In this position

Fig. 3.



Cross-section of cylinders and their pivots.

the piston is momentarily at rest, and both induction and eduction valves should be closed. Accordingly, the disposition of the parts is such that, when the cylinder is vertical, the openings by which the channels *j j* communicate with the supply and discharge pipes, present themselves exactly opposite to the solid sector dividing *h* from *i*. In the next moment the flow of water will recommence, the cylinder discharging itself from the full side of the piston, and filling anew on the opposite side.

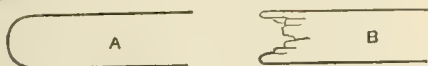
From this statement it is apparent that the influx and efflux of the water proceed with more and more freedom from the beginning to the middle of the stroke, when the passages are at their maximum opening, and that from this point to the end the reverse takes place. But it is to be also observed that, from the nature of crank-motion, the velocity of the piston varies correspondingly, and that the relation of the supply of water to the demand is very nearly constant. Very nice adjustment is evidently necessary in these engines, in order that the moment of the absolute closing of the valves may correspond to that of the completion of the stroke; and as it is possible that this perfect coincidence may not be exactly secured or permanently maintained, some provision against counter-pressure and the effects of hydraulic shocks is necessary. Air-chambers and relief-valves are employed for this purpose. The relief-valves open a backward communication between the cylinder and the driving column, so that if there occurs an obstruction to the discharge, the pressure on the two sides of the piston will be equilibrated by the opening of the valve. The engines of this model heretofore in use are generally small, some of them having cylinders of not more than two inches in diameter. They have been used for a variety of industrial purposes, as for operating printing-presses, circular saws, lathes, etc., as well as for cranes and other machinery in foundries. Their simplicity and neatness render them preferable to almost any other form of small motor wherever the hydraulic head can be easily secured for working them. But in general it is not a natural hydraulic head that is depended on; and indeed no natural head could furnish, in machines of so small model as those employed in foundries, anything like the large power which they exert. The head is established in an accumulator of power, which is a body of water driven into a reservoir under heavy pressure by forcing-pumps worked by steam. For lighter industries such expedients are unnecessary. In cities in which the water-supply is sufficiently abundant to justify the application of a portion of it to industrial uses, the water-engine is recommended by the combined advantages of simplicity, neatness, compactness, constant readiness for work, perfect safety, economy while working, and the absolute cessation of expenditure during interruptions and after the work of the day is ended.

F. A. P. BARNARD.

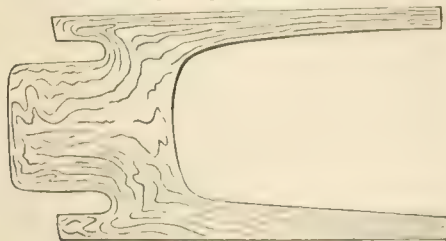
**Hydraulic Forging.** This process of forging consists essentially in substituting the powerful and continuous pressure of the hydraulic press for the repeated blows of a hammer in shaping wrought iron and steel. A swedge, or mould, of the desired object is necessary, and under the proper conditions of temperature the metal may be forced into every angle and recess as perfectly as if made fluid by fusion and cast; but objects so made are very much stronger than castings, and are claimed to be even superior to forgings made in the ordinary way. The process has been carried to great perfection, after years of patient experimenting, by Mr. Haswell at the machine-shops of the Imperial State Railway Co. of Austria, in Vienna. It is used



there chiefly for forming such parts of locomotives as cross-heads, link-bars, axle-box frames, and for car-wheels and various other intricately formed parts of railway rolling stock, where superior strength and lightness are important. It is also used instead of heavy steam-hammers for drawing down large ingots of Bessemer steel. The results appear to justify the conclusion that ingots so treated give stronger and more homogeneous bars than are obtained by hammering. At Vienna two large hydraulic presses are in use—one with a piston 24 inches in diameter, giving 1200 tons pressure, and one with an 18-inch piston, working up to 600 tons pressure. The pressure in the pumps is 600 atmospheres. The action is vertical; the piston descends upon the work, and for forging ingots has a hammer-like head opposed to an anvil of the usual form below. In drawing down an ingot, say of one ton weight, of soft Bessemer steel, the work commences at the end, and after each squeeze by the descending piston the mass is pushed along until the first half of the length of the ingot has been acted on, when it is turned end for end. It is then turned over and back and forth, as is usual under a hammer, until the whole has been drawn down to the required size. In this operation there is no noise or jar. The piston descends slowly, but irresistibly, and forces the hot metal each way as if it were a mass of soft putty. The work is effectively performed, and it requires less time than ordinary forging or rolling. The pressure affects the very centre of the mass of the ingot. Its action is by no means superficial, and it is far more effectual in modifying the structural condition of the bar than blows on the surface can be. There is no distribution of the force of the blow through the anvil to the foundation, as there is in the violent impact of a steam-hammer. The ingot yields gradually to the pressure, and bulges out at the sides and end as in Fig. A, and is not drawn over more at the surface than at the centre, so as to give a ragged hollow end (Fig. B), such as is usually formed under hammers and rollers.



Before the forging of an ingot is completed a distinct structural arrangement of the steel is developed, and is seen most distinctly when the hot steel sinks down under the pressure. As the piston-head descends into the mass, and squeezes it upon the anvil, the lines of structure visible in the sides of the ingot bend downward, and are compressed as shown in the annexed cut, the movement extending to the very centre of the mass. This structure or "fibre" is doubtless the result of a difference in chemical constitution in planes approximately parallel to the squeezing surfaces, and, so regarded, the process may be considered to be more favorable to the development of structure or "grain" than ordinary forging. But, from whatever cause it originates, this grain is an important factor of strength in pressed forgings, and characterizes them in a remarkable manner, as was beautifully exhibited at Vienna in a series of forged objects which had been sawn asunder and etched so as to show the grain. These structural peculiarities are most distinct in the pressed forgings made from piled iron masses, and are beautifully shown in etched sections of irregular angular objects like cross-heads, as in the figure, a section of a cross-head, about  $\frac{1}{2}$  natural size, after 24 hours' etching in aqua regia:



The lines of the grain, it will be seen, conform in a remarkable degree to the form of the mass, winding in and out around the curves and angles in such a manner as to give the greatest strength where it is most needed. These lines show in a very interesting way the flow or movement of the viscid metal when under pressure. Experience has taught that very sharp angles in some parts of moulds interfere with the proper flow of the metal. This difficulty is avoided by rounding off the angles, or by building them out so as to give more space for the metal to move in. The superfluous metal is cut away, leaving the internal curves of the grain in the best shape for the strength of the object.

In forging such objects as the parts of machines weighing from 50 to 150 pounds or more, a mass or ball of metal is cut as nearly as possible of the required weight from the end of an ingot, and is heated nearly white hot preparatory to being thrown into the mould. The moulds are made of iron or steel, in several parts if necessary, and these parts are securely held together by bands of wrought iron. They are left open at the top for the reception of the metal and for the descent of the plunger or follower, which is attached to the piston-head of the hydraulic press. The shape of this follower, called by the workmen the "stamp," determines the shape of the inside of the object to be formed. The mould is placed directly under the piston-head. All the parts being properly adjusted, and the inside of the mould and the surface of the plunger being smeared with thick oil or grease, a mass of hot steel is thrown into the open top of the mould; the plunger is brought slowly down, and pushes the hot metal before it into every part and recess of the mould. The excess of metal, if any, after the mould is filled, rises on each side of the plunger and protrudes. This leaves a wing or "burr" which is afterwards easily cut off with chisels; but a little practice enables the workmen to cut off masses so near the required weight that there is but little excess to be trimmed off. When the stamp has reached the required depth the pressure is removed; the key which attaches the stamp-head to the piston is knocked out; the piston is raised out of the way, and the mould and contents are removed from the bed of the press. A few blows of a sledge-hammer detach the fastenings of the mould and liberate the forging, which is thrown aside to cool. If the work has been well done, all the angles of the object are full and solid. All pieces pressed in the same mould are alike in dimensions, and there is no great excess of metal in any part to be cut away; and consequently it requires less labor and expense to fit up such forgings than it does for those of irregular dimensions made in the ordinary manner.

The rapidity with which intricate forgings are made is one of the greatest advantages of the method. It is especially adapted to heavy work, where there are many angles and interior surfaces to be shaped. Of such objects as cross-heads for locomotives from twenty-five to thirty or more can be made in a day with but little labor. The moulds are made of cast iron, and are used cold. The stamp-heads are also of cast iron, and duplicates are kept on hand to replace those which break. The wheels for locomotives and for railway carriages are forged out in this way in segments, which are afterwards united by welding under the press. The process is also applied to forming boiler-heads, steam-domes, etc., large plates of Bessemer steel being forced through a ring. The total production of pressed forgings at the railway-works, Vienna, during nine months previous to 1873, was 7830 pieces, weighing 1,071,200 pounds.

W. P. BLAKE.

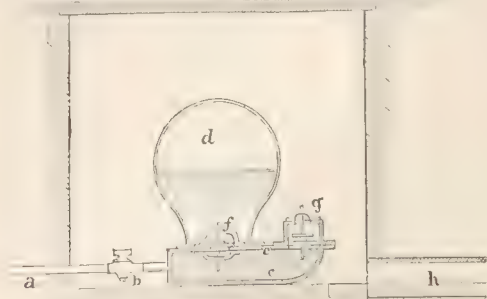
**Hydraulic Press.** See HYDROSTATIC PRESS, by J. P. FRIZELL, C. E.

**Hydraulic Ram,** a well-known machine invented by Montgolfier for elevating a part of the water furnished by a stream to a height greater than that of the source from which it is drawn. Its action depends upon the property of inertia which water, in common with all heavy bodies, possesses. A heavy body, moving with a given velocity, performs, while being brought to rest, an amount of mechanical work sufficient to raise the body to the height due to the velocity. A car, for instance, moving upon a track with a velocity of 48 feet per second, or nearly 33 miles per hour, and reaching a steep incline, would mount it to a height of 35.82 feet (friction and resistance of the air not considered), that being the height which a heavy body must fall to acquire a velocity of 48 feet per second. The mechanical work performed by a moving body in coming to rest is represented by the resistance opposed to its motion, multiplied by the distance which the body moves against this resistance; so that the resistance necessary to stop a moving body, or the pressure which it can exert while stopping, is great or small according as its motion is arrested suddenly or slowly.

In the hydraulic ram the moving body is the mass of water contained in a long pipe, the exit of which is alternately opened and closed. The resistance opposed to the water's motion when its exit is closed, is the elastic force of air confined in a closed vessel, and the work performed by it consists in compressing this air, which, by its tendency to expand, forces the water to a higher level. The accompanying figure is a section of a hydraulic ram, showing also the chamber or pit in which it is placed. *a* is the supply-pipe leading from the pond or other source of supply. The longer this pipe is, the better, provided there is fall enough to give the necessary velocity; *b* is a cock for closing the supply-pipe; *c* is a plate to which the air vessel *d*



is bolted. Below this plate are two compartments—one, *c*, forming a channel through which the water passes freely when the valve *g* is open, and communicating with the air-



Hydraulic ram.

vessel by the valve *f*, which allows the water to enter the air-vessel, but not to return. The other compartment communicates freely with the air-vessel, and with a rising pipe, not shown in the figure, for conveying the water to the higher level. The valve *g* being in the position shown, the water commences to move through the supply-pipe, escaping at *g* and passing off through the waste-pipe *h*. The velocity soon becomes so great as to lift the valve *g*, which closes the outlet. While coming to rest the water in the pipe exerts a pressure sufficient to lift the valve *f*, and compress air in the air-vessel by flowing into it. As soon as the water comes to rest, the pressure ceases, the valve *f* closes, the valve *g* opens, and the same thing occurs again. The expansion of the air in the air-vessel causes a uniform flow through the rising pipe. J. P. FRIZELL.

**Hydraulics of Rivers.** See RIVERS, HYDRAULICS OF, by GEN. H. L. ABBOT, U. S. Army.

**Hydrides** [Gr. *ὑδρ*, "water"], compounds of hydrogen with metals, alcohol-radicals, organic acid radicals.

**Metallic Hydrides.**—Hydride of copper,  $\text{Cu}_2\text{H}$  or  $\text{CuH}$ , is produced by the action of hypophosphorous acid on cupric sulphate. With  $\text{HCl}$  it yields  $\text{CuCl} + \text{H}$ . Hydride of iron is formed by the action of zinc-ethyl on ferrous iodide. It is a black metallic powder which evolves  $\text{H}$  in water. Arsenuretted hydrogen ( $\text{H}_3\text{As}$ ) and antimonuretted hydrogen ( $\text{H}_3\text{Sb}$ ) are formed when solutions of these metals are brought in contact with metallic zinc and dilute sulphuric or hydrochloric acid or potassic hydrate. They are gases. (See ANTIMONY and ARSENIOUS OXIDE.)

**Hydrides of the Alcohol Radicals.**—The paraffins, as marsh-gas,  $\text{CH}_4$ , etc., are often viewed as hydrides,  $\text{CH}_3\text{H}$ , etc. (See HYDROCARBONS and PARAFFINS.)

**Hydrides of Acid Radicals.**—The aldehydes referred to the type  $\text{HH}$  constitute this class of compounds. Acetic aldehyde  $\text{C}_2\text{H}_4\text{O} = \text{C}_2\text{H}_3\text{O.H}$ ; benzoic aldehyde, bitter-almond oil, is the hydride of benzoyl,  $\text{C}_7\text{H}_5\text{O.H}$ . (See ALDEHYDES and ALMONDS, OIL OF.) C. F. CHANDLER.

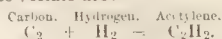
**Hydriodic Acid.** See IODINE, by E. WALLER, E. M.

**Hydrobromic Acid.** See BROMINE, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.

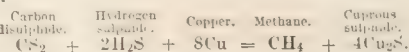
**Hydrocarbons** (Gr. *ὑδρ*, "water," and Lat. *carbo*, "coal"), compounds consisting of carbon and hydrogen only. Many such compounds are found ready formed in nature; most of the essential oils, as turpentine, lemon, orange, bergamot, neroli, etc., are hydrocarbons. (See ESSENTIAL OILS.) Caoutchouc (see INDIA-RUBBER) and GUTTA-PERCHA (which see) are hydrocarbons. Methane (marsh-gas) is found in the mud of stagnant pools and in coal-beds, and under the name of *fire-damp* produces the disastrous explosions in mines. Petroleum and ozocerite are mixtures of several homologous hydrocarbons. (See PETROLEUM.) The most fruitful source of hydrocarbons is the destructive distillation of vegetable and animal substances. This always results in the formation of four distinct products: (1) the charcoal or coke which remains behind in the retort; (2) the fixed gases; (3) the tar; (4) the watery product, which is acid when distilled from non-nitrogenous bodies, such as wood, etc., owing to the presence of acetic acid, and alkaline when derived from nitrogenous bodies, owing to the presence of ammonia. The gas and tar consist largely of hydrocarbons, solid, liquid, and gaseous. (For a detailed statement of the products of the destructive distillation of coal, see article GAS-LIGHTING.)

The hydrocarbons are the simplest of all organic compounds, and are regarded as the starting-points from which all other organic bodies may be derived by substitution or addition. (For the methods by which organic compounds are formed from hydrocarbons, see articles ALCOHOL, ALI-

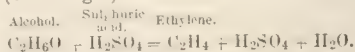
ZARENE, ANILINE, and ANILINE COLORS.) The hydrocarbons may be formed (1) synthetically from carbon and hydrogen, as when hydrogen is passed over carbon heated to redness by the voltaic arc:



From acetylene other more complicated hydrocarbons may be built up. (2) From compounds containing these elements:



Methane (marsh-gas) may also be formed from carbon dioxide ( $\text{CO}_2$ ) by first converting this into carbon monoxide ( $\text{CO}$ ), converting this into formic acid ( $\text{HCHO}_2$ ), and then subjecting a salt of this acid to destructive distillation. Alcohol heated with an excess of sulphuric acid yields ethylene (olefiant gas):



A hydrocarbon may be transformed into another of greater or less complexity; methane ( $\text{CH}_4$ ) may be changed to acetylene ( $\text{C}_2\text{H}_2$ ) by a series of induction sparks, or to naphthalene ( $\text{C}_{10}\text{H}_8$ ) by a very high temperature. Methane and carbon monoxide yield tritylene when passed through a red-hot tube:  $2\text{CH}_4 + \text{CO} = \text{C}_3\text{H}_6 + \text{H}_2\text{O}$ . In the process of *cracking* (see PETROLEUM) the heavy hydrocarbons are split up into lighter oils by exposure to temperatures near their boiling-points. By substitution, the hydrocarbons yield haloid ethers:  $\text{CH}_4 + \text{Cl}_2 = \text{CH}_3\text{Cl} + \text{HCl}$ . These, in turn, may be changed to alcohols by the action of potassic hydrate:  $\text{CH}_3\text{Cl} + \text{KHO} = \text{CH}_3\text{OH} + \text{KCl}$ . Hydrocarbons may be oxidized either by the action of the air, long continued, or by the action of powerful oxidizing agents. (See article on the oxidation of petroleum, by W. P. Jenney, in the *Am. Chemist*, Apr., 1875, and also "Oxidation of Carbides of Hydrogen" (by chromic acid) in the *Chem. News*, xix, 273.)

**Classification and Nomenclature of the Hydrocarbons.**—The simplest of all hydrocarbons is methane or marsh-gas,  $\text{CH}_4$ . This is a saturated molecule, and is consequently incapable of combining directly with chlorine, bromine, etc., or of receiving any addition of hydrogen. It may, however, unite with any number of dyad elements or radicals, as such a radical introduced into a group of atoms neutralizes one unit of equivalence, and introduces another, leaving the combining power or equivalence of the group the same as before. The saturated molecule,  $\text{CH}_4$ , may therefore take up any number of molecules of the dyad group,  $\text{CH}_2$ , giving rise to a homologous series (see HOMOLOGUOUS) of saturated hydrocarbons:  $\text{CH}_4, \text{C}_2\text{H}_6, \text{C}_3\text{H}_8, \text{C}_4\text{H}_{10}, \dots, \text{C}_n\text{H}_{2n+2}$ . These saturated hydrocarbons may be deprived of two atoms or one molecule of hydrogen ( $\text{H}_2$ ), and thus produce a second series of homologous hydrocarbons:  $\text{CH}_2, \text{C}_2\text{H}_4, \text{C}_3\text{H}_6, \text{C}_4\text{H}_8, \dots, \text{C}_n\text{H}_{2n}$ . By a similar removal of  $\text{H}_2$  from these bodies a third series may be produced:  $\text{C}_2\text{H}_2, \text{C}_3\text{H}_4, \text{C}_4\text{H}_6, \dots, \text{C}_n\text{H}_{2n-2}$ . Twelve such successive series are already known, containing even numbers of hydrogen atoms. The first six of these series, with the names proposed for them by Hofmann (*Proc. Roy. Soc.*, xv, 57), are given in the following table:

Methane. Methene.					
$\text{CH}_4$	$\text{CH}_2$				
Ethane. Ethene. Ethyne.					
$\text{C}_2\text{H}_6$	$\text{C}_2\text{H}_4$	$\text{C}_2\text{H}_2$			
Propane. Propene. Propyne.					
$\text{C}_3\text{H}_8$	$\text{C}_3\text{H}_6$	$\text{C}_3\text{H}_4$	$\text{C}_3\text{H}_2$		
Quartane. Quartene. Quartine. Quaternone.					
$\text{C}_4\text{H}_{10}$	$\text{C}_4\text{H}_8$	$\text{C}_4\text{H}_6$	$\text{C}_4\text{H}_4$	$\text{C}_4\text{H}_2$	
Quintane. Quintene. Quintine. Quintone.					
$\text{C}_5\text{H}_{12}$	$\text{C}_5\text{H}_{10}$	$\text{C}_5\text{H}_8$	$\text{C}_5\text{H}_6$	$\text{C}_5\text{H}_4$	$\text{C}_5\text{H}_2$
Sextane. Sextene. Sextine. Sextone. Sextone.					
$\text{C}_6\text{H}_{14}$	$\text{C}_6\text{H}_{12}$	$\text{C}_6\text{H}_{10}$	$\text{C}_6\text{H}_8$	$\text{C}_6\text{H}_6$	$\text{C}_6\text{H}_4$

**First Series ( $\text{C}_n\text{H}_{2n+2}$ ).**—**Paraffins.**—Methane (marsh-gas),  $\text{CH}_4$ , is the simplest; ethane ( $\text{C}_2\text{H}_6$ ) and propane ( $\text{C}_3\text{H}_8$ ) are also gases at ordinary temperatures. Butane ( $\text{C}_4\text{H}_{10}$ ) is a liquid above  $34^\circ\text{F}$ . The following fifteen or twenty members of the series are liquids, and constitute the greater portion of petroleum;  $\text{C}_{27}\text{H}_{56}$ , and the higher members of the group, constitute the beautiful white solid known as PARAFFIN (which see).

**Second Series ( $\text{C}_n\text{H}_{2n}$ ).**—**Olefines.**—The simplest member of this series is ethylene (olefiant gas),  $\text{C}_2\text{H}_4$ , and the series includes gases, liquids, and solids. (See ETHYLENE and OLEFINS.)

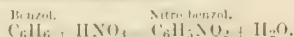
**Third Series ( $\text{C}_n\text{H}_{2n-2}$ ).**—Five members of this series are known: ethine or acetylene ( $\text{C}_2\text{H}_2$ ), propine or allylene ( $\text{C}_3\text{H}_4$ ), quartine or crotonylene ( $\text{C}_4\text{H}_6$ ), quintine or valerylene ( $\text{C}_5\text{H}_8$ ), and sextine or diallyl ( $\text{C}_6\text{H}_{10}$ ). They are readily formed by heating the monobrominated deriva-



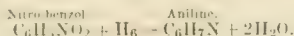
tives of the olefines with sodium ethylate:  $C_3H_7Br + C_2H_5NaO \rightarrow NaBr + C_3H_5OH + C_2H_4$ .

*Fourth Series* ( $C_nH_{2n-4}$ ).—*Quintane or valylene* ( $C_5H_8$ ).—The terpenes (see ISOMERISM) were supposed to belong to this series, but oil of turpentine is now believed to be a hydride of cymol.

*Fifth Series* ( $C_nH_{2n-6}$ ).—*Aromatic Hydrocarbons*.—Benzol ( $C_6H_6$ ) is the simplest member of the series. Other known members are toluol ( $C_7H_8$ ), xylol ( $C_8H_{10}$ ), cumol ( $C_9H_{12}$ ), cymol ( $C_{10}H_{14}$ ), and lauro ( $C_{11}H_{16}$ ). This and most of the following series of compounds are remarkable for the readiness with which the members exchange H for  $NO_2$  and form nitro derivatives:



From these nitro-derivatives the amines are readily formed by the action of nascent hydrogen (see AMINES and ANILINE).



*Sixth Series* ( $C_nH_{2n-8}$ ).—Phenylene ( $C_6H_4$ ), styrol, or cinnaume ( $C_8H_6$ ).

*Seventh Series* ( $C_nH_{2n-10}$ ).—Cholesterene ( $C_{26}H_{42}$ ).

*Eighth Series* ( $C_nH_{2n-12}$ ).—NAPHTHALINE ( $C_{10}H_8$ ), (which see).

*Ninth Series* ( $C_nH_{2n-14}$ ).—Diphenyl ( $C_{12}H_{10}$ ) and dibenzyl ( $C_{14}H_{12}$ ).

*Tenth Series* ( $C_nH_{2n-16}$ ).—Stilbeno ( $C_{14}H_{12}$ ).

*Eleventh Series* ( $C_nH_{2n-18}$ ).—ANTHRACENE ( $C_{14}H_{10}$ ), (which see).

*Twelfth Series* ( $C_nH_{2n-20}$ ).—No members known.

*Thirteenth Series* ( $C_nH_{2n-22}$ ).—PYRENE ( $C_{16}H_{10}$ ), (which see).

*Fourteenth Series* ( $C_nH_{2n-24}$ ).—Chrysene ( $C_{18}H_{12}$ ).

*Hydrocarbons containing Uneven Numbers of Hydrogen Atoms*.—The saturated hydrocarbons of the first series may give up one, two, three, or more atoms of H in exchange for Cl, Br, or I, producing haloid salts, from which the alcohols are readily derived, as already shown in this article. The hydrocarbons existing in these haloid salts and alcohols are compound radicals, as methyl ( $CH_3$ ), ethyl ( $C_2H_5$ ), ethene ( $C_2H_4$ ), propene ( $C_3H_6$ ), ethynyl ( $C_2H_3$ ), propynyl ( $C_3H_3$ ), ethine ( $C_2H_2$ ), propine ( $C_3H_4$ ), ethynyl ( $C_2H$ ), propynyl ( $C_3H$ ), propene ( $C_3H_2$ ), propynyl ( $C_3H$ ), etc. The radicals with even numbers of H atoms are included in the series already mentioned: those with uneven numbers of H atoms may be included in a separate group of series.

*First Series*.—( $C_nH_{2n+1}$ ).—Methyl ( $CH_3$ ), ethyl ( $C_2H_5$ ), etc. These are the radicals of the common alcohols, methyl hydrate, wood naphtha ( $CH_3OH$ ), ethyl or common alcohol ( $C_2H_5OH$ ), etc.

*Second Series* ( $C_nH_{2n+1}$ ).—Methenyl ( $CH$ ), the radical in chloroform ( $CHCl_3$ ) and iodoform ( $CHI_3$ ); propenyl ( $C_3H_5$ ), the radical in propenyl alcohol, glycerine ( $C_3H_5OH$ ), etc.

*Third Series* ( $C_nH_{2n+3}$ ).—Propenyl ( $C_3H_3$ ).

*Fourth Series* ( $C_nH_{2n+5}$ ).—Propenyl ( $C_3H$ ).

C. F. CHANDLER.

**Hydrocele** [Lat. *hydrocele*; Gr. *ὕδωρ*, *húdōr*, from *ὕδωρ*, "water," and *κύημα*, "tumor"], an accumulation of water between the two scrotal coverings of the testicles or of the spermatic cord, known as the tunica vaginalis. It may follow an inflammation of the testes, but generally follows strains. It may affect both sides at the same time, but usually we find the effusion on one side only. It is a curious fact that musicians who play on wind instruments are more subject to this disease than any other class of individuals; it seems to be due to the constant strain produced by blowing. It forms a pear-shaped, painless tumor, which causes uneasiness to the patient only on account of its size; it sometimes grows so large as to reach nearly down to the knees. Unless the sac in which the fluid is enclosed be abnormally thick and distended to its utmost by the contained fluid, fluctuation can be felt. There is no impulse felt upon coughing. By stretching the integuments over the tumor, and placing a candle behind it in a dark room, the light will be transmitted; this would not occur if the swelling were solid. Another test to determine the consistence of it is to plunge a needle into the mass, and see whether it falls over to one side and floats about, or retains the position in which it was placed. The treatment of hydrocele may be divided into the palliative and the radical. The former consists in drawing off the effused fluid by the trocar and cannula; this relieves the patient for a longer or shorter time, but the sac is apt to fill again, when the operation has to be repeated. We find patients submitting to this operation from once to four times annually throughout their lives, rather than submit to a procedure which is perfectly harmless and would ensure their complete recovery. The radical cure is effected by exciting an inflammation in the sac

which shall cause the opposing surfaces to adhere, and thus obliterate the cavity and prevent further effusion. This is sometimes accomplished by irritating the surfaces with the end of the cannula before it is withdrawn, but this method is uncertain. Generally, it is done by injecting some stimulating fluid; for this it was customary to use port wine or zinc lotion, but more recently tincture of iodine seems to be the favorite. A prominent New York surgeon has lately used the lunar caustic for the same purpose; this causes more general disturbance of the system, but it is never necessary to use it a second time. After the operation the patient should keep in bed for a few days and avoid all stimulating articles of diet. If there is much inflammation, cold applications locally and opium internally are the indications.

EDWARD J. BIRMINGHAM.

**Hydrocephalus** [Gr. *ὕδωρ*, *húdōr*, from *ὕδωρ*, "water," and *κεφαλή*, "head"], a dropical effusion of fluids into the interior of the skull, occupying one or more of the ventricles of the brain or the sub-meningeal space, or both. Acute hydrocephalus is ordinarily a symptom of MENINGITIS (which see), particularly of tubercular meningitis; but cases occur in which no tubercle can be discovered after death. The causes of chronic hydrocephalus are various. Gross states that, in his opinion, a sub-acute or chronic arachnitis, usually congenital, is a frequent cause. It is regarded as certain that arrest of development of the brain-substance, pressure upon the vena of Galen by masses of tubercle or cancer, and in fact any condition which obstructs the venous circulation in the brain, may lead to hydrocephalic effusion, just as a contracted liver produces ascites. It is probable also that in arrest of brain-development the increase of the normal sub-arachnoid fluid is a conservative process, serving to keep full the space between the brain and the cranium. The large majority of cases are congenital, and hydrocephalus must be set down as a disease (or symptom) belonging to infantile life; but cases occasionally occur in mature life or in old age. Dean Swift, after three years of illness, died with hydrocephalus, the result, doubtless, of organic brain-disease. The prognosis of chronic hydrocephalus is very grave. The child may live for many years, but (with rare exceptions) becomes idiotic, and in some cases is epileptic. The head becomes distended, the fontanels remain open, *ossa triquetra* form in the courses of the cranial sutures, and in some cases quarts of fluid are effused, consisting of water, with earthy salts and a little albumen; while in acute hydrocephalus there is sometimes much albumen present, with some pus-corpuscles or a little blood. When the disease is detected early, mercurial inunctions, with the administration of the iodides, may possibly afford benefit. Treatment by systematic compression or by tapping the skull (the latter operation to be followed by firm compression) has been tried in many cases, but the most common result has been the speedy death of the patient, although in a few instances it would appear that more or less advantage has been obtained by these means. The term *spurious hydrocephalus* is sometimes applied to infantile typhoid or other enteric disease, the general symptoms of which may simulate those of acute meningitis.

C. W. GREENE.

**Hydrochloric Acid**, called also **Muriatic**, **Chlorohydric**, and **Chlorhydric Acid** [Latin names, *acidum muraticum*, *spiritus of salt*; Fr. *acide muriatique*, *acide chlorohydrique*; Ger. *Salzsäure*, *Chlorwasserstoffsäure*]. The muriatic or hydrochloric acid of commerce and of the laboratory is a solution in water of the gaseous compound, HCl, of hydrogen and chlorine. It occurs in nature only as an irregular product of volcanic eruptions. It is, however, a natural constituent of *gastroic juices*. Artificially, it is always prepared by the action of sulphuric acid upon common salt, the chloride of sodium—an action evolving the gaseous chloride of hydrogen, the latter being passed into water kept cold, which absorbs it with great avidity to the maximum extent of about 460 times its volume, increasing in bulk one third, and in weight about 70 per cent. In commerce, there are three distinct qualities—the common yellow commercial acid, which is sold in cylinders, and which is usually quite impure, owing its yellow color, in part at least, to iron, and usually containing sulphurous and sulphuric acids, with other contaminations; the grade called "jeweller's acid," which, when prepared with the use of distilled water, is likely to be a good article, sufficiently so even for medical use, and the so-called "chemically pure" acid, for analytical uses, which should of course be made from distilled water, and should justify its name.

Hydrochloric acid gas is colorless and transparent, and of suffocating odor. In the air it forms white fumes by condensing the aqueous vapor to a liquid fog. It contains by weight 97.26 per cent. of chlorine and 2.74 of hydrogen, and by volume equal measures of these two gases combined without condensation. Under a pressure of 40 atmospheres



it condenses into a liquid. Its density is 1.269, air being 1. The affinity of HCl for water is so great that the latter, when free to enter a vessel filled with the gas, will rush thereto with almost as much violence as into a vacuum, and a piece of ice introduced into the gas will melt as rapidly as in a fire. When saturated with the gas the liquid

acid has a density of 1.20 or 1.21. Such acid requires a cold of 60° below zero F. to freeze it. Heated, it gives off the gas, with appearance of ebullition, until its density runs down to 1.094, when it will distill over unchanged. The following is one of Dr. Ure's tables, giving the composition for varying specific gravities:

Specific gravity.	Aqueous acid of sp. gr. 1.2.	Gaseous acid.	Chlorine.	Specific gravity.	Aqueous acid of sp. gr. 1.2.	Gaseous acid.	Chlorine.
1.2000	100	40.777	39.675	1.1102	55	21.822	22.426
1.1910	95	38.738	37.692	1.1000	50	20.388	19.837
1.1822	90	36.700	35.707	1.0899	45	18.948	17.854
1.1721	85	34.660	33.724	1.0798	40	16.510	15.870
1.1701	84	34.252	33.328	1.0697	35	14.271	13.887
1.1630	80	32.621	31.746	1.0597	30	12.233	11.903
1.1599	79	32.213	31.343	1.0497	25	10.194	9.919
1.1515	75	30.582	29.757	1.0397	20	8.155	7.935
1.1410	70	28.544	27.772	1.0298	15	6.116	5.951
1.1308	65	26.504	25.789	1.0200	10	4.078	3.968
1.1206	60	24.466	23.805	1.0100	5	2.039	1.984

**Tests for Purity.**—Pure acid should leave no trace when a drop is dried on bright platinum foil and the latter ignited. To test for sulphuric and sulphurous acids, evaporate in a clean porcelain dish after adding a crystal of nitrate of baryta, or a little chlorate of potash and chloride of barium. The dry residue should then form a clear solution in distilled water again. Any turbidity is sulphate of baryta. After warming with a fragment of chlorate of potash, saturation with ammonia should give no precipitate (iron). It must not tarnish bright copper when boiled in it (arsenic). It must not dissolve on boiling therewith the minutest speck of gold-leaf (nitric and nitrous acids). For most uses sulphurous acid is likely to be the most detrimental impurity, and, unfortunately, is one of the most common.

In case of poisoning with muriatic acid, the symptoms of which are generally similar to those of other corrosive mineral acids, *magnesia, prepared chalk, or even soap*, may be administered in large quantities as an immediate antidote.

H. WERTZ.

(For the medicinal uses of hydrochloric acid see MINERAL ACIDS, by EDWARD CURTIS, M. D.)

**Hydrochæride** [Gr. ἵδωρ, "water," and χοῖρος, "hog"], a family of symplectidate rodents distinguished by the large size, the great oval anteorbital foramen, and the structure of the four molar teeth (the posterior of which is very much elongated, and transversely simply folded, while the others are provided with transverse Y-shaped folds), and especially by the union of the alveolar portion of the maxillary bone with the squamosal about the level of the condyle; the clavicles are obsolete; the fibula and tibia separate from each other; and the nails are blunt and somewhat hoof-like (whence they have been called subungulate); the hair is but little harsh. This family is established for the reception of the capybara of South America, which is by far the largest of living rodents. As indicated by the name, it frequents the water, and its aspect somewhat (but very slightly) resembles that of a hog. Unlike other rodents, it has not a "squat" body, with limbs much flexed, but it walks with its limbs extended from the body at about the same angle as do the large quadrupeds.

THEODORE GILL.

**Hydrocyanic Acid.** Hydrocyanic acid is a most deadly poison to both animals and plants. In the anhydrous state it is one of the most active destroyers of life known, a single drop put on the tongue killing a large dog in a few seconds, and death being even caused by breathing its fumes. Even the medicinal preparation, a dilute aqueous solution containing 2 per cent. of the anhydrous acid, is a tremendous poison, and must be used cautiously. In excessive dose the symptoms are merely those of the act of death. The sufferer falls as if struck by lightning, all the vital functions being apparently arrested simultaneously. In less dose death ensues by failure of breathing after a brief interval of from a few minutes to half an hour of convulsion or paralysis and collapse. The nature of the poisonous action is not yet thoroughly made out. There is no chemical antidote, and in cases of poisoning by accident or malice death is generally so speedy that all remedies are too late. Ammonia, atropine by subcutaneous injection, artificial respiration, and alternate dashings of hot and cold water on the chest, are the means that offer most hope. Medicinally, the dilute acid is useful to arrest nausea and vomiting, allay cough, and, locally applied, to relieve irritation and itching of the skin.

EDWARD CURTIS.

**Hydrodynamic Engines.** See HYDRAULIC ENGINES, by F. A. P. BARNARD.

**Hydrodynamics** [Gr. ἵδωρ, "water," and δυναμικός, "power," from δύνασθαι, to "be able"], by most writers treats of the laws governing the motion of fluids. Its application, in what follows, is restricted to liquids, of which water

is considered the representative. Water remains at rest only when confined on all sides. In this condition the pressure in any given direction, at any point in the liquid mass, is balanced by an exactly equal pressure in the opposite direction. This equality of pressures may be disturbed, in water confined on all sides, by external forces acting intermittently, as the wind acting upon the surface of large bodies of water. This gives rise to oscillatory movements called waves, but does not move any particle of water permanently away from its position of rest. Continued motion in any one direction takes place only when an opening is made in the boundary of the confining reservoir. The liquid particles adjacent to the opening are no longer sustained by the resistance of the boundary, and, yielding to the pressure on the opposite side, are set in motion and driven through the opening. Their displacement disturbs the equilibrium of adjoining particles, and the movement extends to all parts of the reservoir, being, if we suppose the opening to be small as compared with the total boundary of the reservoir, active in the vicinity of the opening and slower in parts more remote. Water thus moves whenever a way is opened by which its surface may reach a lower level. Its velocity, other things being equal, is great or small according as the descent of its surface during the movement is great or small. This descent of the surface is called the *head*.

**Velocity.**—A heavy body falling freely, acquires velocity at the rate of 32.2 feet per second. This figure represents

FIG. 1.



the effect of gravity acting without obstruction. A body moving under a force greater or less than its own weight acquires a proportionally greater or less velocity. The velocity acquired in falling through any given height is found by multiplying the height by twice this quantity and extracting the square root of the product. The velocity acquired in falling 4 feet, for instance, is the square root of 4 times 64.4, or 16.04 feet per second. In other words, 16.04 feet per second is the velocity due to a height of 4 feet. For all ordinary purposes, it is sufficiently accurate to say that the velocity is 8 times the square root of the height, and the height is 1-64th of the square of the velocity. The velocity imparted to water by a given head is the same as that acquired by a heavy body in falling through a height equal to the head. A few words of explanation are necessary to avoid misapplication of this term "head." When water issues from an orifice in the vertical side of a vessel, the head producing the velocity with which it leaves the orifice is the height of the surface of water in the vessel above the centre of the orifice. If, after leaving the orifice, it falls to a lower level C, the head producing the

FIG. 2.



the effect of gravity acting without obstruction. A body moving under a force greater or less than its own weight acquires a proportionally greater or less velocity. The velocity acquired in falling through any given height is found by multiplying the height by twice this quantity and extracting the square root of the product. The velocity acquired in falling 4 feet, for instance, is the square root of 4 times 64.4, or 16.04 feet per second. In other words, 16.04 feet per second is the velocity due to a height of 4 feet. For all ordinary purposes, it is sufficiently accurate to say that the velocity is 8 times the square root of the height, and the height is 1-64th of the square of the velocity. The velocity imparted to water by a given head is the same as that acquired by a heavy body in falling through a height equal to the head. A few words of explanation are necessary to avoid misapplication of this term "head." When water issues from an orifice in the vertical side of a vessel, the head producing the velocity with which it leaves the orifice is the height of the surface of water in the vessel above the centre of the orifice. If, after leaving the orifice, it falls to a lower level C, the head producing the



velocity at such lower level is the height A C. When water issues from an orifice under water, the head is the height of the surface in the discharging above that in the receiving basin. When water flows from one basin to another through a long pipe, the head producing the velocity in the pipe is not the height of the surface in the discharging above that in the receiving basin. The motion in this case is not free. It is resisted, and a part of the head is expended, not in producing motion, but in overcoming certain resistances. Let Fig. 2 represent the entrance to the pipe. Suppose a small vertical tube to be inserted in the pipe near its origin. The head producing motion is the height at which the water in the reservoir stands above that in the tube. The following table gives the velocities due to heads up to 15 feet:

TABLE 1.

Head in feet	Velocity in feet per second	Head in feet	Velocity in feet per second	Head in feet	Velocity in feet per second	Head in feet	Velocity in feet per second
0.0	0.000	1.8	10.760	3.6	15.217	7.0	21.219
0.1	2.536	1.9	11.055	3.7	15.427	7.5	21.934
0.2	3.587	2.0	11.342	3.8	15.634	8.0	22.685
0.3	4.393	2.1	11.622	3.9	15.839	8.5	23.383
0.4	5.072	2.2	11.896	4.0	16.040	9.0	24.061
0.5	5.671	2.3	12.163	4.1	16.240	9.5	24.720
0.6	6.212	2.4	12.425	4.2	16.437	10.0	25.362
0.7	6.710	2.5	12.681	4.3	16.631	10.5	25.988
0.8	7.173	2.6	12.932	4.4	16.823	11.0	26.600
0.9	7.609	2.7	13.179	4.5	17.013	11.5	27.198
1.0	8.020	2.8	13.420	4.6	17.201	12.0	27.783
1.1	8.412	2.9	13.658	4.7	17.387	12.5	28.356
1.2	8.786	3.0	13.891	4.8	17.571	13.0	28.917
1.3	9.144	3.1	14.121	4.9	17.753	13.5	29.468
1.4	9.490	3.2	14.347	5.0	17.934	14.0	30.009
1.5	9.823	3.3	14.569	5.5	18.809	14.5	30.540
1.6	10.145	3.4	14.789	6.0	19.645	15.0	31.062
1.7	10.457	3.5	15.004	6.5	20.448		

**Hydraulic Head.**—It is shown in the article HYDROSTATICS that the pressure per square inch at any point in a reservoir of water, when at rest, not counting the atmospheric pressure, is equal to the weight of a column of water 1-inch square reaching vertically from the given point to the level of the surface. This is not true of water in motion. The head cannot exert its full static effect of pressure and its dynamic effect of motion at the same time; any exertion of one of these effects is accompanied by a corresponding abatement of the other. Water moving with the full velocity due the hydrostatic head is under no pressure. The diminution of pressure consequent upon the motion of water is represented by the head due the velocity. In Fig. 2, if the velocity in the pipe

FIG. 3.

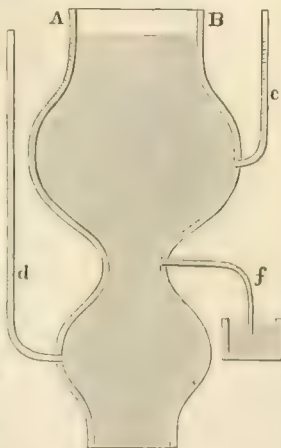


FIG. 4.

is 4 feet per second, the pressure upon the sides of the pipe will be less than that corresponding to the height of the water in the reservoir by the head due the velocity of 4 feet per second—viz. 0.25 foot; i. e. the water in the vertical tube will stand 0.25 foot lower than that in the reservoir. Let water be flowing through a vessel of the form shown at Fig. 3, A B representing the surface supposed to be maintained at an invariable level. The water will move fast in the contracted and slow in the expanded section. In a tube *c* branching upward from the widest part the water will stand nearly as high as in the vessel; in the tube *d*, considerably lower. At the narrowest part the pressure may be negative, or less than that of the atmosphere, so that water will enter the vessel through a tube *f*, branching downward as indicated.

**Efflux, or the Discharge of Water from Orifices.**—An orifice, in its simplest form, is an opening in the wall of a reservoir remote from any other side, the wall being supposed to have no sensible thickness. This supposition merely implies, as in Fig. 4, that the water escapes as a jet, and does not touch the prolongation of the orifice after passing the plane A B.

Such an opening is

called an orifice in a thin plate, and when the term *orifice* is used without qualification, this is usually understood. C D is the axis of the orifice, A B the plane of the orifice.

**Contraction.**—To compute the quantity of water discharged from an orifice of known dimensions under a known head would be a very simple matter if the fluid particles traversed the orifice in parallel directions and without resistance. In that case the discharge would be the product of the velocity due the head multiplied by the area of the orifice. The fluid particles, however, approach the orifice in converging directions, some in diametrically opposite ones. Arrived at the plane of the orifice, they do not instantly change their direction, but still tend toward the axis of the orifice. This produces what is called contraction of the fluid-vein. At a distance from the plane of the orifice equal to one-half its diameter the fluid particles assume parallel directions, and here the contraction is greatest, the diameter of the stream being about eight-tenths that of the orifice. The velocity in this section of the stream is very nearly that due the head, falling short of it, ordinarily, about 3 per cent. The product of the area of the orifice by the velocity due the head is called the theoretical discharge. This term is used for lack of a better, though it implies what is not true. No rational theory indicates this as the true discharge. The discharge from orifices is always considerably less than this. It is found by multiplying the theoretical discharge by a certain fraction called the coefficient of efflux. The coefficient of contraction is the fraction by which the area of the orifice must be multiplied to give the area of the most contracted section of the stream; and the coefficient of velocity is the fraction by which the velocity due the head must be multiplied to give the actual velocity in the most contracted section of the stream. Very numerous and accurate experiments have been made to determine these coefficients, particularly the first. The most extended series of experiments was made in 1828, under the auspices of the French government by two of its military engineers, Poncelet and Lesbros. It results from these experiments that the coefficient of efflux is not constant for orifices in a thin plate, being greater for small orifices and low velocities than for the opposite conditions—that it is much greater for long, narrow orifices than for those with circular or nearly square forms. For circular orifices Weisbach found the results given in Table 2.

TABLE 2.

Diameter of orifice, feet	Coefficient of efflux for a head of—	
	1.968 feet.	0.82 feet.
0.0328	0.628	0.637
0.0656	0.621	0.629
0.0984	0.614	0.622
0.1312	0.607	0.614

It will be seen that the coefficient of efflux diminishes slightly as the diameter of the orifice increases, and increases as the head diminishes.

Table 3 gives values of the coefficient of efflux obtained by Poncelet and Lesbros for rectangular orifices:

TABLE 3.

Head in feet	Coefficient of efflux for an orifice 0.656 feet wide with a height of—						Coefficient of efflux for an orifice 1.91 feet wide, with a height of—	
	0.656 feet.	0.328 feet.	0.164 feet.	0.098 feet.	0.065 feet.	0.032 feet.	0.656 feet.	0.656 feet.
0.033	.....	.....	.....	0.607	0.630	0.660	0.701	0.611
0.066	0.572	0.596	0.615	0.631	0.659	0.694	.....	0.613
0.164	0.585	0.605	0.625	0.640	0.658	0.679	0.597	0.611
0.262	0.589	0.610	0.629	0.638	0.656	0.670	0.601	0.610
0.368	0.592	0.611	0.630	0.637	0.654	0.666	0.602	0.639
0.820	0.599	0.616	0.639	0.632	0.646	0.652	0.606	0.634
1.640	0.603	0.617	0.628	0.630	0.640	0.641	0.607	0.630
2.297	0.604	0.616	0.627	0.629	0.637	0.640	0.607	0.628
3.281	0.605	0.615	0.626	0.628	0.633	0.632	0.606	0.626
6.562	0.601	0.607	0.613	0.612	0.612	0.611	0.602	0.620
9.843	0.601	0.603	0.606	0.608	0.610	0.609	0.601	0.615

The head was measured at a point in the reservoir where the water was sensibly still. It was measured from the level of the upper edge of the orifice.

**Rounded Orifices.**—An orifice may be so rounded internally as to almost entirely obliterate the contraction; in which case the coefficient of contraction becomes very nearly equal to unity. The rounding should be such as to make the orifice conform in shape as nearly as possible to the contracted vein. Weisbach found for a well rounded orifice about 0.4 inch in diameter the following results: For a head of ..... 0.065 ft 1.64 ft 11.5 ft 26 ft 328 ft. Coefficient of efflux. 0.959 0.967 0.975 0.994 0.994







gives the discharge for different depths, from a weir one foot in horizontal length. The depth is reckoned from the level of the crest of the weir, and is taken at a point a little up stream or aside, beyond the curve of the surface consequent upon the discharge. To correct the results for the effect of contraction at the ends of the weir, the length is to be diminished by one-tenth of the depth for each end-contraction. If an end of the weir coincide with a vertical wall of the canal or reservoir, the contraction at that end is annulled. Fig. 11 shows the form of the horizontal crest and vertical sides or ends of the weir for which this table is computed. The computation by Mr. Francis's formula is uncertain for depths less than 0.1 foot. A weir for measuring water should always be short enough to give a greater depth than this.

FIG. 11.



To find, e. g., the discharge from a weir with two end-contractions with a depth of 0.83 foot, the length of the weir being 20 feet; length to be used in calculation,  $20 - 2 \times 0.83 \times 0.1 = 19.834$ ; discharge for one foot in length, 2.518 cubic feet per second; total discharge =  $19.834 \times 2.518 = 49.942$  cubic feet per second. In the above table it is assumed that the opening of the weir is inconsiderable, compared with the cross-section of the channel through which the water approaches it. Where this is not the case, the water passes the weir with a velocity greater than that generated by the head, as measured at the weir, and the discharge is consequently greater than indicated above. The correction for this source of inaccuracy is made by the aid of Table 7, given by Weisbach. In the above example let the section of the weir-stream be four-tenths that of the approaching stream; the discharge, according to Weisbach's table, will be  $49.942 \times 1.044 = 52.139$  cubic feet per second.

TABLE 7.

Section of weir-stream as compared with that of the channel by which the water approaches the weir.	Discharge as compared with that given in Table 6.	
	For a weir with end-contractions.	For a weir without end-contractions.
0.05	1.000	1.042
0.10	1.000	1.045
0.15	1.001	1.049
0.20	1.003	1.056
0.25	1.007	1.061
0.30	1.014	1.074
0.35	1.026	1.086
0.40	1.044	1.100
0.45	1.070	1.116
0.50	1.107	1.133

**Short Tubes.**—If we apply a short tube externally to an orifice, the conditions of the discharge are entirely changed. From the simple orifice the issuing stream is contracted and transparent; from the tube it is uncontracted and troubled. The velocity of the stream is diminished, but its cross-section is increased. A very material increase takes place in the quantity of water discharged. The tube must have a length of  $2\frac{1}{2}$  or 3 times the diameter of the orifice, otherwise the stream, when the head is considerable, is liable to issue without touching the tube, in which case the latter has no influence upon the discharge. Under heads of from 3 to 20 feet the coefficient of efflux through a short tube  $1\frac{1}{2}$  to 3 inches diameter is about 0.815. It increases somewhat if the size of the tube is increased or the head is diminished, being, in some cases, as much as 0.855. It is sufficiently correct for most purposes to say that the discharge from an orifice in a thin plate is increased one-third by the addition of a short tube.

**Resistance to the Motion of Water.**—Though water moves under the action of the slightest force, its movement is always accompanied by a certain resistance, analogous to that which solid bodies experience in sliding or moving one upon another. There is this difference, however, between the friction of solids and that of fluids: the former is the same whether the movement is rapid or slow; the latter increases with the velocity. A car, e. g., runs down a track of uniform grade. It moves because the force of gravity exceeds the resisting force of friction. This excess takes effect in increasing the velocity, and does not diminish as the velocity increases. The longer the car continues in motion, the faster it moves. This, at least, would be the case if it did not encounter a fluid resistance—that, namely, of the air. When, on the contrary, water flows down an inclined channel or through an inclined pipe, or, what is the same thing, through a horizontal pipe under the action of a head, the resistance increases as the velocity increases.

Uniform velocity always establishes itself at such a rate as to make the resistance equal to the moving force. The head or force of gravity is entirely expended in overcoming the resistance to the water's motion.

**Motion of Water in Long Pipes.**—The head expended in overcoming the resistance to motion in long pipes is called "frictional head," and sometimes "lost head" or "loss of head." It is directly proportional to the length of the pipe, and nearly, though not exactly, proportional to the square of the velocity. It is less, *ceteris paribus*, for a large pipe than for a small one, and depends greatly upon the nature of its internal surface, being much greater for rough than for smooth surfaces. Table 8, computed from the results of experiments made by Henry Darcy at the expense of the French government, serves for any calculations ordinarily required as to the motion of water in pipes. The formula is  $R I = b v^2$ , in which  $R$  is the radius of the pipe in feet;  $I$ , the loss of head in feet per linear foot of pipe;  $v$ , the velocity in feet per second;  $b$  is a number varying with the size of the pipe. It is given in the third column. If the loss of head per foot is required, the velocity and size of the pipe being known,  $I = \frac{b v^2}{R}$ .  $I$  is found by multiplying

the quantity in the fourth column by the square of the velocity. If we desire to find the velocity corresponding to a given loss of head per foot, we must multiply the square root of the given loss of head by the quantity in the fifth column.

TABLE 8.

1. Diameter of pipe, feet.	2. Radius, feet.	3. $b$ .	4. $\frac{b}{R}$ .	5. $\frac{R}{b}$ .
0.04	0.02	0.0004780	0.023900	6.1856
0.08	0.04	0.0003163	0.017688	11.24520
0.12	0.06	0.0002623	0.014372	15.128
0.16	0.08	0.0002354	0.012942	18.4365
0.20	0.10	0.0002192	0.012192	21.3589
0.24	0.12	0.0002085	0.011737	23.9939
0.28	0.14	0.0002007	0.011434	26.4074
0.32	0.16	0.0001949	0.011218	28.6534
0.36	0.18	0.0001904	0.011058	30.7488
0.40	0.20	0.0001869	0.010934	32.7210
0.44	0.22	0.0001839	0.010836	34.5557
0.48	0.24	0.0001815	0.010756	36.3606
0.52	0.26	0.0001794	0.010690	38.0693
0.56	0.28	0.0001776	0.010634	39.7151
0.60	0.30	0.0001761	0.010587	41.2744
0.64	0.32	0.0001747	0.010546	42.7760
0.68	0.34	0.0001735	0.010510	44.2308
0.72	0.36	0.0001725	0.010479	45.6392
0.76	0.38	0.0001715	0.010451	47.0082
0.80	0.40	0.0001707	0.010427	48.3934
0.84	0.42	0.0001699	0.010405	49.6904
0.88	0.44	0.0001692	0.010385	50.9647
0.92	0.46	0.0001686	0.010367	52.1996
0.96	0.48	0.0001680	0.010350	53.4122
1.00	0.50	0.0001674	0.010335	54.6058
1.04	0.52	0.0001669	0.010321	55.815
1.08	0.54	0.0001665	0.010308	56.980
1.12	0.56	0.0001661	0.010297	58.026
1.16	0.58	0.0001657	0.010286	59.131
1.20	0.60	0.0001653	0.010275	60.302
1.24	0.62	0.0001649	0.010266	61.314
1.28	0.64	0.0001646	0.010257	62.378
1.32	0.66	0.0001643	0.010249	63.372
1.36	0.68	0.0001640	0.010241	64.416
1.40	0.70	0.0001637	0.010234	65.572
1.44	0.72	0.0001635	0.010227	66.672
1.48	0.74	0.0001632	0.010221	67.267
1.50	0.75	0.0001631	0.010217	67.884
1.60	0.80	0.0001626	0.010203	70.186
1.70	0.85	0.0001621	0.010191	72.357
1.80	0.90	0.0001617	0.010180	74.536
1.90	0.95	0.0001613	0.010170	76.696
2.00	1.00	0.0001610	0.010161	78.811
2.10	1.05	0.0001607	0.010153	80.845
2.20	1.10	0.0001604	0.010146	82.761
2.30	1.15	0.0001601	0.010139	84.589
2.40	1.20	0.0001599	0.010133	86.711
2.50	1.25	0.0001597	0.010128	88.388
2.60	1.30	0.0001595	0.010123	90.167
2.70	1.35	0.0001593	0.010118	92.057
2.80	1.40	0.0001591	0.010114	93.659
2.90	1.45	0.0001590	0.010110	95.406
3.00	1.50	0.0001588	0.010106	97.129

This table applies to new cast-iron pipes. For pipes coated internally with bitumen or pitch the loss of head will be about two-thirds as much, and for uncoated pipes, long in use, twice as much, as indicated by this table.

**Example.**—What is the loss of head in a new cast iron pipe 1 foot in diameter, 2000 feet long, conveying 1 cubic foot of water per second—cross section of pipe, 0.7854 sq. ft.

velocity,  $0.7854 = 1.273$  feet per second.  $I$  = loss of head per foot of pipe  $\frac{b v^2}{R} = 0.000223 \times 1.273 \times 1.273 = 0.000443$ . Total loss =  $2000 \times 0.000443 = 1.629$  feet. What



quantity of water would this pipe deliver with a loss of head of 10 feet?  $I = \frac{10}{3600}$ ,  $\sqrt{I} = 0.05773$ ,  $v = 34.6358 \times 0.05773 = 3.154$ . Quantity,  $0.7854 \times 3.154 = 2.477$  cubic feet per second.

**Jets.**—When water issues vertically upward from an orifice in a vessel under pressure, it would rise to a height corresponding to the pressure, if it encountered no resistance from the air or in passing through the orifice. The last-named resistance, however, prevents the velocity from being quite equal to that due the pressure, and the first prevents the stream from rising to the height due the velocity. When the velocity of issue is from 3 to 20 feet, the height of the jet is substantially that due the velocity. For higher velocities the resistance of the air has a greater influence. A contracted stream rises higher than an uncontracted one of the same size and issuing under the same pressure, the contracted stream having the greater initial velocity. But an uncontracted stream will rise higher than a contracted one of the same initial velocity, as the latter presents swells and bulges which increase the resistance of the air. Other things being equal, a thick stream rises higher than a thin one. An orifice well rounded internally, and provided externally with a conical converging tube, is most favorable for a great height of jet. Table 9 gives, upon the authority of Weisbach, the height of jet for different velocities and different forms of orifice:

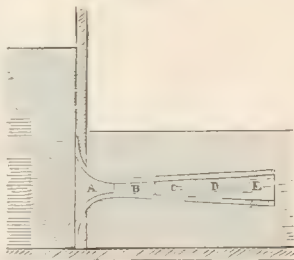
TABLE 9.

No. of orifice.	Height of jet, the head due the velocity being—						
	10 feet.	20 feet.	30 feet.	40 feet.	50 feet.	60 feet.	70 feet.
1	9.61	18.31	25.98	32.58	38.12	42.76	45.99
2	9.71	18.74	26.75	33.77	39.72	44.63	48.25
3	9.48	18.53	26.77	33.97	39.98	44.79	48.47
4	9.69	19.08	28.02	36.39	44.09	51.08	57.31

No. 1 was a circular orifice in a thin plate 0.4 inch diameter; No. 2 was a circular orifice 0.56 inch diameter; No. 3 was a circular converging tube 5.9 inches long, 1.18 inches diameter at the inner end, 0.39 at the outer end; No. 4 was a shorter tube with an external orifice of 0.56 inch diameter.

**Expanding Submerged Tubes.**—When water flows through an expanding tube A C (Fig. 15), discharging under water, after passing the narrowest part of the tube it moves with a continually diminishing velocity. Now, as a certain force must be exerted upon water to accelerate its motion, a certain force is exerted by water when its motion is retarded. This force is here employed in diminishing the pressure opposed to the movement of the water

FIG. 15.



—viz. that due to the submergence of the tube, and the atmosphere. The result is a virtual increase of the head. The velocity in this case may be greatly in excess of that due the difference of level between the discharging and receiving basins. Mr. Francis has made very careful and accurate experiments upon this subject. He employed a tube of the form shown at Fig. 15, diverging at an angle of 5 degrees. It was made in five parts, A, B, C, D, E, each one foot in length. The mouthpiece A was 1.37 feet diameter at the inner end, rounded by a cycloidal curve to a diameter of 0.1 foot at the outer end. The sections B, C, D,

TABLE 10.

Parts of the tube in use.	Head or difference of level between the two basins, feet.	Velocity at the smallest section as compared with that due the head.
A.....	0.0339	0.815
	0.230	0.863
	0.958	0.928
	1.514	0.941
A, B.....	0.020	1.151
	0.100	1.396
	0.854	1.592
	1.470	1.575
A, B, C.....	0.014	1.418
	0.062	1.784
	1.100	2.164
	1.312	2.123
A, B, C, D.....	0.014	1.385
	0.059	1.817
	1.177	2.431
	1.361	2.427
A, B, C, D, E.....	0.014	1.438
	0.057	1.876
	1.282	2.421
	1.408	2.267

E, were respectively 0.145, 0.234, 0.321, 0.408 foot in diameter at the outer ends. Table 10 is a summary of his results. The principles of the flow of water through diverging tubes find a useful application in the diffuser, an appendage applied to the turbine water-wheel by Mr. Boyden. The water is discharged from the wheel through an expanding passage, and the momentum which would otherwise be wasted is employed in increasing the velocity and consequent effectiveness of the water passing the wheel.

**Various Resistances to the Motion of Water.**—Every abrupt change of velocity or direction in the motion of water

FIG. 16.

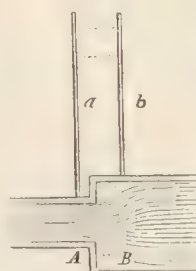
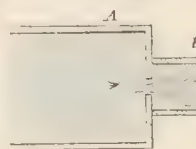


FIG. 17.



is accompanied by a loss of head, manifesting itself in pipes by a diminished pressure, and in channels by a depression of the surface, after passing the point of such change. An abrupt change of velocity results from an enlargement of the pipe (Fig. 16). In this case the head lost is that due the change of velocity. Thus, if the pipe B have a diameter 3 times that of A, the velocity in A being 6 foot per second, the velocity will be  $\frac{2}{3}$  foot per second in B. The change of velocity is  $6 - 0.67 = 5.33$  feet per second. The head due this velocity is 0.442 foot. This is the loss of head. If two small pipes  $\alpha$  and  $\beta$ , reaching indefinitely upward, are inserted one in A and one in B,

the water in  $\beta$  will stand 0.442 foot lower than in  $\alpha$ . This loss of head may be avoided by making the enlargement gradual. At the entrance to a pipe from a reservoir or from a larger pipe a loss of head takes place. If the water enters through an orifice smaller than the pipe B, this loss may be very great. Table 11 is given by Weisbach as the result of his experiments on this point. When, e. g., the area of the orifice is one-half that of the pipe, the head lost is 5.256 times that due the velocity.

TABLE 11.

Area of the orifice, as compared with that of the pipe.	Loss of head, as compared with that due the velocity.
1.00	0.480
0.9	0.734
0.8	1.169
0.7	1.876
0.6	3.077
0.5	5.256
0.4	9.612
0.3	19.78
0.2	50.99
0.1	251.7

TABLE 12.

Angle of deviation, degrees.	Loss of head, as compared with that due the velocity.
20	0.016
40	0.139
60	0.364
80	0.740
90	0.984
100	1.260
110	1.556
120	1.861
130	2.158
140	2.431

**Elbows or Angles in pipes** occasion a loss of head depending upon the amount of deviation from a straight line. Table 12 is given by Weisbach for a pipe a little less than 1½ inches in diameter. The loss of head is considerably greater for smaller pipes. For a pipe 0.4 inch diameter, deviating 90 degrees, it was 1.536 times that due the velocity.

**Bends in pipes** occasion a considerable loss of head, though materially less than occurs with elbows. This loss is found to depend upon the proportion which the semi-diameter of the pipe bears to the radius of the bend. Table 13, given by Weisbach, applies to this case, the bends being full quadrants, or what are called quarter turns:

TABLE 13.

Semi-diameter of pipe, as compared with radius of curve.	Loss of head, as compared with that due the velocity.	
	Rectangular pipe.	Circular pipe.
0.1	0.124	0.131
0.2	0.135	0.138
0.3	0.180	0.158
0.4	0.250	0.206
0.5	0.398	0.294
0.6	0.643	0.440
0.7	1.015	0.661
0.8	1.546	0.977
0.9	2.271	1.408
1.0	3.228	1.978

**Resistance of Valves and Cocks.**—A knowledge of the resistance occasioned by the various contrivances for controlling the flow of water in pipes is of great importance. The several types of these contrivances are indicated by Figs.



18 to 22. For large pipes a sliding gate (Fig. 18) is used. It is raised into a chamber by a screw working through a stuffing-box. When partly closed, it leaves a crescent-shaped opening in circular pipes, and a rectangular one in rectangular pipes. Fig. 19 is a cock consisting of a cylin-

surface would not be affected by the operation, and opening an orifice in the vessel's bottom. If the vessel is of uniform horizontal section, and the orifice is of the same size in each case, and the same form with reference to inward as to outward flow, it would be filled to the level of the external water in the same time that it would require to empty itself when so filled if suddenly raised clear of the water. If the coefficient of efflux were constant, this time would be twice that required to discharge the same quantity of water through the same ori-

FIG. 18.

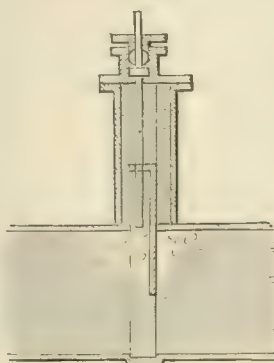


FIG. 21.



FIG. 19.



FIG. 20.



FIG. 22.



dric or conical plug pierced with a rectangular opening. It closes the passage by turning about its centre. Fig. 20 is a throttle-valve, Fig. 21 a puppet-valve, and Fig. 22 a clock-valve. Prof. Weisbach gives the following results for these different forms of valves:

TABLE 14.

Sliding-valves (Fig. 18).				Cocks (Fig. 19).			
Cylindrical pipes		Rectangular pipes		Cylindrical pipes		Rectangular pipes	
Area of opening, as compared with section of pipe	Head lost, as compared with that due to the velocity in the pipe.	Area of opening, as compared with section of pipe.	Head lost, as compared with that due to the velocity in the pipe.	Area of opening, as compared with section of pipe.	Head lost, as compared with that due to the velocity in the pipe.	Area of opening, as compared with section of pipe.	Head lost, as compared with that due to the velocity in the pipe.
1.000	0.000	1.00	0.00	0.926	0.05	0.926	0.05
0.948	0.07	0.9	0.09	0.850	0.29	0.849	0.31
0.856	0.26	0.8	0.39	0.772	0.75	0.769	0.88
0.740	0.81	0.7	0.95	0.692	1.56	0.687	1.84
0.609	2.06	0.6	2.08	0.613	3.10	0.604	3.45
0.466	5.72	0.5	4.02	0.535	5.47	0.520	6.15
0.315	17.00	0.4	8.12	0.458	9.68	0.436	11.2
0.159	97.8	0.3	17.8	0.385	17.3	0.352	20.7
		0.2	44.5	0.315	31.2	0.269	41.0
		0.1	193.0	0.250	52.6	0.188	95.3
				0.190	106.	0.110	275.0
				0.137	206.		
				0.091	486.		

TABLE 15.

Throttle-valves (Fig. 20).			Puppet-valves (Fig. 21).		Clock-valves (Fig. 22).	
Area of opening as compared with section of pipe.	Head lost, as compared with that due to the velocity.		Area of opening, etc.	Head lost, etc.	Angle of opening, degrees.	Head lost, etc.
		Cylindrical pipe.				
0.913	0.24	0.28	0.9	0.69	15.	90.
0.826	0.52	0.45	0.8	1.10	20.	62.
0.741	0.90	0.77	0.7	1.82	25.	42.
0.658	1.54	1.34	0.6	3.03	30.	30.
0.577	2.51	2.16	0.5	5.24	35.	20.
0.500	3.91	3.54	0.4	9.67	40.	14.
0.426	6.22	5.70	0.3	20.0	45.	9.5
0.357	10.8	9.27	0.2	52.0	50.	6.6
0.293	18.7	15.07	0.1	239.0	55.	4.6
0.234	32.6	24.9			60.	3.2
0.181	58.8	42.7			65.	2.3
0.134	118.0	77.4			70.	1.7
0.094	256.0	158.				
0.069	751.0	368.				

**Efflux under Variable Pressure.**—When a vessel (Fig. 23) empties itself through an orifice in its bottom, the head, and consequently the rapidity of the flow, diminishes as the surface falls. The same thing occurs when a vessel is filled through an orifice in its bottom, as, for instance, by sinking it to a certain depth in a body of water so large that its

face under a constant head equal to that acting at the commencement of the flow; or, in other words, to twice the time required to discharge an equal quantity of water at the initial rate. The slight increase of the coefficient of efflux as the head diminishes modifies this and the following statements slightly, but not materially. For a vessel larger or smaller at the top than

at the bottom, the above proportion would not hold good, neither would the time of emptying be equal to that of filling. A vessel larger at the top than the bottom requires less time to empty and more to fill than one of uniform horizontal section, and *vice versa*. Such a vessel will empty with its small end uppermost in the same time that it will fill in a reversed position, and *vice versa*, the orifice and initial head being the same in both cases; the orifice being in the face or extremity which forms the bottom for the time being. A wedge-shaped vessel (Fig. 24) will empty

FIG. 24.

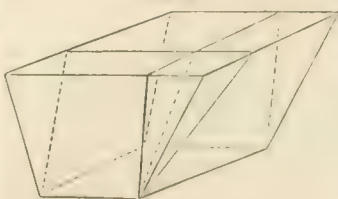


itself with its vertex uppermost in  $2\frac{1}{2}$  times the time required to discharge an equal quantity at the initial rate of flow. In a reversed position it will empty itself in  $1\frac{1}{2}$  times the time required to discharge an equal quantity at the initial rate. A vessel having the form of a pyramid or cone

will empty itself with its vertex upward in  $3\frac{1}{2}$ , with its base upward in  $1\frac{1}{2}$  times the time required to discharge an equal quantity at the initial rate.

The commonest form of vessel for holding water is a conical or pyramidal frustum. The contents of such a vessel are separable into three parts: (1) a prism or cylinder; (2) a wedge; (3) a pyramid. This will readily appear, as regards a pyramidal frustum, from an inspection of Fig. 25. This is separable into—(1) a prism or parallelepiped; (2) two wedges, which may be considered as one; (3) a pyramid. A conical frustum or tub contains approximately—(1) a cylinder whose base is the small end; (2) a wedge whose base has a length equal to the circumference of the small end, and a breadth equal to the excess of the radius of the large end over that of the small end; and (3) a pyramid whose base is half the product of the difference of the circumferences by the difference of the radii. The common height of the prism, pyramid, and wedge is the depth of water in the vessel. When a vessel of this form stands upon its small end, the time required to empty it is twice the time required to discharge the cylinder or prism of water, one and one-third that required to discharge the wedge, and one and one-fifth that required for the pyramid, at the initial rate. When it stands on its larger end, the time is twice that required for the prism or cylinder, two and two-thirds times that for the wedge, and three and one-fifth times that for the pyramid, at the initial rate of flow.

FIG. 25.



J. P. FRIZELL.

**Hydrofluoric Acid.** See HYDROFLUORIC ACID, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.



**Hydrogen** [Fr. *hydrogène*; Ger. *Wasserstoffgas*; earlier chemists, *inflammable air*]. *History*.—The ancients believed water an elementary substance. In the sixteenth century Paracelsus discovered that iron and sulphuric acid engender together an aëriiform body or gas. Not until 1672 was this observed, by both Mayerne and Boyle, to be combustible. It was henceforward known as inflammable air, until Lavoisier, after the discovery of its chemical nature and origin, called it *hydrogen*, or water-generator, from the Greek *h₂da* and *gēnaw*. In 1700, Lemery discovered that it explodes in admixture with air. Henceforth, it was regarded as being or conveying the principle of fire, and under the famous theory of Stahl was believed to be wholly or chiefly composed of the so-called *phlogiston*. In 1766 the great English chemist Cavendish first took up its investigation, and quickly discovered that when burned it produces water. Two other chemists, Macquer and De la Métherie, recorded the same observation at the same date. Not till 1781, however, did Cavendish complete the discovery by burning together *acetylen*—previously discovered, in 1774, by Priestley—and hydrogen, and finding that the sole product was water. James Watt is also believed to have made the same discovery, independently, in this same year (1781).

*Occurrence in Nature*.—Many authorities assert that hydrogen is never found free in nature upon the earth. It certainly exists, however, in volcanic gases. H. Rose and others have asserted that the gas found compressed in the decrepitating salt of Wieliczka contains free hydrogen. Graham found it, in the condition he called "occlusion," in the iron of aërolites. De Candolle made the remarkable statement that certain fungi evolve free hydrogen night and day. The spectroscope detects hydrogen in the chromosphere of our sun and in many other stars; also in certain nebulae. Water contains one-ninth of its weight, or 11.11 per cent., of hydrogen. Steam, and water in other vaporous forms, contain an amount of hydrogen which, when set free in gaseous form, is found to assume, at the same temperature, exactly the volume of the vapor itself; gaseous water being made up of two measures, or volumes, of hydrogen, and one of oxygen; the three measures condensing, in combining, to two measures. Steam therefore contains its own volume of hydrogen. Liquid water, however, contains 1238 times its volume of free gaseous hydrogen. Hydrogen occurs also in nature in combination with nitrogen, as ammonia; with carbon, as marsh-gas, the chief constituent of the gas of gas-wells and of the fire-damp of coal-mines, which, of all known compounds, is the richest in hydrogen, containing one-fourth of its weight, or more than twice as much as water. It also contains twice its own volume of hydrogen. With carbon also, as petroleum and paraffine; and as an essential constituent of most of the solid tissues of organic beings, both animal and vegetable; and therefore of all mineral substances of organic origin, such as coals, asphalts, bitumens, mineral resins and resinoids, etc. In the inorganic gases it occurs as muriatic acid gas; also as sulphuretted hydrogen under many circumstances; and, some believe, also in combination with phosphorus, as native phosphuretted hydrogen.

*Preparation*.—Hydrogen gas may be obtained from water by many methods, of which there are seven principal ones that have been and may be used, according to circumstances: 1. The method of Paracelsus, with iron (or zinc, which is oftener now used) and a dilute acid, generally either sulphuric or muriatic acid. This is the most common method, but yields generally an impure and very malodorous hydrogen, contaminated by combination with the impurities of the metal and acid used. In the case of iron, important quantities of volatile and gaseous hydrocarbon compounds are formed with the carbon of the iron, and it is doubtful whether pure hydrogen can be obtained by any modification of this method, unless possibly by the use of zinc of chemical purity, which must then be mixed with platinum to produce voltaic currents, or else it will decompose the acidulated water but very slowly. 2. Metals whose oxides are soluble in caustic alkaline solutions, such as zinc and aluminum, will decompose water and evolve hydrogen when warmed with such alkaline solutions. With aluminum free from carbon, hydrogen thus prepared should be pure. 3. The alkali metals, such as potassium and sodium, decompose pure water directly by appropriating its oxygen and setting the hydrogen free—a method useful only as a lecture experiment. 4. Metallic iron, when incandescent, will decompose steam, with formation of magnetic oxide of iron and free hydrogen. This method is not to be recommended in practice. The action is very quickly retarded, and becomes sluggish, from the coating of oxide formed over the iron. 5. A far more rapid and practicable method is arrived at by substituting for the iron some form of mineral or artificial carbon. Hydrogen is thus obtained in admixture with carbonic oxide. Unless the temperature

be very high, more or less carbonic acid is also formed. At very high heats, a mixture of about two volumes of hydrogen with one volume of carbonic oxide, and but a small percentage of carbonic acid, may in this way be prepared on a large scale from steam. This is known technically as "water-gas," and is used by some as a diluent for coal and petroleum gases for illuminating purposes, and is proposed to be used by itself, on a large scale, for warming, cooking, motor, and manufacturing purposes. 6. By "dissociation," or the method discovered by Grove in 1846—that is, by the direct decomposition of steam by a high heat, which will furnish a mixture of oxygen and hydrogen. Prof. B. Siliman discovered in 1869 that this mode of preparation may be effected on a considerable scale by forming beneath the surface of pure water the voltaic arc from a battery of considerable power, the mixed gases coming off in torrents. Pure hydrogen may be procured by absorbing the oxygen from such a mixed gaseous product. 7. By electrolysis of water containing in solution some substance which increases its conducting power for the voltaic current. Hydrogen is then evolved from the cathode or negative electrode, and may be collected in a state of purity.

Hydrogen is also a product of the destructive distillation, at incandescent heats, of all organic substances. Thus, common coal-gas contains 40 per cent. or more of this gas as a proximate constituent.

Hydrogen is the lightest known gas, and of course, therefore, the least dense of all known substances. Air being 1, its density is 0.0693, but water being 1, its density is only 0.00008974. One cubic foot weighs 39.1545 grains, an equal volume of air weighing 565 grains; hence its use sometimes for filling balloons. Air is 14.43 times as heavy as hydrogen, and water is 11,143 times as heavy. The metallic mineral platinum, the heaviest known substance (sp. gr. = 23.), is over 256,000 times as heavy as hydrogen, the lightest. Pure hydrogen is colorless, odorless, and tasteless. It is not directly poisonous when inhaled pure, death ensuing from mere absence of oxygen; but it should never be inhaled unless certainly pure, the contaminations that are incident to it being often highly poisonous, and several chemists having lost their lives through reckless experiments of this kind. A person breathing it speaks with a peculiar squeak. The great tenuity of hydrogen gas gives it a great penetrative or rapid diffusive power; many solid metals are even readily penetrated or permeated through their pores, iron being one of these. When there is an adhesive attraction—or, it may be, a feeble chemical affinity—between hydrogen and the metal, the former may become largely condensed in the pores of the latter. This condensation, called by Graham "occlusion," occurs with iron (as in meteoric iron), but much more notably with palladium, which Graham caused to condense and retain 600 or 700 times its volume of hydrogen, forming what he imagined to be of the nature of a metallic alloy; whence he believed hydrogen passed here into a *metallic* form, called by him "hydrogenium." Few chemists, however, have favored this hypothesis of hydrogenium. When soft iron is permeated by condensed hydrogen, its tenacity is greatly injured; and Klein and other chemists have obtained by voltaic precipitation iron otherwise chemically pure, but so largely impregnated with condensed hydrogen that it was as brittle as glass, and would take fire from a flame, and burn as if it were wet with alcohol, from the hydrogen expelled by the heat. Such iron becomes soft and malleable on losing its hydrogen. Iron wire often loses its tenacity when it is immersed in acid "pickle," to remove films of oxide, through the condensation of hydrogen in the substance of the metal; but the tenacity is said to return after a time, by reason of the spontaneous escape of the hydrogen.

Hydrogen, in its tendency to combine directly under normal pressures and temperatures with other elements, is almost as passive and inert as nitrogen; the only element towards which it manifests much activity being chlorine. With this it does not combine spontaneously in the dark, but light causes an immediate combination to form muriatic acid gas; and direct sunshine will even set up rapid and explosive combustion. When mixed with oxygen or air no combination takes place spontaneously, but contact with certain metals causes a condensation and combination, to form water, on the surfaces of such metals, developing heat; which may easily be so managed as to raise the metal to incandescence, and thus cause the gaseous mixture to kindle throughout, with explosion if confined. This phenomenon, discovered by Döbereiner, furnishes the principle of what is known as Döbereiner's "hydrogen lamp," in which a jet of hydrogen, generated in a self-regulating reservoir of that gas, may be emitted into the air, and the gaseous combustible mixture thus formed caused to impinge on a small mass of platinum in spongy form, which latter instantly becomes red hot and kindles



the hydrogen jet. Thus fire may be at any moment obtained. At temperatures higher than normal, hydrogen will combine with some other elements, as with sulphur at the boiling point of the latter, to form sulphuretted hydrogen, and with bromine and iodine, at a red heat, to form the hydrides corresponding. Even with carbon, at the intense temperature of the voltaic arc, it was found by Berthelot that a tendency to direct combination was developed, one product being acetylene gas. There are other cases in which hydrogen appears to enter directly into combination—namely, when in the act of being evolved from water by the agency of a metal, or of electrolysis, or in what has been called the “nascent state.” Under these conditions it will even manifest sufficient activity to decompose other existing combinations present in the liquid, and appropriate their elements. It will thus take up, for example, arsenic and antimony, and carry them along with itself in gaseous combinations. This is the principle on which is founded the well-known “Marsh’s test” for arsenic and antimony, which is of such immense toxicological importance.

HENRY WERTZ.

**Hydrogen, Peroxide of**, called also **Bioxide, Binoxide, Dioxide, and Deutoxide of Hydrogen**; also **Oxygenated Water** [Fr. *eau oxygénée*; Ger. *Wasserstoff Hyperoxyd, Sauerstoffwasser, Oxydierter Wasser*]. It was discovered in 1818 by the French chemist Thenard. He found, when peroxide of barium,  $\text{BaO}_2$ , was added in the cold to dilute muriatic acid,  $\text{HCl}$ , instead of a decomposition, such as might have been anticipated,  $\text{BaO}_2 + 2\text{HCl} = \text{BaCl}_2 + \text{H}_2\text{O} + \text{O}$ —that is, the formation of neutral chloride of barium and water, with a setting free of the second equivalent of oxygen of the peroxide—that no oxygen appeared to be set free at all; and he was finally led to comprehend that the reaction is as follows:  $\text{BaO}_2 + 2\text{HCl} = \text{BaCl}_2 + \text{H}_2\text{O}_2$ , a new compound being formed, containing twice as much oxygen as water. By a long, complex, and laborious process of alternate purifications and concentrations Thenard finally obtained the hydrogen peroxide almost free from excess of water, and almost of the composition stated, containing 475 times its volume of oxygen over and above that of the water itself. Pelouze afterwards devised a simpler method, founded on the use of hydrofluoric or hydrofluosilicic acid (instead of hydrochloric), which acids precipitate the baryta at once in an insoluble form. The final concentration, for separation of intermixed water, is effected *in vacuo* over oil of vitriol, by reason of the fact that the new compound, though volatile without decomposition, is nevertheless less so than water itself. The resulting product is transparent and colorless, with a density = 1.452, nearly half as high again as water; not freezing at  $22^\circ \text{F}$ . below zero; tastes like tartar-emetie; and makes itching sores on the skin. It breaks up spontaneously at ordinary temperatures into water and free oxygen when pure, but the presence of acids makes it more stable, and that of alkalis less so. Cold preserves it. By suddenly heating it to the temperature of boiling water oxygen is evolved with explosive rapidity. More contact with certain substances, as charcoal, some metals, and some oxides, sets up more or less violent decomposition, often with strong evolution of heat. On many substances it acts as a most powerful oxidizer, converting them into their highest oxides. Among these are arsenious and sulphurous acids. Sulphide of lead becomes sulphate. Arsenic, molybdenum, chromium, and selenium are at once converted into their highest oxides. On the other hand, on another class of substances this peculiar compound actually operates as a powerful reducer, as on argentic and mercurous oxides, manganic and plumbic peroxides, chromic and permanganic acids; oxygen being evolved simultaneously from the oxide operated on and from the peroxide of hydrogen itself. Brodie first (in 1850), and Schönbein afterwards, proposed the view that in the cases in which peroxide of hydrogen and another oxide decompose each other, the two compounds contain oxygen in two different “allotropic” modifications, represented as positive and negative (and oxygen), and that the ordinary molecule of oxygen set free was produced by the combination of these positive and negative molecules. Schönbein showed that the peroxide of hydrogen destroys ozone, and he viewed ozone as being the negative oxygen  $\text{O}_2$ , and the second equivalent of oxygen in peroxide of hydrogen as positive oxygen  $\text{O}$ , which he also called “autozone.” These views may be regarded as still in controversy. Meidinger, and subsequently Schönbein, found hydrogen-peroxide in water that has undergone electrolysis. It has been found also to be formed in many cases of slow oxidation of moistened substances, such as metals. It bleaches indigo and decomposes peroxide of potassium, with liberation of iodine, easily detectable by starch. It also decolorizes a solution of permanganate of potash by reduction. With chromic acid it forms perchromic acid;

and one method of detecting it in a liquid is to add chromic acid and ether, whereupon the latter is colored bright blue by perchromic acid, in its presence.

The discoverer of peroxide of hydrogen, Thenard, proposed its use—after testing it personally—for restoring paintings which had become dim through the conversion of the white lead-carbonate used in the pigments to black sulphide of lead. The latter is at once converted by it into white lead-sulphate. Of late years it is stated that it has been largely sold, in France at least, for *bleaching living human hair*, in accordance with certain dictates of fashion.

HENRY WERTZ.

**Hydrogen, Phosphides of.** See PHOSPHORUS, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.

**Hydrogen, Sulphides of.** See SULPHUR, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.

**Hydrography.** Hydrography, a comparatively modern term, is derived from two Greek words, one of which signifies “water,” and the other to “write” or to “describe.” This science has for its object the measurement and description of all the surface-waters of the earth, together with their coasts and islands, in so far as they are important and useful for purposes of navigation and commerce. Hydrography embraces within its scope, therefore, marine surveying, the construction of marine charts, and the collection and publication, under various suitable forms, of all physical and other information tending in any manner to the perfecting of navigation.

Hydrography naturally divides itself into three grand and distinct branches—viz. Continental Hydrography, having for its object the measurement and investigation of the continental waters; Marine Hydrography, having for its object the ordinary measurement and description of the seas, coasts, and islands; and, lastly, Physical Hydrography, having for its object the determination of the winds, currents, variation, and many other things respecting the sea as a whole, which can only be discovered by the careful and laborious study of a vast number of observations, taken in all quarters of the globe.

The early history of hydrography, like that of many other of the arts and sciences, is involved in much obscurity. We know, however, that from the earliest times mariners have made use of charts; hence it may be said that hydrography is, in reality, as old as navigation. The charts of the ancients were of the rudest description, being mere sketches of the coasts, which were laid down according to roughly estimated distances; hence, in such of them as remain to us it is no unusual thing to find the coasts and islands represented at many times in excess of their actual extent. Owing to various causes, among which may be mentioned superstition, timidity, the lack of proper instruments for making observations and of proper ships for making extended voyages, the acquisition to hydrographic knowledge was, for many centuries, scarcely worth considering. Down to the time of Homer, who flourished 907 B. C., as little was known of the surface of the earth as is now known of the interior. Greece was then regarded as the centre of the earth, which was surrounded, at the distance of 500 miles, by the *Ocean River*; later, the land was extended farther, and a limited form given to the old continent. In the time of Pliny (about A. D. 80) the Mediterranean Sea was referred to as the centre of everything; and even as late as 1500 the pope gave to the king of Spain all countries to the West as an extended plain; the theory of the rotundity of the earth was treated as a heresy, and was not fully established until the completion of the first voyage of circumnavigation in 1522.

When, however, we consider that the mariner’s compass was not introduced into Europe until about the twelfth century, that the chronometer was only invented in 1675, and reflecting instruments, for measuring angles, brought into use at somewhere near the same time, we can readily understand the backward state of hydrography at so late a period; and we are prepared to accept the date commonly given as the one when the first steps were taken towards its erection into a science: this was about 1110, when Henry the Navigator, a Portuguese prince, and son of King John I. of Portugal, founded an observatory at Sagres, in Algarve, near Cape St. Vincent, and by causing persons to be instructed in the science of navigation, by sending out numerous expeditions of discovery, by collecting hydrographic information from persons who had made noted voyages, and by collecting many marine charts worthy of the name, there laid the foundation for the science of hydrography. The charts in the time of Henry, though a great improvement over those of an earlier date, were yet rude and imperfect, the instruments for determining positions and measuring distances with accuracy had not yet come into existence, the log was unknown; and the astrolabe, a graduated ring with sights, was the only



instrument for taking altitudes. Henry, whom we may style the first hydrographer, died in 1463, and next to him, as a noted laborer in the science, came Christopher Columbus, who, after having obtained much hydrographic knowledge by study and an experience of many years at sea, became a maker and seller of marine charts. While engaged in this occupation he conceived his grand design of a voyage of discovery to the W., and in 1492 discovered America, thus extending the field for hydrographic research more, in a single voyage, than had the labors of all the preceding centuries. The way having been thus pointed out, voyages of discovery were prosecuted in every direction, and the increase in hydrographic knowledge was vast and rapid; but the formation of hydrography into an exact science, such as we find it at the present day, had scarcely yet begun. Founded upon mathematics and astronomy, and wrought out by means of many instruments of the utmost precision, the accuracy of hydrographic work is now limited only by the accuracy of the observer.

Pursuing further the events connected with the gradual development of the science of hydrography, we find many of them worthy of mention. Among the collections of the works of the French Academy of Sciences for the year 1692 may be found a memoir by Pothenot, having for its aim to fix the place occupied by an observer in relation to three other neighboring points, the positions of which are known; this is the famous three-point problem, the very foundation of marine surveying, and which, though thus early discovered, does not seem to have been put in practice until many years later. Camus, in his *Course of Mathematics*, in the year 1753, and Dalrymple, in a memoir published in 1771, recommended to navigators, for surveying upon the sea, the use of the circle and the observation of three points. To the French hydrographic engineers is due the credit of having first applied the theorem of Pothenot, and they made by it a great advance in hydrography. Alexander Dalrymple, as just mentioned, published in 1771 a memoir entitled *An Essay on the Most Convenient Modes of Marine Surveying*; this is considered as the first hydrographical work; and in it we find a description of the construction and adjustments of Hadley's quadrant. M. Beautemps-Beaupré, a celebrated French hydrographer, published at Paris in 1808 a work called *An Introduction to the Practice of Marine Surveying and the Construction of Sea-Charts, illustrated by thirty-four plates*; this is considered as the second hydrographical work. Other early writers upon hydrography were the Jesuits Ricciolus, De Charles, and Fournier, the latter of whom published in 1741 the *Manuel du Caboteur*. Cook, in the remarkable voyages which have immortalized his name, was the first to introduce the system of running surveying; his running surveys, however, were very defective, as they were based upon compass-bearings and other unreliable data; later followers of Cook improved upon his method by substituting astronomical for compass-bearings; but it was not until 1837, in the hydrographic surveys under M. Dumont d'Urville, that reliable running surveys were made, and the present mathematical system introduced. In 1823 the work of M. Beautemps-Beaupré was translated into English by Capt. Richard Copeland, R. N., and in his preface this officer writes: "At no period of our history has the attention of naval men been so generally directed to the study of hydrography as the present; yet this branch of nautical science has been hitherto so little cultivated that it is difficult to find officers qualified to undertake the duties of surveyors."

Although numberless discoveries had been effected, and vast additions made to the stock of hydrographic information, prior to the commencement of the present century, yet the great hydrographic works did not begin until that time. Then France reorganized her corps of hydrographic engineers, and began the survey of her coasts; and other maritime powers, in imitation of her, created special corps for hydrographic work, and the true hydrographic survey of the world began. For some time France took the lead in the now established science of hydrography, but her unfortunate political complications soon caused her to fall behind some of her rivals in the work, and the lead was taken, and has ever since been maintained, by England; which nation at the present time does more home and foreign hydrographic work in each year than does any other; and to her are we at this time indebted for by far the greater portion of all our foreign charts.

For about 300 years after the time of the discovery of America by Columbus the expeditions fitted out and sent abroad by maritime powers in the interests of hydrography, navigation, and commerce were more properly voyages of discovery, and they did not result in great and permanent additions to hydrography; the surveys made during these voyages were rough ones, and the charts rude in comparison with those of the present day. Of this nature were all the famous voyages completed up to 1791. At this time was

fitted out the French expedition, under Rear-admiral d'Entrecasteaux, to go in search of La Pérouse. Writing of this expedition, M. Beautemps-Beaupré, who was the principal marine surveyor of it, says: "During the time which has elapsed between the time of the first attempt at bringing the art of navigation to perfection by means of reflecting instruments and chronometers, and the year 1791, many celebrated navigators have materially increased our knowledge of hydrography, and it has already become difficult to exceed the point at which they have arrived; every sea has been explored, and there remain no great discoveries to be made." He then goes on to state that the aim of the present expedition, in order that it might be of benefit to hydrography, navigation, etc., would be to give more accurate surveys and more detailed information of the various foreign places visited by it. Here, then, ended the era of reconnaissance, so to speak, and began the era of thorough hydrographical surveying; the discoverers were now succeeded by the surveyors, who hold the field up to the present time, and have yet a vast work before them, while the field for marine discovery has been almost exhausted.

The vast accumulation of hydrographic information by maritime powers led early to the establishment by them of hydrographic offices, where this information was taken in hand and wrought into marine charts, books of sailing-directions, and other practical shapes, for the benefit of navigation and commerce. These offices soon became, and have ever since continued, matters of prime concern to all governments having a marine, and they form a most important branch of the naval administration. Without her own efficient hydrographical establishment no maritime nation can feel perfectly independent respecting her commerce, nor respecting herself, in the event of foreign complications, for if she be largely dependent upon foreign hydrographical supplies, they are liable to be cut off at any time, thus creating serious delay and embarrassment. The largest, best appointed, and most important hydrographic offices in the world are those of England and France; these together publish charts and sailing-directions for every portion of the known world; they each issue about 3000 different charts, almost all of which are printed from engraved plates, and about 100 hydrographical works on various subjects. Both these offices are under the direction of naval officers of high rank and great ability in the special branch in which they are serving. The original surveys made by the French and English during each year are much greater in extent and more numerous than are those furnished by all the other maritime powers combined. The French have now in hand a complete survey of the coast of Brazil, besides many others in divers quarters of the globe. The English are constantly surveying all over the world, and produce many new and original charts each year, besides sending out many scientific expeditions in various fields. All the home surveys are worked up and converted into marine charts at the various hydrographic offices, as are also all foreign surveys which may come into their possession by exchange, tracing, etc. Here are written the sailing-directions, and hence issue the light-lists, notices to mariners, etc.

The U. S. support, at present, two hydrographical establishments—a regular Hydrographic Office and a Coast Survey Office. The former of these is of comparatively recent origin, having been founded only in 1866, yet already it issues many very important and valuable charts and works, derived, in great measure, from the U. S. exploring and surveying expeditions under Wilkes, Rodgers, Perry, Page, and others, and from numerous surveys by individual vessels in various quarters of the world. This office has now in hand, besides its regular office-work, the survey of Lower California and its gulf, the survey of an extensive belt across the Pacific, the running of a line of soundings across the Pacific, the survey of the Gulf coast of Mexico, and the telegraphic establishment of longitudes in the West Indies. It issues already some 600 charts of various kinds, and the most complete works and charts ever produced on physical hydrography. Besides the charts of its own issue, this office keeps constantly on hand some 20,000 English and many French charts for the use of our navy, and requires annually not less than 5000 foreign charts to supply deficiencies in this stock. Some 12,000 copies of its own charts, and many hundred copies of its works, are sold annually by this office, through its agents, to foreigners and to our mercantile marine.

The Coast Survey office was created many years ago for the purpose of executing the hydrography of the coasts and inland waters of the U. S., and it has made great progress in that work, which is the greatest hydrographical work ever undertaken by any country. This office does no foreign work whatever, being confined strictly to the home field; it issues about 700 charts and several hydrographical works, and keeps constantly employed a considerable sur-



veying force, both on our E. and W. coasts, making the most exact and elaborate surveys of any hydrographical establishment in the world.

To give some idea of the demand for charts and nautical books upon one of the older offices by navies and mercantile marines, it may be stated that during the year 1869 the English office alone sold 68,280 charts and 6918 books of sailing-directions, etc.; and even this large amount would fall very far short of an annual sale at this date.

By reason of the very perfect mail and telegraphic communication between countries at the present day, hydrographers are enabled to keep themselves thoroughly posted on all which takes place concerning the science in any quarter of the globe. All new surveys are published at once by the office of the country making the survey, and no new light is established, nor any rock, shoal, or danger discovered, that is not immediately announced in a notice from some one of the offices, and copied by all the rest; all the charts and plates affected by these notices are corrected at once; the notices are forwarded to all naval vessels in commission, that they may correct their charts, and the contents of the notices are further published in the leading papers, for the benefit of the merchant marine. There is a perfect system of exchange between all the hydrographic offices, so that all the publications of any one are known to all the rest as soon as they are issued.

Of the arts embraced within the scope of hydrography, the first and chief one is the art of marine surveying—an art which, it is said, may be traced back to the time of the Pharaohs—an art of very ancient origin, therefore, but nevertheless of very recent perfection. Marine surveys, according to circumstances, are conducted in two distinct manners. When the surveyor is fully supplied with all the necessary instruments, skilled assistants, etc., has ample time and perfect command over the territory which he is to survey, then he carries on a combined system of sea and shore observations, which should result in the production of an almost faultless work. On the other hand, when there is a lack of time, when a hostile coast is to be surveyed, or a coast of such a nature as to preclude the possibility of landing, then the surveyor must resort to the method known as running surveying, and make all his observations from afloat: this method, when skilfully and carefully executed, gives very reliable results, which, though deficient in details, are sufficient for the construction of charts for coasting purposes. The aim of the surveyor is to furnish such plans and other data as will suffice for the determination of the following particulars of the locality surveyed: tides, currents, depths, bottom, rocks, shoals, channels, anchorages, variation, latitude, longitude, landmarks, leading-marks, contour, and general topography of coasts. These particulars concerning a locality, being forwarded to the hydrographic office, are there taken in hand, carefully examined, verified, and finally constructed into a marine chart. A marine chart is a representation, by projection in plano, of a portion of water, with the land which it surrounds or by which it is surrounded. These charts give all the points of the compass, variation, meridians, parallels, coasts, capes, bays, islands, shoals, channels, rocks, bottom, etc. in their proper positions and proportions. The Mercator projection, which represents all the meridians, parallels, and courses as straight lines, is the one commonly employed in the construction of marine charts, except in the high latitudes, where, owing to various causes, it becomes absolutely necessary to employ some one of the circular projections.

According to the use for which they are intended, marine charts are divided into three distinct classes—viz. general charts, coast charts, and harbor charts. The first class, or general charts, are usually constructed upon a small scale—that is, a small fraction of an inch to a degree of latitude. They furnish only general outlines, often cover whole oceans, and are used only for reference charts or for open off-shore navigation—say, to within 50 or 75 miles of a coast. The second class, or coast charts, are constructed upon such a scale, depending much upon the nature of the coast to be represented, as will enable a vessel to navigate by them clear up to the very entrances to the harbors thereon. The third class, or harbor charts, are upon a still larger scale, and by them the navigator is enabled to conduct his vessel through the most intricate channels of entrance, and bring her to the proper spot for anchoring in any well-surveyed harbor.

Most charts are printed from engraved copper or steel plates: some few are lithographed; and, by a process of photo-lithography of recent invention, we are now enabled to reproduce hundreds of copies of any foreign chart which we may desire in almost as short a space of time as would be required to print them had we the plates. The charts of the present day, issued from the leading hydrographic offices and covering exact surveys, are so perfect in topog-

raphy, construction, and detail as to seem to leave nothing more to be added to them which would be of any aid or benefit to navigation.

Such, in brief, is the history of the origin, rise, progress, and present state of the science of hydrography—a science which, except in its physical department, has reached at this time to such a state of perfection as to render it one of the most exact of all the sciences. GEORGE W. SUMNER.

**Hydroïda** [Lat. *hydroï*; Gr. *ὑδρα*, a "mythological monster," and *ειδός*, "form"], one of the orders of Acalephs, remarkable for forming compound colonies, usually consisting of numerous individual zooids

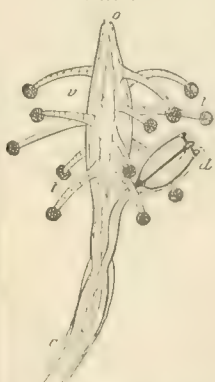
FIG. 1.



*Synecorys mirabilis*, with medusæ buds (Agassiz).

swimming medusæ (Figs. 2 and 3). The nutritive zooids usually consist of a more or less swollen, oval, or fusiform body, changeable in form, containing a large digestive cavity, with a simple terminal orifice or mouth, and bearing externally a number of more or less slender tentacles, either scattered or in one or more circles. The tentacles are covered with peculiar minute stinging organs, known as thread-cells or "lasso-cells," for seizing and killing the minute animals upon which they prey. The body of these zooids is usually supported upon a hollow stem (Fig. 2, *a*), which is usually covered with a chitinous, flexible sheath. It may be long or short, and is sometimes wanting; and then the body arises immediately from the creeping root-like tubes serving for the attachment of the colony to some solid support. The central tube of the stem communicates freely with the digestive cavity of the zooids,

FIG. 2.



One of the zooids of *S. mirabilis*, much enlarged: *a*, mouth; *b*, body; *c*, tentacles; *d*, a medusæ bud not fully developed (Agassiz).

and with those of the branches and basal tubes, so that all the zooids of a colony are intimately connected. The nutritive fluid is circulated freely through the stems and branches by means of vibrating cilia that cover all the interior surfaces. There may be but one nutritive zooid, but in most cases the primitive one, originating from the egg, very soon gives rise to buds, either from its stem or from hollow, stolon-like extensions of its base; and these may develop into other zooids, like the first, thus producing more or less complex branching colonies, often consisting of hundreds, or even thousands, of zooids. Such colonies often grow to the height of one or two feet on our sea-coasts, though the zooids themselves may be very minute. The buds destined to form reproductive zooids, or medusoids, are produced at certain seasons of the year, generally on particular parts of the body, stems, or root-fibres, the position varying according to the species. They start as horn-like, hollow swellings, the cavity communicating with that of the stem or zooid from which the bud arises. In some species (Figs. 2, 4) the medusoid buds arise directly from the nutritive zooids; in others they arise from another kind of asexual zooid (Fig. 6, *b*), usually destitute of mouth and stomach, and apparently destined for this particular office (*blastostyle*). The reproductive zooids often develop into perfect medusæ (Figs. 3, 9), provided with tentacles, locomotive disk, proboscis, stomach, radiating and circular tubes, and sometimes with reproductive organs, even before they break away from the pedicels by which they were attached; but they commonly increase in size and perfection of parts after they become independent medusæ. In many species, however, the medusoid buds never develop a mouth, stomach, nor locomotive disk (Figs. 4, 5), and often neither tentacles nor radiating and circular tubes (Fig. 6, *d*, *e*), though these sometimes appear in a rudimentary state. Such medusoids, known as *sporozooids*, seldom become free, but develop their reproductive organs, either male or female, and produce embryos while still attached to the colony, after which they wither away and disappear. In one genus (*Physalia*) the sporozooids become detached, and swim about by means



of the cilia that cover the whole surface. The free medusæ of hydroids often grow to large size after becoming free, in some species attaining the diameter of ten inches, while others never exceed a quarter of an inch. As a rule, large hydroid medusæ (e. g. *Zygodactyla*, *Lafusa*) come from small and inconspicuous hydroid colonies, while those hydroids which produce large branching colonies, or which have large nutritive zooids, generally give rise to minute fixed medusoids (sporosacs) or to small free medusæ (e. g. *Ophelia*, *Sertularia*, *Endendrium*, *Tubularia*). The free hydroid medusæ may be distinguished from those of the *Discophoræ* by the presence of a diaphragm-like membrane or velum (Fig. 3, *c*) partially closing the opening of the umbrella or bell-shaped disk; by the simple (rarely branched) radiating canals; by the existence of either colored ocelli or of spherical sense-organs (*lithocysts*), containing one or more hard granules, and attached to the margin of the umbrella (Fig. 9); and by the position of the reproductive organs, which are either situated between the outer and inner walls of the digestive cavity (Fig. 3), or else depend, in the form of purse-like lobes, from the lower side of the radiating canals (Fig. 9), and discharge their contents externally through a rupture of the outer wall. All the sexual zooids of one colony are also usually of one sex, though a few exceptions to this occur (e. g. *Hydra*, *Diphyasia*). The free medusæ of some species

as *planulæ*. They consist of an outer layer (*ectoderm*) made up of prismatic cells, and an inner layer (*endoderm*), of larger and more globular cells, which encloses

FIG. 3.



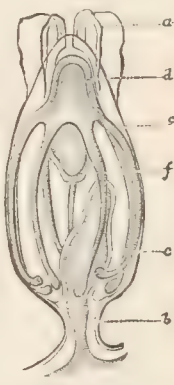
Mature free medusa of *S. mirabilis*: *a*, mouth; *b*, a radiating tube; *c*, circular tube; *e*, velum; *f*, tentacles - Agassiz.

FIG. 4.



*Parypha crocea*, one of the zooids, with clusters of medusoid buds (sporosacs), about natural size (Agassiz).

FIG. 5.



A female sporosac, much enlarged: *a*, tentacles; *b*, pedicel; *c*, spadix; *d*, body of embryo; *e*, tentacles; *f*, rudiment of stem of embryo (Agassiz).

FIG. 6.



*Hydractinia polygelia*, part of female colony enlarged: *a*, nutritive zooid; *b*, blastostyle; *c*, defensive zooid; *d*, *e*, *f*, sporosacs or medusoid buds containing eggs in different stages of development (Agassiz).

of Hydroidea (e. g. *Lizzia*, *Dysmorphosa*, *Hybocodon*, etc.) in their turn produce medusæ-buds, which become detached and develop into medusæ similar to those from which they originated. In *Hybocodon* these buds arise from the base of the large solitary tentacle on the margin of the disk; in the two other genera named above they are produced on the sides of the digestive cavity or "proboscis." These buds may coexist with true ova in the same medusæ. A few instances of reproduction by spontaneous division have been observed, both in the medusæ and in the nutritive zooids.

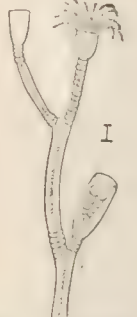
Two types of sexual reproduction have been observed. In most of the species the eggs, after fertilization by spermules, undergo complete segmentation and develop directly into round and somewhat elongated embryos (Fig. 10, *a*), which are covered externally with cilia, by means of which they swim actively about for a time; these young embryos are known

FIG. 7.



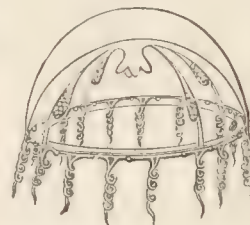
*Sertularia pumila*, on a sea-weed (*Fucus*), natural size.

FIG. 8.



*Ophelia commensuralis*, a gonotheca and two hydroids, enlarged (Agassiz).

FIG. 9.



*Clytia Johnstoni*, the mature medusa, enlarged.

the central cavity. In this stage there is no external opening. The planulæ soon attach themselves to some object like a stone, shell, seaweed, or submerged timber, by one end, which rapidly enlarges (Fig. 10, *b*) into a flattened disk-like form; the cilia disappear at the same time; the upper end then begins to enlarge, and the intermediate portion becomes narrow and elongated to form a stem; very soon the upper end enlarges into a body, and develops a mouth at the end, and the central cavity becomes a stomach; at the same time tentacles grow out around the mouth, and a thin covering of chitinous matter is deposited over the stem and lower portion of the body (Fig. 11); so that the little hydroids begin to resemble the adult nutritive zooids.

The second mode of sexual reproduction is only met with in *Tubulariæ*, *Hydra*, and a few other genera. In *Tubulariæ* the medusoids are small oval sporosacs (Figs. 4, 5), arising in clusters from the body just above the long tentacles. The *spadix* (Fig. 5, *c*) becomes surrounded by a cellular mass of germinal matter, from which, in the female, irregular egg-like masses are separated from time to time. Each mass soon flattens into a concave disk, which rapidly becomes angular, and then the angles elongate so that the form becomes star-shaped; the rays gradually elongate into tentacles (Fig. 5, *e*); the outer convex surface protrudes, and shows an internal cavity (*d*), and in some cases small oral tentacles grow out around the end; from the concave side a projection (*f*) is developed, which will ultimately form the stem. In this state the embryo hydroid (*actinula*) is discharged. It then swims about, and also creeps upon its tentacles, mouth downward; finally it attaches itself by the opposite end (*f*), which expands into a disk at the base, and elongates into a stem; a mouth and stomach are formed, and it then becomes a nutritive zooid.

The existing Hydroidea may be divided into four principal sub-orders. The coral-forming species (*Millepora*) may constitute a fifth, but are little known. The extinct *Graptolites* probably represent a sixth sub-order.

I. The Thecophora (or Calyptoblasten), including the families Sertulariæ (Fig. 7), Campanulariæ (Figs. 8, 9), Plumulariæ, etc., are characterized by having all parts, except the upper portion of the zooids, covered with a chitinous sheath; around the body of each zooid this forms a protective calicle, into which the upper parts can be retracted when disturbed. In Plumulariæ there are also smaller cup-like calicles from which irregular processes of naked sarcode may be extended. The medusoid buds arise from a blastostyle enclosed within a chitinous capsule (*gonotheca*), which also serves to contain and protect

FIG. 10.



Embryos of *Mollicertum campanula*: *a*, planula; *b*, embryos just attached, much enlarged (A. Agassiz).



the buds until developed either into fixed sporosacs or free medusæ. The latter usually have reproductive organs (regarded as sporosacs by Allman) on the radiating tubes.

II. The Athecata (or Gymnoblæstæ), including Corynidae (Figs. 1, 2, 3), Clavidae, Hydractinidae (Fig. 6), Tubulariidae (Figs. 4, 5), etc., usually have the root-fibres and stems covered with a chitinous sheath, but this does not form calicles around the nutritive zooids, nor gonothecæ around the medusoid buds, which are naked, and become either sporosacs or free medusæ. The latter have their reproductive organs on the digestive cavity, and do not have lithocysts on the margin.

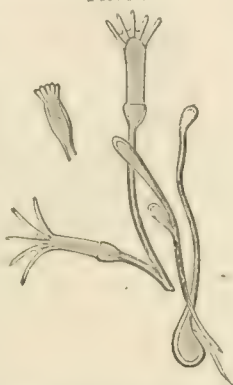
III. The Siphonophora, including Physalia (the "Portuguese man-of-war"), Velella, Porpita, etc., are very complex, free-swimming colonies, composed of many united hydroids. In these one or more of the zooids becomes transformed into a floating apparatus, usually in the form of a vesicle or bladder filled with air; others are nutritive zooids; others locomotive; and still others reproductive. Some species produce free medusæ, others fixed ones or sporosacs.

IV. The Gymnophora, including only the fresh-water Hydræ, have the body naked and furnished with a sucking disk for voluntary adhesion at the posterior end. They can creep about, and also float free in the water. The reproductive zooids are very simple sporosacs, arising from the sides of the body, both sexes often on the same hydra. The male sporosacs are conical bodies just below the tentacles; the female ones are irregular tuberculiform, and situated toward the base. The eggs develop into *actinula*, which become Hydræ. The ordinary buds arise from the sides of the *Hydra* as simple herniæ of the body-walls, but they soon elongate and develop a mouth, stomach, and tentacles like those of the parent; then the hollow pedicel by which they are united to the parent becomes constricted, and the young hydræ detach themselves, and soon become exactly like the first. The species of *Hydra* inhabit fresh water, and are noted for their wonderful powers of repairing injuries, restoring lost parts, and reproducing the entire body even from minute fragments.

A. E. VERRILL.

**Hydrometer** [Gr. *hýdron*, "water," and *μέτρον*, "measure;" Fr. *hydromètre*], **Areometer**, or **Gravimeter**, an instrument consisting of three parts: (1) a graduated stem of uniform diameter and cross-section; (2) a bulb; (3) a counterpoise or ballast. On being placed in a liquid it sinks until a certain point on the scale is on a level with the surface of the liquid, and from the reading of the scale at that point the specific gravity of the liquid is either ascertained directly or by a simple calculation. The principle of the hydrometer is simply that of the law of floating bodies—viz. that when a body floats the weight of the bulk of liquid displaced is equivalent to the weight of the body floated. The bulb is put on in order that the instrument may float, and the counterpoise or ballast ensures its floating in an upright position. The stem is of small diameter, in order that small differences of specific gravities in liquids may show considerable differences on the scale. Hydrometers are usually of glass, though they are sometimes made of metal. Glass has the advantage of cleanliness, resistance to corrosion, incapability of fraudulent alteration except by an experienced worker in glass, and its facility of manufacture. Its fragility, however, is a point against it. Some of the first hydrometers constructed were made so that weights might be added to them, either in a pan at the top of the stem, or attached between the bulb and counterpoise, and therefore below the surface of the liquid. Fahrenheit's hydrometer is a sample of one having the pan at the top of the stem, to which weights may be added in order to sink the hydrometer to a certain mark. The hydrometers of Sikes and Dycas are hydrometers where the weights are added to the portion immersed in the liquid. The addition of weights in this way, by increasing the volume of the immersed portion, as well as the weight of the entire

FIG. 11.



Young hydroids of *M. campanula*, much enlarged (A. Agassiz).

hydrometer, however, introduces considerable complication into the instrument, and renders it difficult of accurate adjustment. The Sikes and Dycas instruments have, however, been used as standards in the British custom-house for a considerable period. The Dycas hydrometer was ordered by the U. S. Congress as the official instrument in 1790, and was still in use in 1844. This instrument possessed the advantage that by the addition of weights a considerable range might be given to the instrument. Nicholson's hydrometer is, like the preceding ones, of metal, and has not only a pan at the top of the stem for the reception of weights, but has also a pan just above the counterpoise for the reception of solids of which it may be desirable to determine the specific gravity. The majority of the hydrometers at present in use are invariable in size and weight, and are usually constructed of glass. Some of these are graduated, so as to read off directly in specific gravities. The hydrometers of Schmidt of Berlin, constructed carefully on mathematical principles, have given his name to some instruments made on this plan; but usually hydrometers made on this plan have not the name of any individual attached to them. Wilson's or Lovi's beads are a peculiar form of hydrometer (if a number of bodies can be spoken of in the singular number). They consist of a number of bead-like bulbs of glass, slightly differing from each other in weight or volume, each engraved with a number. On being thrown into a liquid, some float, while others sink, while the figures on the one which neither floats nor sinks, or barely floats or sinks, show the specific gravity of the liquid under examination. Most hydrometers are, however, constructed with an arbitrary scale, so that their readings contain no decimals. The Twaddell hydrometer is so graduated that the number of degrees indicated, multiplied by 5 and added to 1000, give the specific gravity of a liquid referred to water as 1000. The marine hydrometer for sea-water has a range of 40 degrees, the number of degrees indicating the third place of decimals in expressing specific gravities; thus, 5 degrees indicate a sp. gr. of 1.005; 22 degrees, of 1.022, etc. Hydrometers with an arbitrary scale are extensively used in certain manufactures or for testing the products of such manufactures, and are graduated with this object. Thus, that of Brix (sometimes called a saccharometer) is graduated so as to indicate at once the percentage of sugar in an aqueous solution. This is used by sugar-refiners on the Continent. Southworth's hydrometer, adopted some time since in the State of New York by act of the legislature, has the zero-point at the point to which the instrument sinks in proof spirits (50 vols. of alcohol to 50 of water), and the graduations above and below indicate the percentages above or below proof. The hydrometer of Gay-Lussac (also called alcoholometer) is graduated so that the readings give the percentage of alcohol by volume in an alcoholic solution, in which alone it is intended to be used. The temperature, which is an important factor in considering the indications of a hydrometer, is for Gay-Lussac's instrument, 15° C. or 59° F. A table of corrections for temperature has been published. The alcoholometer of Tralles is essentially the same as that of Gay-Lussac, but is intended for a temperature of 60° F. This is now the official instrument for testing alcoholic liquors in the U. S. Numerous other hydrometers for testing alcoholic liquids have been devised, among which may be mentioned Richter's, which reads in percentages by weight of alcohol; Meissner's, which has two scales, one giving percentages by weight, and the other by volume, etc. DuRoi's galactometer is intended for use in testing samples of milk for watering. The 0 of the scale is at the point to which the instrument sinks in pure water; the 100, the point to which it sinks in pure milk, which ordinarily has a specific gravity of 1.029. The space between is divided into 100 equal parts, and the readings of the instrument show, with a close approximation to the truth, the amount of pure milk which the sample contains. The hydrometer of Balling is arbitrarily graduated, its indications being converted into specific gravities by the formula  $\text{sp. gr.} = \frac{200}{200 - n}$ , in which

$n$  represents the reading of the hydrometer, the  $-$  sign being used when the liquid is lighter than water, the  $+$  sign when it is heavier. This instrument is used by many manufacturers, dyers, etc. in England.

The instrument, however, which is most generally used, both here and abroad, is that of Baume. Properly speaking, there are two instrument bearing the name of Baume, the one for liquids lighter than water, the other for those heavier, and the scales do not correspond. For liquids lighter than water the zero point is the point to which the instrument sinks in a solution containing 10 parts of common salt, by weight, in 20 of water, while the 10 mark is at the point to which the instrument sinks in pure water.



Hydrometer.



The space between is divided into ten parts, and the gradations are continued indefinitely. For liquids heavier than water the zero-point is the point to which the instrument sinks in pure water, and  $15^{\circ}$  is at the point to which it sinks in a solution containing 15 parts by weight of com-

mon salt in 85 of water. The space is divided into 15 parts, and the gradations are continued indefinitely downward. The first-mentioned instrument is called the *pèse esprit*, the latter the *pèse acide*. The formulæ for converting the readings into specific gravities are—

$$\begin{array}{l} \text{For the pèse esprit, sp. gr.} = \frac{116}{136 - x} \\ \text{For the pèse acide, sp. gr.} = \frac{152}{152 - x} \end{array} \quad \begin{array}{l} \text{McCulloh, Report on} \\ \text{Hydrometers, Pub.} \\ \text{Dec. 30, 1848.} \end{array} \quad \begin{array}{l} \text{Sp. gr.} = \frac{144}{134 - x} \\ \text{Sp. gr.} = \frac{144}{144 - x} \end{array} \quad \begin{array}{l} \text{Gilpin, and} \\ \text{U. S. Disp.} \end{array}$$

Numerous tables have been constructed by different scientific men, showing the specific gravities corresponding to the indications of the Baumé hydrometers. They differ somewhat among themselves, owing to the fact that the common salt used to standardize the instruments often contains impurities, which cause a slight difference in the indications. Moreover, the liquids used, in consequence of the attraction of the glass stem of the hydrometer, rise in a curve against it, so that it is difficult to determine the exact point which coincides with the level of the liquid, and errors of manufacture are thus introduced. The specific gravities corresponding to the indications of the Baumé and Beck hydrometers are given as follows (*Watts's Dict.*, vol. iii. pp. 209, 210):

*Comparison of the Degrees of Baumé's Hydrometer with the real Specific Gravities of Liquids heavier than water, calculated by Gilpin's formula.*

Degrees	Specific gravity.	Degrees	Specific gravity.	Degrees	Specific gravity.	Degrees	Specific gravity.
0	1.000	20	1.152	39	1.345	58	1.617
1	1.007	21	1.160	40	1.357	59	1.634
2	1.013	22	1.169	41	1.369	60	1.652
3	1.020	23	1.178	42	1.382	61	1.670
4	1.027	24	1.188	43	1.395	62	1.689
5	1.034	25	1.197	44	1.407	63	1.708
6	1.041	26	1.205	45	1.421	64	1.727
7	1.048	27	1.216	46	1.434	65	1.747
8	1.055	28	1.226	47	1.448	66	1.767
9	1.063	29	1.236	48	1.462	67	1.788
10	1.070	30	1.246	49	1.476	68	1.809
11	1.078	31	1.256	50	1.490	69	1.831
12	1.086	32	1.267	51	1.505	70	1.854
13	1.094	33	1.277	52	1.520	71	1.877
14	1.101	34	1.288	53	1.535	72	1.900
15	1.109	35	1.299	54	1.551	73	1.924
16	1.118	36	1.310	55	1.567	74	1.949
17	1.126	37	1.322	56	1.583	75	1.974
18	1.134	38	1.333	57	1.600	76	2.000
19	1.143						

*Baumé's Hydrometer for Liquids lighter than Water, calculated by Gilpin's formula.*

Degrees.	Specific gravity.	Degrees.	Specific gravity.	Degrees.	Specific gravity.	Degrees.	Specific gravity.
11	1.000	23	.918	35	.849	49	.789
12	0.993	24	.913	36	.844	50	.785
13	.986	25	.907	37	.839	51	.781
14	.980	26	.901	38	.834	52	.777
15	.973	27	.896	39	.829	53	.773
16	.967	28	.890	40	.825	54	.768
17	.960	29	.885	41	.820	55	.764
18	.954	30	.880	42	.816	56	.760
19	.948	31	.874	43	.811	57	.757
20	.942	32	.869	44	.807	58	.753
21	.936	33	.864	45	.802	59	.749
22	.930	34	.859	46	.798	60	.745
23	.924	35	.854	47	.794		

*Table for converting degrees of Beck's Hydrometer into real Specific Gravities.*

Degrees.	Specific gravity.		Degrees.	Specific gravity.		Degrees.	Specific gravity.	
	Greater than 0.00.	Less than 1.000.		Greater than 0.00.	Less than 1.000.		Greater than 0.00.	Less than 1.000.
1	1.006	.994	25	1.172	.827	48	1.393	.780
2	1.012	.988	26	1.181	.867	49	1.405	.776
3	1.018	.983	27	1.189	.863	50	1.417	.773
4	1.024	.977	28	1.197	.859	51	1.429	.769
5	1.030	.971	29	1.206	.854	52	1.441	.766
6	1.037	.965	30	1.214	.850	53	1.453	.762
7	1.043	.960	31	1.223	.846	54	1.466	.759
8	1.049	.955	32	1.232	.842	55	1.478	.756
9	1.056	.950	33	1.241	.837	56	1.491	.752
10	1.063	.944	34	1.250	.833	57	1.504	.749
11	1.069	.939	35	1.259	.829	58	1.518	.746
12	1.076	.934	36	1.268	.825	59	1.532	.742
13	1.083	.929	37	1.278	.821	60	1.546	.739
14	1.090	.924	38	1.288	.817	61	1.560	.736
15	1.097	.919	39	1.298	.813	62	1.574	.733
16	1.104	.914	40	1.308	.810	63	1.589	.730
17	1.111	.909	41	1.318	.806	64	1.604	.727
18	1.118	.904	42	1.328	.802	65	1.619	.723
19	1.126	.899	43	1.339	.798	66	1.635	.720
20	1.133	.895	44	1.349	.794	67	1.651	.717
21	1.141	.890	45	1.360	.791	68	1.667	.714
22	1.149	.885	46	1.371	.787	69	1.683	.711
23	1.157	.881	47	1.382	.783	70	1.700	.708
24	1.164	.876						

The Holland hydrometer is essentially the same as Baumé's, used, as its name implies, in Holland, where it is the official standard. The instrument of Cartier, adopted at one time by the French government, is essentially the same as that of Baumé. The  $22^{\circ}$ -mark of each is the same; for other points, either above or below,  $15^{\circ}$  of the Cartier scale correspond with  $16^{\circ}$  of the Baumé scale. The construction of this instrument was really an infringement upon Baumé, who was thereby deprived of the emoluments which he would otherwise have received had his instruments, instead of Cartier's, been adopted by the government.

Beck's hydrometer is one having the zero-point corresponding to a sp. gr. of 1, and 30 to sp. gr. 0.850, and the scale is extended by equal divisions both above and below 0. Several other hydrometers with arbitrary scales have been constructed, but as a general rule their use is so limited that a further enumeration of the instruments is unimportant.

Temperature naturally has a considerable effect on the indications of the hydrometer. All the above-mentioned instruments are intended to be used at the ordinary temperature, or about  $60^{\circ}$  F.

A hydrometer resembling a flute in fact a graduated brass tube closed and loaded at one end—is described, under the name of *hydroscoium*, in a letter of Synesius to Hypatia, but Archimedes is claimed to be the real inventor. It was not introduced into general use, however, until the close of the seventeenth century.

E. WALLER.

**Hydropathy** [Gr. *ὑδωρ*, "water," and *πάσχειν*, from *πάσχω*, "to suffer"]. The numerous health institutions in the U. S. and other countries under the names of "water-cures," "hydropathic establishments," "hygienic institutes," and "hygeian homes," where invalids of all classes are treated by means of bathing, diet, exercise, and other hygienic agencies to the exclusion of all drug medicines, illustrate the extensive results that can often be traced to insignificant beginnings. The incident of a sprained wrist, and the instinctive application of water from an adjacent pump, originated an entire system of the healing art. Vincent Priessnitz, a German peasant of Silesia, being then thirteen years of age, sprained his wrist, and, finding that water allayed the pain and inflammation, followed the application with that of a wet cloth (*Umschlag*), from which also he received much benefit. Another accident, the crushing of his thumb, enabled him soon after to repeat the experiment of water-treatment with a similar result. But in this case the cure was attended with a rash on the skin, which he attributed to impurity of the blood, and at once conceived the idea that water favored the elimination of morbid matter from the system, and was therefore a purifying as well as a soothing agent. This rash was the origin of the idea of "crisis" which subsequently became an important feature in the hydropathic treatment of chronic diseases, although at the present time crises are regarded as accidental complications, rather than essential conditions, of the eliminating processes. In his nineteenth year Priessnitz met with an accident which fractured several ribs, and so displaced the bones that the surgeons found it difficult to replace them satisfactorily. But the sufferer was equal to the emergency. Leaning over a window-sill and inflating the lungs to the utmost, the ingenious patient succeeded in bringing the broken ends of the bones in juxtaposition. To alleviate the soreness and inflammation, Priessnitz applied his favorite wet bandage. This relieved, and was followed by another rash, which confirmed him in the theory that water was a powerful eliminating agent. In his intercourse with his neighbors Priessnitz naturally suggested the water-treatment to others in their various accidents and ailments, and acquired considerable reputation as a "water-doctor." But he soon learned that many severe and protracted chronic diseases required a more thorough and careful management and a stricter regimen than most persons were able or willing to attend to in connection with business and family cares at home. This observation induced him to open an institution where patients could have proper nursing facilities, and where the necessary discipline could be enjoined; and in 1839 the famous Gräfenberg water-cure began to receive patients—where, reducing his plan to something like order and system, a variety of baths, adapted to different cases and constitutions, was added to the remedial appliances. Among these



were the *Hin-tuck*, or rubbing wet sheet, the wet-sheet pack, the dry-blanket or sweating pack, the hip or *Sitz*-bath, the head-bath, foot-bath, douche, spray, plunge, wave, etc. baths.

Patients were soon attracted to Gräfenberg from nearly all parts of the civilized world, and the writings of Claridge, Scudamore, Johnson, Wilson, and Gully of England, Francke, Weiss, and Munde of Germany, and Henry C. Wright and Drs. Trall and Shew of the U. S., made the public familiar with the leading features of the system. It has been charged that some of the practice at Gräfenberg, in the application of cold water, water-drinking, and exercise, was too severe, especially for the feeble invalids suffering from nervous and dyspeptic affections. It would be very strange if, in the infancy of the system, such errors did not occur. But it is not true that his method was a "cold water-cure," nor that he treated all diseases with "water alone." He attached great importance to the auxiliaries of simplicity of diet, due exercise, a proper amount of sleep, and other hygienic influences. Priessnitz was suspected of using more or less medicine clandestinely, and on that suspicion he was arrested and imprisoned for practising medicine without a license; but as no medicine of any kind could be found by analyzing the water in which his patients were bathed and the sponges through which the patients drank while enveloped in the "pack," he was acquitted and released.

A hydropathic society was organized in London in 1842, and soon after institutions were opened at Malvern and other places in Great Britain. The system was introduced into the U. S. in 1843 by the writings of Drs. Trall and Shew. In the spring of 1844, Dr. Trall opened an institution in New York, and in the fall of the same year Dr. Shew opened another. In the spring of 1845, Dr. Shew opened an institution at Lebanon Springs, N. Y., in connection with David Campbell. In a few years thereafter there were 100 similar institutions in the country.

The entire literature of the system embraces about 100 volumes, the most popular and comprehensive of which are Dr. Trall's *Hydropathic Encyclopedia* and Dr. Shew's *Hydropathic Family Physician*. Of European works, the best known are Francke on the *Water-cure*, Johnson's *Hydropathy*, and Gully on *Chronic Diseases*. The *Water-Cure Journal* was started by Dr. Shew in 1844, and in 1845 transferred to Fowler & Wells, who continued its publication for twenty years. About 1873 S. R. Wells, who succeeded the firm of Fowler & Wells, commenced the publication of a monthly periodical entitled the *Science of Health*, on the plan of the original *Water-Cure Journal*, and intended to be an exponent of the system. But it must be observed that in the U. S. the term *hydropathy*, which literally means "water-disease," is generally regarded as a misnomer; and the majority of practitioners have adopted the term *hygienic*, for the reason that the system contemplates the treatment of diseases by means of all hygienic agencies, of which water is only one. They claim, too, that while in many cases—fevers and inflammations, for example—water may be the leading remedy, in other cases—dyspepsia, scrofula, plethora, etc.—diet, exercise, rest, or some other agency may be of much more relative importance than water. R. T. TRALL.

**Hydroph'idæ** [from *φύω*, "water," and *ὄφις*, "serpent"], a family of proteroglyph serpents (i. e. serpents with front teeth grooved to serve as canals for the contents of the poison-glands) distinguished by the compression of the caudal vertebrae and the extension of their neural spines and hypapophyses to serve as a basis for a compressed tail, which is adapted for swimming by propulsion from side to side. The serpents contained in this group are highly venomous, and are pre-eminently adapted for aquatic life. They are chiefly inhabitants of the East Indian seas, but one species is also found on the Pacific coast of Central America. They are generally beautifully colored, and may at once be recognized by their very compressed tail. Several genera and a number of species have been described.

THEODORE GILL.

**Hy'drophile**, or **Hydrophilidæ** [from *Hydrophilus*, "water-lover," one of the genera], a name given to various water-beetles, coleopterous insects often having ear-like legs for swimming purposes. They constitute a family, *Hydrophilidæ*, whose larvæ are carnivorous, while the perfect insects live on decaying vegetables. Thus they are important water-scavengers. The brown hydrophilæ (*Hydrophilus piceus*) is one of the largest European beetles.

**Hydroph'bia** (SYMS. *Water-head*, *Rabies*, *Rabies canina*, *Rabies contagiosa*, *Lytha*, *Lyssa*, *Cynadipsa*, *Lyssa canina*, *Entasia lyssa*, *Hydrophobia*, *Acrophobia*, *Ecthis mus hydrophobia*, *Canis hydrophobia*, *Pantophobia*, *Paraphobia*, *Phobadipsia*, *Phenacipsum*, *Cynanthrophia*, *Dipsacopis*, *Phrenitis latrans*; Fr. *Rage*, *Hydrophobie*, *Brachy-*

*patie*, *Mal de St. Hubert*; Ger. *Wuth der Hunde*, *Hundswuth*, *Handtallheit*, *Wuthkrankheit*, *Wasserscheu*; Dutch. *Waterrees*, *Hondsdelheid*; Sp. *Rabia*, *Hydrofobia*; It. *Rabbia*, *Ideofobia*; Hung. *Dichobeg*, *Kutyag debosszgek*; Polish. *Wsciekłazna*; Roumanian, *Tarbaria*; Turk. *Kuduz*, *Quadrulzyg*, *Kuleh*; Arab. (pure) *Dû al kalah aw al khauf mia alma*; (Algiers) *Mkloub*; (Barbary) *Isith*; Dan. *Brandskroek*; Swed. *Wattenskræck*; Hind. *Bantani kutta*, [from the Greek *ὕδωρ*, "water," and *φόβος*, "fear"] is a remarkable disease to which both the human species and probably all of the brute creation are subject. In examining its very interesting history we find that the Hebrew writers are altogether silent in regard to it, and we can discover only rare allusions to it among other authors previous to the Christian era. Such references, however, are sufficient to indicate that, although it may not have been so prevalent among the nations of antiquity as among those of more modern periods, yet it was in very ancient times recognized as a peculiar disorder infesting certain animals, and even man himself. The earliest distinct mention of the disease occurs in a Hindoo medical work of great antiquity—dating probably as far back as nine or ten centuries before Christ—written by a renowned physician named Susruta. It is observed therein that when dogs, jackals, foxes, wolves, bears, or tigers become rabid, they foam at the mouth, which remains open and from which flows saliva; their tails hang down; they do not hear or see well; they snap at and bite one another, and thus communicate the same malady. The symptoms of hydrophobia in human beings who have been bitten are likewise detailed briefly, and are said to terminate in convulsions and death. Scarification of the wound and burning it with boiling ghee—a sort of oil made from butter—are recommended, as well as various antidotes to be subsequently administered. This concise and remarkably accurate description of the affection, with suggestions for treatment, may be regarded as an epitome of all ancient and modern research upon the subject. The extract given can be found in Wise's *History of Medicine among the Hindoos*. Homer is supposed to allude to hydrophobia in the expression *κύνα λυσσητήρα* of the *Iliad*, where Hector is compared to a raging dog. There are two passages in Hippocrates which appear to indicate that the physician of Cos had observed its characteristic symptoms in man, but failed to regard it otherwise than as a variety of idiopathic phrenitis. His contemporary, Democritus, however, who was a famous traveller, had probably encountered the disease in foreign regions, as he was evidently well acquainted with its most striking peculiarities. We are informed by the distinguished physician Celsus Aurelianus that Democritus, in a treatise upon opisthotonos, had described the affection in the human subject, admitting its origin from the bite of rabid animals, but considering it simply as a form of tetanus. Theocritus and Plato refer to madness among wolves. Aristotle, in his *History of Animals*, remarks that dogs are afflicted with madness, quinsy, and gout; that the first renders them furious and inclined to bite other animals, which thereupon also become rabid; and that all animals except man are liable to be seized with and destroyed by the malady so engendered. Artemidorus and Gaius, who flourished some two centuries B. C., allude to the disease, the former locating it in the stomach, and the latter in the pneumogastric. Asclepiades, less than 100 years B. C., refers the chief cause of hydrophobia to irritation of the brain membranes.

In the early portion of the Christian era the allusions to this affection become more frequent. M. Artorius, the friend and medical attendant of Augustus, speaks of it in a treatise on the subject as being situated in the stomach. Gratius Faliscus, a poet of the same period, describes rabies in a work entitled the *Cynægeticon*. Virgil, in his *Georgics*, classes rabies among the distempers of cattle and sheep induced by a pestilential condition of the atmosphere. Ovid speaks of a rabid she-wolf and rabid centaurs (*rabidi Bimembres*), and Pliny of the bite of a mad dog. Ovid states, moreover, that hydrophobia and gout are incurable maladies, while Pliny advises a number of specifics for the prevention of the former. Horace employs the expression *rabies canis* in a figurative sense, applying it to the fierce heat of the dog-star, instead of using the ordinary phrase, *astus caniculae*. The disease is mentioned by Columella, a writer on husbandry in the first century, who alludes to an opinion common among shepherds that a dog may be ensured against rabies by biting off the last bone of its tail on the fortieth day after birth. This is still a popular superstition. Suetonius refers to wild animals affected with madness (*fera rabida*). Lucius, a physician in the reign of Tiberius, makes some interesting observations upon the disease, remarking that even the shedding of tears will excite pharyngeal spasms in an affected person. Dioecorides, in the time of Nero, appears to be the first who claims to have actually observed and treated the disease. Both



he and Galen describe it as attacking animals and men, and agree in the opinion of its communicability from the former to the latter by contact of morbid saliva with the second skin. But Galen, and Celsus as well, concern themselves rather with the prevention and treatment of hydrophobia than with its history and progress. Their contemporary, Magnus of Ephesus, locates the affection in the stomach and diaphragm. According to Plutarch, it was not until the time of Pompey the Great that the rabific poison first began to manifest itself among human beings. Andreas of Caryste, a physician of the Alexandrian school, has left a work upon the disease, which he terms *κυνόλυστος*. Cœlius Aurelianus, whom we have mentioned, a distinguished physician of the reign of Trajan or Hadrian, or perhaps as late as the fifth century, is the first to furnish an accurate detailed description of the affection in man, and of the various controversies regarding it. He mentions it as being endemic in Caria and Crete. He called it *passio hydrophobica*, and relates one instance of its occurrence in a seamstress who used her teeth to rip the cloak of a hydrophobic patient. About the same period the affection is treated of with more or less minuteness by Pedanius Dioscorides the Cilician, Claudius Aelianus, Claudius Galenus, Oribasius, and Vegetius Renatus. Aëtius, a Mesopotamian doctor of the sixth century, is the first to furnish anything like an accurate description of rabies in dogs. A century later the physician Paulus Ægineta gives an excellent account of hydrophobia, dividing it into two varieties—viz. that arising from inoculation, always fatal, and that due to nervous irritability, capable of cure. A similar distinction is now sometimes made, particularly by French authors. Among the Arabian physicians, Yahia-ebn-Serapion, Rhazes, Africanus, and Avicenna mention the disease. Yahia-ebn-Serapion, who lived in the ninth century, expresses the opinion that the affection produced by the bite of a mad dog is incurable. Rhazes affirms that a certain hydrophobic man barked by night like a dog and died, and that another when he beheld water was seized with trembling, extreme terror, and rigors. Avicenna, at the commencement of the eleventh century, describes hydrophobia with considerable fulness, noticing several of its phenomena ignored by the Greek and Roman authors. He terms it simply *canis rabidi morbus*. Since the time of Paulus Ægineta we find the disease described by numerous European writers, the study of its symptomatology especially keeping pace with the general progress of medical science. In 1026 an outbreak of rabies among dogs is mentioned in the laws of Howel the Good. From that time it appears to have been well known in England, numerous specific remedies, charms, and incantations against it being recommended in old Anglo-Saxon manuscripts still extant. On the continent of Europe the modern history of rabies is obscure until the thirteenth century. One of the earliest reports of scientific interest refers to wolves afflicted with the disease in Franconia, Germany, in 1271, where more than thirty shepherds and peasants fell victims to their attacks. Since that period we find frequent mention of the affection as prevailing in an epizootic form in almost every country of Europe, but more particularly in the wooded districts of Germany, Switzerland, and France, appearing to attack principally wolves, dogs, and foxes. Vulpine madness, however, was not noticed until the beginning of the present century in Europe, although it had appeared in the neighborhood of Boston, U. S., in 1768. In 1776 rabies made its first appearance in the French West Indies, and in 1785 it became extremely prevalent throughout the U. S., and since that time the disease in both animals and men has occupied a prominent place in our medical literature. It was unknown in South America until 1803, when it broke out in Peru. It has been recognized for centuries in Northern Africa, but its presence in Western and Southern Africa is denied upon the authority of distinguished travellers. In Asia its history, as we have seen, is very ancient. It has never appeared in Australia or New Zealand.

The popular belief that hydrophobia is in all animals characterized by an *abhorrence of water* was long since proved to be erroneous. The mad dog laps it eagerly, and will not hesitate to swim in it when it obstructs his course. In the case of man, however, the attempt to drink, or whatever is suggestive in any manner of that act, induces such dreadful spasms of the muscles of deglutition and respiration, with sense of suffocation, that a horror of fluids, even though associated with intolerable thirst, may be truly regarded as one of the most prominent and characteristic features of the disease. For these reasons a distinct term, *rabies*, has been employed by some writers to designate this affection as it prevails among the brute creation, the word *hydrophobia* being restricted to the disorder as manifested in man. Such a distinction is observed by Fleming, a recent English author, who has written certainly the best

work upon the subject. Others have spoken of *rabies* in a universal sense, while endeavoring to abolish entirely the term *hydrophobia*. Numerous other more or less comprehensive terms have been proposed to distinguish the affection, but *hydrophobia* has continued, and will probably always continue, to be its most popular and general name among English-speaking nations.

Although the manifestations of hydrophobia are clearly modified by character, habit, and temperament in various species and varieties of animals, and even in individuals, it is undoubtedly the same disease in all, whatever its peculiar form or mode of origin and propagation. It is almost universally conceded that the introduction of a specific virus, from a rabid animal, into the system, through either an actual wound, an abraded surface, or a delicate mucous membrane, is an essential preliminary to the development of this affection in man. But its origin among brutes has always been, and still is, a subject of much discussion, and one worthy of our most serious consideration. Hydrophobia certainly infests, and by many is regarded as originating *de novo* among, certain Carnivora—viz. the dog, wolf, jackal, cat, skunk, and raccoon—while herbivorous and other creatures, including man, contract it by inoculation alone. Of the various conditions asserted as favoring its spontaneous development in the canine race, few have even a probable foundation. They are principally repressed sexual desire, extremes of atmospheric temperature, excitement of anger, want of water, and putrid or insufficient food. Ziegler fixes the origin of the disease in lack of the instinctive degree of nourishment from blood and flesh, and hence designates it *Blutdurst* and *Fleischgier*. Still another presumed influence is the presence under the dog's tongue of a worm-like appendage, whose extirpation in puppyhood is considered an infallible preventive of the disease. This idea may doubtless be referred to a very ancient myth. Pliny speaks of it, terming the peculiar appendage *lyssa*. The Germans term it *Tollwurm*, or worm of madness, and among them it has long been a popular superstition. The practice of removing this so-called worm still exists in Thrace, Turkey, Greece, Roumania, Moldo-Wallachia, Spain, and even in the Southern U. S. Its efficacy has been entirely disproved by scientific investigation, and the operation may be best characterized, in the expressive language of Dr. Johnson, as "a substance—nobody knows what, extracted—nobody knows why." The other presumed causes of spontaneous hydrophobia would appear to be equally equivocal. Unsatisfied salacity, putrid food, hunger, thirst, anger, and extremes of temperature are manifestly circumstances which obtain among dogs quite generally throughout the world. But in some regions abounding in dogs hydrophobia has always, so far as can be learned, been either totally unknown or extremely rare, while in others exempt from it for ages it has only recently appeared, and in most instances can be traced positively to importation. Such exemption has been particularly noticed in various islands throughout the world and in isolated localities. It is related that Mr. Meynell, the most eminent English sportsman of the last century, preserved his kennel of hounds from hydrophobia during many years by forcing every new dog to undergo a rigid quarantine of several months preparatory to his admission into the pack. There is little doubt that were the universal adoption of such a system of sequestration practicable, rabies would become extinguished.

*Rabies canina* prevails indifferently in all seasons, as the following figures prove most conclusively. They embody the large number of 2520 distinct and authentic cases observed in France, Italy, Austria, England, and the U. S. The foreign statistics refer almost exclusively to cases investigated by distinguished veterinary surgeons; those of our own country (101) are derived from a report on the subject by Dr. Blatchford to the American Medical Association in 1856. Of the 2520 cases, there occurred 704 in the spring, 621 in the summer, 608 in the autumn, and 587 in the winter. These figures demonstrate the absurdity of repressive laws designed to be in operation only in the dog-days, when the canine race is popularly supposed, as Mr. Mayo observes, to be afflicted with a sort of dog-lunacy, having the same relation to Sirius that human insanity has to the moon.

We must acknowledge our ignorance of any influences concerned in the spontaneous development of this disorder, and accept the theory of its reproduction solely by inoculation from one animal to another. Such certainly is the mode of its transmission in the vast majority of instances; and although it is urged that the disease must have sprung from a beginning, such argument when used with regard to any communicable affection can only remove us from the sphere of susceptible proof back to the confines of the mysterious and impenetrable domain of original causes. It seems quite well established that all creatures liable to con-



tract the disease are also in a greater or less degree competent to transmit it, and we know of no animals exempt from it. It is true that herbivorous and ruminating beasts, owing to the formation of their jaws and teeth, as well as to their seldom attempting to bite when rabid (sheep only excepted), rarely communicate the disease; and hence the belief, entertained for some time by such eminent men as Sir Astley Cooper and the veterinary professors Coleman and Renault, that the power to propagate the affection was confined to such animals as naturally employ their teeth for weapons of offence. The fallacy of this opinion has been proved by numerous unquestionable experiments, and it is now likewise conceded by the best authorities that the saliva of a hydrophobic human being is capable of inoculating the disease.

Among the various creatures subject to hydrophobia, the dog, on account of its intimate association with man, is not only our greatest source of danger, but it affords us the most frequent opportunities for observing the phenomena of this redoubtable affection. A knowledge of the disease, therefore, as manifested in the canine race is of vital importance in enabling us to recognize it promptly, and thus to escape the dreadful consequences of its communication to ourselves. Hydrophobia in the dog has been by some writers divided into two varieties, *dumb* and *furious* rabies, according as the animal is silent and undemonstrative or noisy and fierce. Other authors recognize still a third variety, which they term *tranquil* rabies, where the animal is quiet, indifferent, and unaggressive. These distinctions, however, are by no means clear, and are altogether denied by Virchow, who considers the different forms merely as prolonged conditions or stages which, according to him, are—1st, the stage of *melancholy*; 2d, the *irritable* and *furious*; 3d, the *paralytic* stage. It is often very difficult to detect the existence of rabies in its nascent state. This accounts for most cases of hydrophobia in persons inoculated by dogs supposed not to have been mad which died or were injudiciously destroyed before the full development of the disease. Fortunately, however, the disposition to bite is not apt to be exhibited until the affection is well established. The disease is first manifested by constant restlessness, uneasiness, and irritability of temper, the dog of fondling and sociable disposition becoming snarly, morose, and shy, retiring under pieces of furniture, into dark corners, or the interior of its kennel, but not remaining long in any one spot, and being continually engaged in licking, scratching, or rubbing some portion of its body. Costiveness and vomiting are often present. The appetite becomes depraved, such indigestible substances as bits of thread, hair, wood, glass, straw, and dung being swallowed by the animal, which also shows a propensity to lap its own urine and eat its own excrement. It grows quarrelsome towards its canine companions, and chases and worries the cat. The countenance undergoes a marked change; that of the docile and affectionate dog assumes an earnest, inquiring, appealing expression; that of the savage brute becomes the very picture of ferocity. In the early stages the animal's attachment for its master appears greatly exaggerated, and as long as it retains its consciousness it will refrain from injuring him. Two early and characteristic signs of rabies are a peculiar delirium, causing the animal to snap at imaginary objects in the air, and a remarkable alteration in its voice, the bark ending very abruptly and singularly in a howl a fifth, sixth, or eighth higher than at the commencement. Sometimes it will utter a hoarse inward bark, rising slightly in tone at the close. Common symptoms are strabismus and twitchings of the face. In a couple of days the animal begins to lose control of its voluntary muscles and experiences difficulty in eating and drinking. In the early stages frothy spume or slaver is generally seen dripping from its jaws, but this soon lessens in quantity and becomes thick and glutinous, adhering to the corners of the mouth and fauces, and causing intense desire to drink. In its eagerness to lap water the dog often overturns the vessel containing it. It is now insensible to pain—will munch burning coals or even mutilate itself without apparent suffering. It exhibits an inclination to escape from home, to which it will sometimes return after many hours of absence. It is restless and savage, wandering about, attacking imaginary objects or venting its fury upon real ones. If confined, it gives utterance to the peculiar bark and howl described. When at large, however, it gives forth no warning noise, but seems only determined upon a straightforward trot. If interfered with, and more especially if struck, it will wreak its vengeance on the offender, but will seldom, as a rule, go out of its way to do a mischief, and if pursued will generally endeavor to escape. This is not invariably the case, as a naturally ferocious dog is apt to hunt out its prey diligently, often attacking many animals and persons in its fearful course. It does not continue its progress long, but

becomes exhausted, and moves with unsteady, tottering gait, drooping tail, head toward the ground, mouth open, and protruded tongue of a lead-blue color; finally paralysis ensues, first of the hind quarters and then of the whole body, which is promptly followed by death. The progress of canine rabies is rapid, and its termination almost always fatal. Its duration rarely exceeds ten days; the ordinary time is from four to six days. Nothing has been positively determined with regard to the interval elapsing between the receipt of the injury and the appearance of rabies in the dog and other animals. It seldom, however, exceeds six months.

The phenomena of rabies in the cat are gloominess of disposition, restlessness, tendency to bite and keep aloof, thirst, refusal of food, and sometimes depraved appetite. When the disease reaches the furious stage, the original tiger-like ferocity of the animal becomes predominant; it froths at the mouth; its eyes glare; its back is arched; its tail beats its flanks; its claws are rigidly protruded. If disturbed, it usually flies at the face. It soon gets haggard and emaciated, its voice sounds hoarse and sinister, and paralysis and death finally supervene. The wolf and fox, and in fact most wild Carnivora, when rabid become extremely audacious, taking to the fields and roads, entering towns, and without hesitation furiously attacking men, dogs, horses, herds, and flocks. They usually fly at the hands or face, and hence their wounds are much more frequently followed by inoculation than those of dogs, who are apt to snap at the legs, and from whose teeth the rabid saliva is often absorbed by the clothing. Renault, in a report to the Paris Academy of Medicine in 1852, presented statistics of 254 persons bitten by mad wolves, of whom 164 perished from hydrophobia; while, according to Niemeyer, of 145 persons bitten by rabid dogs in Württemberg, only 28 contracted the disease. In the pig, horse, sheep, goat, and bovine species the general symptoms of rabies are very similar. They are manifestations of disagreeable sensations at the seat of injury, restlessness, irascibility, hallucinations, alteration in voice, salivation, exaltation of sexual desire, great susceptibility to external influences, loss of appetite, difficulty in swallowing, dilatation of pupil, congested eye, emaciation, and finally paralysis, coma, and death. The desire to bite is often exhibited in the pig, horse, and particularly the sheep. All have paroxysms of rage, during which they attack everything within reach with their natural weapons. Fowls manifest the disease by restlessness, excitability, mental delusions, and frenzied movements—finally staggering, convulsions, and paralysis. They are often aggressive, and sometimes endeavor to bite.

Hydrophobia in our own species possesses a deep and melancholy interest on account of the peculiarity of its mysterious and often prolonged latency, the horrible intensity of its paroxysms, and its irresistible fatality. The most venomous reptile or insect may inflict a wound for whose effects an antidote may be successfully administered, but the virus of the rabid animal, when once its insidious operation has begun, defies the most consummate therapeutical skill. When the rabific poison has been deposited within the body no extraordinary appearances succeed about the point of reception, which seems to heal and cicatrize entirely in a natural manner. At that spot, however, the virus remains *perdu*, until at some uncertain period it comes forth stealthily upon its deadly errand. Watson infers that it is shut up in a nodule of lymph, or detained in temporary and precarious union with some of the tissues, until liberated by an injury to the cicatrix or some constitutional disturbance. The duration of this union is no less variable in man than in the lower animals. According to Thambayn's statistics of 220 cases of hydrophobia in the human subject (in *Schmidt's Jahrbücher*, 1859), the period of incubation in 202 instances ranged from three days to six months. In 145, or the large majority, it extended to from four to thirteen weeks. One occurred after four years, and another after five and a half years. Many other unquestionable cases of prolonged incubation have been recorded, and it is by no means improbable that the poison may, if undisturbed by causes such as those mentioned, remain latent until the occurrence of natural death.

About the year 1818, Dr. Marochetti, a Russian physician, announced that he had discovered in a number of cases which he had attended in the Ukraine characteristic phenomena never previously noticed. These consisted of pustules beneath the tongue, appearing ordinarily between three and nine days after the bite, and which contain the virus transmitted from the point of injury, their immediate destruction by cauterization being necessary in order to arrest the disease. Similar appearances, termed *lyssa*, were said to exist in rabid dogs. This announcement created a great sensation in the medical world, but Marochetti's opinions were soon proven to be entirely erroneous, the so-called



pustules being simply enlarged mucous follicles caused by the disease.

One of the earliest symptoms is usually a tingling sensation at the cicatrix, which sometimes opens and discharges a thin ichorous fluid. In a short time the person grows dejected, morose, taciturn, restless, and irritable; he seeks solitude and shuns bright and sudden light. Within a period varying from a few hours to several days the more serious and characteristic symptoms are developed. The patient is sensible of a stiffness or tightness about the throat, and is troubled with some difficulty of swallowing, especially liquids. Deglutition soon becomes impossible unless attempted with the utmost resolution. The real paroxysms of the disease then supervene; they are either spontaneous or produced by anything suggestive in the slightest degree of the idea of drinking; they are preceded by chills and tremors. During these attacks sensations of stricture about the throat and chest are experienced; the respiration is painful and embarrassed, and interrupted with sighs and sobs; in fact, there occur terribly violent spasms of the muscles of the throat, almost intercepting the entrance of air into the trachea. In the intervals between the paroxysms the patient is sometimes calm and collected, retaining full consciousness and knowledge of his condition, but generally he exhibits more or less excitement and irregularity, and occasionally has fits like those of insanity. Frequently he is seized with a species of delirium; he seems to see about him swarms of flies; he converses with imaginary persons or fancies himself in the midst of perils. When suddenly addressed, however, his hallucinations are for a time dispelled. Occasionally, in some of his fits of violence he will attempt to bite his attendants, will roar, howl, curse, and endeavor to destroy anything in his reach. He often seems conscious of the approach of such attacks, and will beg to be restrained. Hyperæsthesia of the skin and acute sensibility of the nerves distributed to the other organs of the senses are usual. In some instances there is developed unwonted loquacity, and in others a singular increase of intelligence. The latter phenomenon is recorded in the *Gazette des Hôpitaux*, Aug. 27, 1864, as having been noticed in the case of a confirmed cretin, seventeen years old, suffering from hydrophobia. The paroxysms are sometimes attended with involuntary micturition, priapism, and seminal emissions. A very characteristic symptom is the copious secretion of a viscid, tenacious mucus in the fauces, which the patient constantly hawks up and spits out with vehemence in every direction, producing a sound sometimes imagined to resemble a dog's bark. The tongue is at first coated and red, afterwards dry and brown. Occasionally, there is vomiting of a "coffee ground" fluid. The pulse is quick and excited, becoming very frequent and feeble before death. The urine is high-colored and scanty. It generally contains albumen, sometimes sugar. The temperature of the body is always elevated, which is coincident with rapid waste of tissue. Often within a few hours a plump and well-nourished patient grows shrunken and emaciated, and the face of youth is transformed into the shrivelled visage of old age. As the disease advances cerebral disorder becomes more and more marked. The eyes are staring, bloodshot, and always open, with frequently dilated pupil; the speech is abrupt, rapid, and incoherent, and at length there is confirmed delirium. Sometimes remissions occur, and the patient eats and even drinks—with great difficulty, however. Toward the end such a remission, with complete subsidence of agony and agitation, is not uncommon. But this relaxation is only a delusive calm, the prelude to dissolution, which is usually unattended with violent symptoms. Death ordinarily ensues from asphyxia. The duration of the disease is generally from two to five days. It has been known to terminate within twenty-four hours, four of such cases being recorded by Thambayn, while in a case mentioned by Tardieu life was prolonged for nine days.

It is now quite generally admitted that although hydrophobia may be originally due to a blood-contamination, its action when developed is manifested exclusively through the nervous system, and principally that portion whose functions are governed by the medulla oblongata. In former times there was much diversity of opinion upon the character of this disease. Some eminent men believed it to be a continued fever, while others even went so far as to consider it a putrid fever. Some maintained its analogy to yellow fever, principally on account of the "coffee-ground" or black vomit occasionally observed. Boerhaave regarded it as an inflammatory affection, and this idea was generally accepted until the time of Cullen, who placed it in the class *Nervosa*, order *Spermi*.

The autopsical appearances in both hydrophobic dogs and human beings are variable and non-distinctive. Brauer, Müller, after the most careful autopsies of 375 rabid dogs during a period of twenty years, arrived at the conclusion

that the evidence furnished by dissection is of no value in defining or distinguishing the disease, and is worthless as a foundation for any theory. In man the most careful examinations of those who have perished from hydrophobia have proved similarly inconclusive as to the pathology of the disease. In some instances the cerebrum, cerebellum, medulla oblongata, spinal cord, and eighth pair of nerves, in both origin and distribution, have been found apparently normal after the closest scrutiny with the naked eye as well as skilful microscopic investigation. It is true that congestion, effusion of lymph, and even softening, have occasionally been observed in portions of the brain, medulla, or cord, but these and all other lesions thus far discovered in the body can only be regarded as results of the dreadful disturbance in the nervous centres and respiratory and circulatory systems. The other morbid alterations noticed may be briefly mentioned as follows: great vascularity of the mucous membrane of the fauces and air-passages; intense pulmonary congestion; injection of the gastric vessels; sometimes ecchymoses and effusion of dark blood in the stomach. The whole blood is usually dark and grumous. There is apt to be more or less hyperæmia of all the parenchymatous organs. Autenreith, Brandreth, and Sallin have seen the nerves communicating with the cicatrix inflamed. Hallier has recently affirmed that he has discovered in the blood of hydrophobic animals a micrococcus which when cultivated is transformed into a cryptogam, to which he gives the name *Lysosphyton*. The distinctive character, however, of these disease-germs remains to be established. The diseases with which hydrophobia in man may be confounded are tetanus and delirium tremens, and in dogs anthrax, epilepsy, and distemper. An enumeration of the distinctions between hydrophobia and these various affections would occupy more space than the limits of this article will permit. Suffice it to say, that to those who are acquainted with such disorders there can be little difficulty in the differential diagnosis. There is, moreover, a special hysterical or mental hydrophobia, as Trousseau named it, induced by emotion on seeing hydrophobic patients, through fear of the disease after having been bitten, or even in very nervous people from simply hearing the description of a case. In this spurious hydrophobia there is only difficulty in swallowing, and no convulsions, scantiness of urine, or elevation of temperature. It is very rarely fatal.

When once the rabific virus has declared its presence in the human system, all measures hitherto adopted would appear unavailing to arrest its course. It would be quite useless to mention the almost numberless "specifics" which have been proposed for the disease, and have been employed without success, from time immemorial. The fact is, that with our present knowledge the most satisfactory treatment after the disease has appeared consists in simply fulfilling rational indications—viz. by palliating the symptoms as far as possible, excluding all controllable causes of mental and physical disturbance, and supporting the powers of the system with stimulants and appropriate alimentation. There is no doubt, however, that we have at our command effectual prophylactic means for destroying the poison, provided they be employed within a reasonable time after the infliction of the injury. These precautions consist in the application of a ligature, if possible, to impede the circulation from the wound, in sucking the wound, and in its thorough cauterization, nitrate of silver being the most valuable agent; but if this be not available, the hot iron, a burning coal, potassa fusa, or almost any acid may be used. Mr. Youatt, the very best authority upon this subject, testified in 1830, before a committee of the British House of Commons, that he had been successful in arresting the inoculation of the virus by means of cauterization with nitrate of silver in some 400 human cases and in innumerable dogs—in his own person, moreover, as he had been very frequently wounded by rabid dogs, and once severely by a mad cat.

CHARLES P. RUSSEL.

**Hydrostatic Press**, a machine much employed in the mechanic arts for producing great pressures. The pressure applied to a small piston or plunger is transmitted, through the medium of water, to a larger one, and increased in the same proportion in which the sectional area of the latter exceeds that of the former. Fig. 1 shows the main features of this machine. A is a very thick and strong cylinder, generally of cast iron. A broad flange surrounds its mouth, resting upon masonry. B is the plunger, with a water-tight packing at f. It carries the platform C, on which is placed the body to be submitted to pressure. E, a very strong plate confined by the uprights D D, receives and resists the pressure exerted by B. F is a shaft turned by a belt and pulley, which, by means of an eccentric, works the plunger G of the force-pump I. The force-pump and its accessories are shown on a larger scale at Fig. 2. I is the force-pump with its plunger G, working through a stuffing-box. The valve H opens during the up stroke of



the plunger G, and closes during its down stroke, preventing the water from being driven backward through the supply pipe N. In like manner, the valve K is closed during the up stroke and opens during the down stroke of the plunger. The pipe O leads to the cylinder. L is a safety-valve so weighted that when the pressure becomes great enough to endanger the bursting of the cylinder, it allows the water to escape into the waste-pipe. M is a branch communicating with the waste-pipe. A cock in this pipe, upon being opened, allows the water to escape from the cylinder and the plunger to descend. The packing of the plunger consists of a cupped leather collar (Fig. 3). It is a channel-shaped collar encircling the plunger in a recess formed in the mouth of the cylinder, its open side being turned toward the chamber of the cylinder. The water entering it from the cylinder, and tending to escape on the opposite side, keeps it firmly pressed against the surface of the plunger. If the diameter of the plunger G be one inch, and that of the plunger B one foot, the area of the cross-section of the latter will be 144 times that of

FIG. 1.

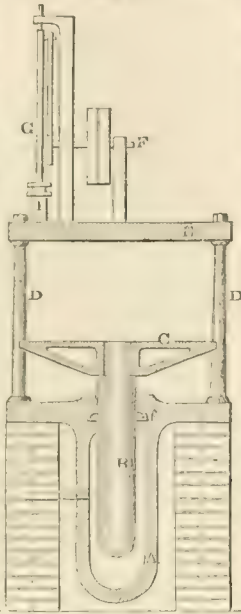


FIG. 2.

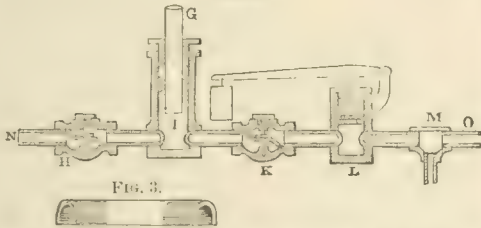


FIG. 3.

the former, and a pressure of 1 ton applied to G will exert a pressure of 144 tons upon B. About 10 per cent. of the power applied to B is absorbed by the friction of the packing collar. These are the essential parts of the hydraulic press, though in the different forms of the machine adapted to its numerous uses they occupy all conceivable positions with reference to one another. In presses for fixing ear and other wheels upon their axles the cylinder is sometimes horizontal. In many machines the force-pump is worked by hand.

J. P. FRIZELL.

**Hydrostatics** [*Gr. ὕδωρ, "water," and στατικός, "statics," from σταθμός, to "stand."*]. The term hydrostatics is used by most writers to mean the science which treats of the mechanical properties of fluid in a state of rest. A fluid is a body which offers no resistance to a change of form. Fluids are of two kinds: (1) elastic fluids, which may be compressed to any extent by a sufficient force, recovering their original volume upon the withdrawal of the force; (2) liquids which, though strictly speaking, admitting of slight compression, are for all practical purposes to be regarded as incompressible. In this treatise the term hydrostatics is restricted to liquids, of which water is taken as the representative, it being understood that whatever is affirmed of water is true, with certain modifications depending upon the weight, for any other liquid.

**General Properties of Water.**—As indicated above, water is slightly compressible. Its volume is diminished about  $\frac{1}{1000000}$  by a pressure equal to that of the atmosphere, or 14.7 pounds per square inch, while the volume of air would be reduced one-half by the same pressure. Water is expansible by heat. Its exact weight per cubic foot depends upon its temperature. The accompanying table gives the weight of a cubic foot of pure water, corresponding to different temperatures by Fahrenheit's scale. The weight of a cubic foot of water at the temperature of maximum density is taken upon the authority of Rankine. The weights at other temperatures are computed by the aid of a table given in the *Transactions of the Berlin Academy of Sciences* for 1855, by G. Hagen, deduced by him from his own experiments, which were made with all the care and accuracy

characterizing that distinguished investigator. It will be noticed that the density of water—i. e. its weight per cubic foot—increases from 32° up to 39° in strictness, 39.1°, and thence diminishes up to the boiling-point. This temperature, 39.1°, is called the temperature of maximum density. For ordinary temperatures, and for calculations not requiring great exactness, the weight of water may be taken at 62½ pounds, or 1000 ounces, per cubic foot. In what follows the weight will be assumed as that corresponding to a temperature of 60 degrees, being 62.37 pounds per cubic foot. Water expands about  $\frac{1}{12}$  of its volume in freezing. A cubic foot of ice weighs 57.5 pounds.

Table of the Weight of a Cubic Foot of Pure Water at Different Temperatures.

Tem. Fahr.	Weight, lbs.	Tem. Fahr.	Weight, lbs.	Tem. Fahr.	Weight, lbs.	Tem. Fahr.	Weight, lbs.
32	62.417	57	62.382	82	62.204	114	61.807
33	62.419	58	62.377	83	62.191	116	61.777
34	62.421	59	62.372	84	62.181	118	61.747
35	62.422	60	62.367	85	62.171	120	61.716
36	62.424	61	62.361	86	62.161	122	61.685
37	62.424	62	62.356	87	62.150	124	61.653
38	62.425	63	62.350	88	62.140	126	61.621
39	62.425	64	62.344	89	62.129	128	61.588
40	62.425	65	62.338	90	62.118	130	61.555
41	62.424	66	62.331	91	62.107	132	61.521
42	62.424	67	62.325	92	62.095	134	61.487
43	62.423	68	62.318	93	62.084	136	61.452
44	62.421	69	62.311	94	62.072	138	61.417
45	62.420	70	62.303	95	62.060	140	61.381
46	62.418	71	62.296	96	62.048	142	61.345
47	62.416	72	62.288	97	62.036	144	61.308
48	62.414	73	62.280	98	62.024	146	61.271
49	62.411	74	62.272	99	62.012	148	61.234
50	62.408	75	62.261	100	61.999	150	61.196
51	62.405	76	62.255	102	61.975	152	61.158
52	62.402	77	62.247	104	61.947	154	61.119
53	62.398	78	62.238	106	61.920	156	61.080
54	62.394	79	62.229	108	61.893	158	61.041
55	62.390	80	62.220	110	61.865	160	61.001
56	62.386	81	62.210	112	61.836	162	60.961

**Pressure.**—The condition of fluidity implies that the fluid particles move, with reference to one another, under the action of the slightest force; one consequence of which is, that a pressure applied at any part of a fluid mass acts at all parts of it and in all directions. If a vessel with a horizontal bottom be filled with water to a depth of one foot, every square foot of its bottom will sustain a pressure of 62.37 pounds; every square inch will sustain a pressure of 62.37 ÷ 144 = 0.433 pound. Let Fig. 1 be a prismatic vessel containing water, A B the surface of the liquid, and C D a horizontal plane. The fluid immediately below this plane sustains a pressure in pounds per square inch of 0.433 time the height A C in feet. This is true not only of the vertical pressure, but also of that in every other direction. The fluid particles in the plane C D exert the above pressure against one another and against the sides of the vessel. The pressure now under consideration is that due to the weight of the water. If an

additional pressure be applied to the surface, the pressure at any point within the vessel will be increased by the same number of pounds per square inch. Such an additional pressure is always present, consisting in the weight of the atmosphere, which in its ordinary state, at heights not far above the sea-level, exerts a pressure of 14.7 pounds per square inch. Thus, the absolute pressure at any point within a vessel is that due to the superincumbent water, increased by 14.7 pounds per square inch. Inasmuch, however, as the atmospheric pressure acts upon the outside of the vessel as well as the inside, it may, for most practical purposes, be neglected, and we may regard the pressure as that due to the weight of the liquid. The pressure at any point in a mass of water does not depend at all upon the form of the vessel containing it. This may be a prismatical vessel, as in Fig. 1, a vessel with a vertical tube (Fig. 2), with an inclined tube (Fig. 3), or an entirely irregular form (Fig. 4). In either case, if we neglect the weight of the atmosphere, the pres-

FIG. 1.

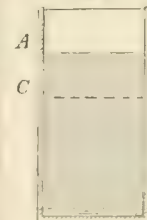
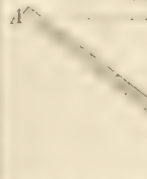


FIG. 2.



FIG. 3.



(Fig. 3), or an entirely irregular form (Fig. 4). In either case, if we neglect the weight of the atmosphere, the pres-



sure in any horizontal plane  $C D$  depends solely upon the vertical height from this plane to the horizontal plane  $A B$  of the surface. This vertical height is called the *head*. In most hydraulic calculations the pressure is designated as so many feet of head. Thus we say, a head of 10 feet, 20 feet, 100 feet, in preference to saying a pressure of 4.33, 8.66, 43.3, etc. pounds per square inch.

The foregoing considerations apply to vessels having free communication with the atmosphere. The pressure in confined vessels depends upon other conditions. In a steam-boiler, for instance, the pressure depends upon the tension of the steam, and this, again, upon the temperature.

It is often convenient to reduce such pressures to an equivalent head of water by dividing the pressure in pounds per square inch by 2.3. Let  $B$  (Fig. 5) be a pipe communicating with the closed vessel  $A$ , both filled with water. Let  $P$  be a piston fitting closely in the tube  $B$ . Any pressure applied to this piston will be transmitted to all parts of the vessel  $A$ . If the area of the piston be 1 square inch, and the pressure applied to it be 10 pounds, the pressure at all points within the vessel  $A$  will be increased by 10 pounds per square inch. The aggregate pressure transmitted to the surface  $C D$  will be as many times 10 pounds as the surface contains square inches. If we suppose  $A$  to be a strong cylinder accurately bored, and  $C D$  to be a close-fitting piston capable of moving therein, we have a hydrostatic press, and may readily conceive what enormous pressures these machines are capable of exerting.

**Pressures upon the Surfaces of Immersed Solids.**—To find the pressure upon a horizontal immersed surface offers no difficulty. We simply multiply the area of the surface by the pressure due the head. Thus, the pressure upon a horizontal area 100 square inches in extent lying 10 feet below the surface of the water is  $100 \times 10 \times 0.433 = 433$  pounds. When the given surface is vertical or inclined, however, the question is not so simple, the head being different upon different parts of the surface; and when the surface is bounded by curved lines, the operation becomes very complicated, involving the more intricate processes of mathematics. The general principle applicable to all plane surfaces, whether bounded by straight lines or curved lines, and whether vertical or inclined, is this: If we understand by *head* the depth of the centre of gravity of the surface below the surface of the water, the pressure may be found in the same way as for horizontal surfaces. For a plane surface partly immersed the centre of gravity of the immersed portion is to be used. The pressure so found is the normal pressure, or that perpendicular to the surface. In the case of an inclined surface, it is often necessary to find the pressure in a horizontal or vertical direction. Understanding the term *head* as above, the horizontal or vertical pressure upon an inclined plane is found by multiplying its horizontal or vertical projection by the pressure due the head. Thus, in Fig. 6, let  $A C$  represent the inclined face of a dam,  $D$  the



FIG. 5.

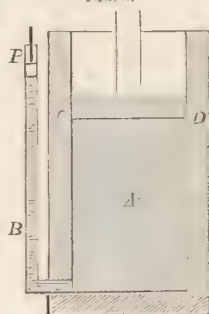
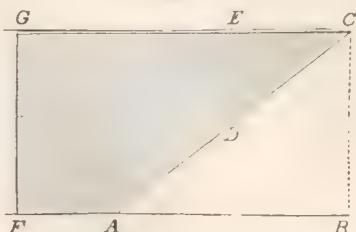


FIG. 6.



centre of gravity of the part under water.  $F A B$  the horizontal line of the bottom.  $C B$  a vertical line. Then, if  $A C$  represent the normal pressure upon the dam,  $C B$  will represent the pressure tending to shove it horizontally, and  $A B$  that tending to load it down. It will be noticed that the pressure tending to move an inclined dam is the same as for a vertical dam of equal height. The advantage of the former consists in the pressure tending to load it, which has the same effect as an increase of its weight. It must be observed that the pressure upon a weir or dam does not

depend at all upon the extent of the body of water behind it. The pressure upon  $A C$  is the same whether the body of water confined by the dam is limited by a wall or surface at  $F G$ , or is practically unlimited in extent, as a great pond or lake.

**Pressures upon Curved Surfaces.**—In considering such pressures, the object usually is to find the resultant pressure, or that with which the fluid tends to give motion to the surface, or to resist its motion in some particular direction, usually horizontal or vertical. The pressure, for instance, tending to burst a water-pipe is not the entire pressure upon the curved surface of the pipe, but the pressure tending to separate one half the pipe from the opposite half, and is represented by the pressure which the same head would exert upon a plane whose width is the diameter of the pipe. The pressure acting upon a curved surface in any given horizontal direction is the same as would be exerted upon the projection of the surface on a vertical plane perpendicular to the given direction. The pressure upon a curved surface in a vertical direction is equal to the weight of the mass of water lying vertically above the surface. In finding, according to this principle, the upward pressure upon the lower surface of an immersed solid, we must for a moment regard it as a surface merely, not pertaining to a solid, and suppose the space between it and the surface of the water to be wholly occupied by water.

**Weight Lost by Immersed Solids: Specific Gravity.** The upward pressure upon an immersed solid tends to raise it; the downward pressure tends to sink it. This latter is equal to the weight of the mass of water lying vertically above the upper surface. The excess of the upward over the downward pressure is evidently equal to the weight of the mass of water displaced by the solid. If the weight of the solid is less than this, it floats; if greater, it sinks. In either case, the weight lost by the body is equal to that of the mass of water displaced by it. This property is employed in determining the relation between the weight and volume of solid bodies. If we weigh a body in air, or, more strictly, in a vacuum, and again while suspended in water, the difference is the weight of a volume of water equal to that of the body. Dividing the entire weight of the body by the loss of weight in water, we have the ratio of the weight of the body to that of an equal volume of water. This ratio is called the *specific gravity* of the substance. A body lighter than water is immersed by attaching to it a body heavier than water whose weight and specific gravity are known. The weight of a volume of water equal to that of the lighter body is the loss of weight of the aggregate, less the loss of weight of the heavy body. A piece of dry pine, *e. g.*, weighs 27 pounds. It is attached to a piece of lead, *sp. gr.* 11.33, weighing 45 pounds. The aggregate weight in water is 8 pounds; loss of weight, 64 pounds; loss of weight of the lead,  $45 \div 11.33 = 3.97$  pounds; loss of weight of the wood, or weight of equivalent bulk of water,  $64 - 3.97 = 60.03$  pounds; *sp. gr.*  $27 \div 60.03 = 0.4498$ ; weight per cubic foot,  $62.37 \times 0.4498 = 28.05$  pounds.

**Stability of Floating Bodies.**—When a solid floats in water, it takes a position such that its centre of gravity is in the same vertical line with the centre of gravity of the fluid displaced by it. This position is called a position of rest or equilibrium. Most floating bodies have more than one position of rest. A position of rest is said to be stable when the body tends to return to it on being tilted or inclined; unstable, when it tends to rotate into another position. One body has more or less stability than another according as a greater or less inclination is necessary to overcome its tendency to return to its position of rest, and a greater or less force is necessary to produce that inclination. The theory of the stability of floating bodies is of the greatest importance in shipbuilding. Let  $G$  (Figs. 7 and 8)

FIG. 7.

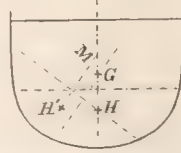
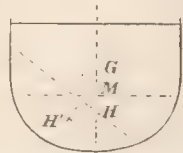


FIG. 8.



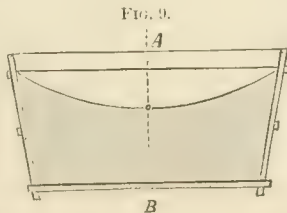
be the centre of gravity of a floating body;  $H$  the centre of gravity of the fluid displaced by it in its position of rest;  $H'$  the corresponding point in an inclined position. A line  $H M$  drawn through  $H$  and  $G$  is vertical when the body is in its position of rest. In the inclined position  $H' M$  is vertical. Two forces act upon the body: (1) its own weight, acting vertically downward through  $G$ ; (2) the pressure of the water, acting vertically upward through  $H'$ . The direction of this latter force intersects the line  $H G$  in  $M$ . If  $M$  lies above  $G$ , as in Fig. 7, it is evident that the two



forces will tend to bring the body back to its position of rest; if below G, as in Fig. 8, they will cause it to recede farther from that position. When the body is in its position of rest, these forces act in the same line and have no tendency to cause rotation. The position of M, corresponding to a very slight inclination, is called the metacentre. A section of the body made by a plane coincident with the surface of the water, the body being in its position of rest, is called its plane of flotation. A floating body in rocking or oscillating always tends to revolve around a horizontal line drawn through the centre of gravity of its plane of flotation. The height of the metacentre above the centre of gravity of the displaced fluid is equal to the moment of inertia of the plane of flotation with reference to a horizontal line drawn through its centre of gravity, divided by the volume of the displaced fluid. The height of the metacentre above the centre of gravity of the body determines its degree of stability. That is to say, among all the positions of equilibrium which can be assumed by a body of given weight, it will have the greatest relative stability in that in which its metacentre is highest. The absolute stability of a very light body is but slight in any position, since the lighter the body the less the forces tending to restore it to its normal position when disturbed. Up to a certain point the stability of a floating body is increased by increasing its weight. It is for this reason that a vessel returning without cargo from a distant port is obliged to take on board a quantity of heavy material, usually sand, to give her what seamen call "stiffness." On the other hand, beyond a certain point an increase of weight diminishes the stability of a floating body. A homogeneous body when entirely submerged has no stability; it rests indifferently in any position.

**Surface of Liquids.**—It is a law of mechanics that the surface of a liquid in equilibrium under any forces whatever is, at any point, perpendicular to the resultant of the forces acting upon it at that point. When, as is commonly the case, the only force acting upon water of limited extent is gravity, its surface, so far as our senses can perceive, assumes the form of an exactly horizontal plane. In strictness, however, since gravity does not act in parallel lines, but in lines tending toward a common point—viz. the centre of the earth—no liquid surface is an exact plane, but forms a part of the surface of a vast sphere.

When water is contained in a vessel revolving around a vertical axis, its surface is acted on at any point by two forces—viz. gravity, acting vertically, and the centrifugal force, acting horizontally. The resultant force is neither horizontal nor vertical, but inclined, and the surface takes such a form that the resultant force is at all points perpendicular to it. A vertical section of the surface of water in a vessel (Fig. 9) revolving around the vertical axis A B, is the curve called a parabola. J. P. FRIZELL.



**Hydroxyl** [Gr. *ὕδωρ*, "water," *δύω*, "sharp," and *γλ*, the acid radical termination], a univalent radical (OH) which in its chemical relations is analogous to chlorine, bromine, and iodine, and may be substituted in compounds for an atom of hydrogen or other monads. Water may be regarded as H.OH, analogous to HCl; potassic hydrate, K.OH, to KCl; baric hydrate, Ba(OH)<sub>2</sub>, to BaCl<sub>2</sub>. (See HYDRATES.) By the substitution of OH for H in hydrocarbons the alcohols are produced; marsh gas, CH<sub>4</sub>, yields methyl alcohol, CH<sub>3</sub>OH; ethane, C<sub>2</sub>H<sub>6</sub>, yields ethylic (common) alcohol, C<sub>2</sub>H<sub>5</sub>OH; propane, C<sub>3</sub>H<sub>8</sub>, yields propenyl alcohol (glycerine), C<sub>3</sub>H<sub>7</sub>(OH)<sub>3</sub>, etc.

C. F. CHANDLER.

**Hyères**, town of Southern France, in the department of Var. It is famous for its delicious climate, which seems to be an everlasting spring. Pop. 10,878.

**Hygieia**, in ancient mythology, the goddess of health, was a daughter of Æsculapius, and worshipped in connection with him. She is generally represented as a young girl feeding a serpent, the symbol of health, from a cup which she holds in her left hand, the serpent winding around the right arm.

**Hygiene**, the science and art of preserving health and preventing disease. Coming directly from the French word *hygiène*, the term may be traced to the Greek *hygieia*, "healthy." Hygieia, the ancient goddess of health, being the daughter (some say the wife) of Æsculapius, the god of medicine. From the earliest times men must have observed somewhat of the favorable or unfavorable influences of the circumstances under which they lived. As an art, in its

rude beginnings, hygiene must have preceded medicine, and even surgery. The early temples of Æsculapius, before Hippocrates, were *sanitaria* rather than medical schools. Hygieia was named, with other deities, in the oath which every physician was required to take as one of the Asclepiads: "By Apollo the physician, by Æsculapius, by Hygieia, Panacea, and all the gods and goddesses." Hippocrates wrote the first hygienic treatise now extant—on *Airs, Waters, and Places*. He therein pointed out the effects of climates and localities, not only upon health, but also upon the characters of races of men, anticipating at so early a date (400 B. C.) the conclusions arrived at in recent times by Montesquieu, Michelet, Guyot, and Buckle.

Positive sanitary measures were probably first instituted by Acron of Crotona, of the school of Pythagoras, who is said to have dissipated the cause of a plague at Athens by means of fires burned in the streets. Empedocles afterwards found it possible to destroy or impede the action of malaria, in one instance by draining a swamp, and in another by building a high wall to protect an exposed town. Herodius was so famous for his application of gymnastics to the improvement of health that Plato accused him of doing an ill service to the state by keeping alive people who ought to die, because, being valetudinarians, they cost more than they were worth to the community. The Spartans reversed this in their custom of exposing young children to the elements, whereby only those survived and grew up who were possessed of natural hardihood. Early writers upon the preservation of health were Philistion, Diocles, Plutarch, Celsus, Galen, Oribasius, Aëtius, and Paulus Ægineta. Ancient Rome showed an appreciation of sanitary art by extensive drainage of the base of the hills on which the city was built; by the immense sewer, *Cloaca Maxima*, of which a part is left, the oldest ruin in Europe, thirteen feet in diameter at the outlet; by the aqueducts; by suburban interments, whose number is still attested all along the Appian Way; and by the appointment of officers (*adiles*) whose duty it was to inspect and regulate the construction, with a view to salubrity and safety, of all private and public buildings. In Egypt the great pyramid of Cheops has an arrangement showing an early recognition of the principles of ventilation applied to its interior chambers. Embalming the bodies of the dead, not only of men but of animals, however it may have been associated with religious ideas, is so well adapted to the prevention of insalubrity in a populous land with a tropical climate as to make it appear likely that it sprang, in part at least, from the sanitary sagacity of the priesthood. Since a resemblance is traceable in many particulars between the Mosaic ceremonial law and the usages of the ancient Egyptians, it is also likely that some measures for the preservation of health, prescribed in the Levitical code, corresponded with usages known to the Israelites while in the land of bondage. Moses, however, must have much extended the provisions required for the care of the health of his people. His regulations concerning food, ablutions, and other purifications, and segregation of persons having certain diseases, were precise and imperative.

All the most enlightened nations of antiquity held physical culture in high estimation. Socrates, the philosopher, was of powerful bodily frame. Plato also was a superior athlete, and so were Pericles and Alcibiades. It is not improbable that the intellectual supremacy of the Greeks was in some part owing to their sedulous care of the development of the whole organization, brain and body together. Archiateri (chief physicians) were appointed publicly by the Greeks for gratuitous attendance upon the poor. In most of the cities of ancient Greece public baths existed, for the poor as well as the rich. Rome also had, at one period, hundreds of private and public baths, some of which, as those of Caracalla, were palatial in grandeur. Although at first designed for health, these degenerated afterwards into effeminate luxuries, as the *apophansia* did, at last, into the scenes of gladiatorial fights of men and beasts. Imitating the Greeks, the Roman emperor Antoninus Pius appointed public medical officers of towns, and Valentinian and Valens confirmed the privileges of the colleges of *archiatri populares* in the larger cities of the empire. Under the name of *medici* *conditi* such a system continued to be maintained in Italy down to the fifteenth century. About 1430 the emperor Sigismund created the offices of *maiestri arti* in every chief city of Germany. Of this functionary the modern *Kreisphysicus* and *Stadtschirurg* may be regarded as in some sort the successors. In the school of Salerno, in Italy, the oldest medical school of Europe, founded in the ninth century, instruction was given upon the prevention of diseases, as well as the preservation of health. That institution gave birth in the twelfth century a very remarkable treatise, the *Regimen Sanitatis Salernitanum*, a poem upon the maintenance of health, in "Isidorian" or rhyming Latin verses. Many of the precepts in this "Code of Salern-



num" are sound and good: some of them have passed into almost proverbial modern use. The institution of *quarantine* in the fourteenth century in Italy, to exclude the plague, was an event in the history of sanitary progress. From Florence this method of restriction of intercourse with infected places spread first to Venice and Sardinia, and afterwards throughout Europe. In America the first quarantine law was enacted under William Penn in 1700, at Philadelphia. (See *QUARANTINE*.)

England was somewhat later than Italy and Germany to advance in sanitary improvements, yet some quite early legislation was in this direction, as an ordinance in the reign of Edward II., forbidding the sale of "muzzled swine's flesh;" one under Richard II., to prevent the pollution of rivers, drains, etc.; and others during the times of Henry VI. and VII. and Elizabeth, for the inspection and cleansing of sewers, prohibiting the slaughtering of cattle in towns, and interdicting the overcrowding of dwellings. Jenner's introduction of vaccination for the prevention of smallpox is perhaps the greatest of all the triumphs of "preventive medicine," as sanitary science has sometimes been called. This event dates from 1798. (See *VACCINATION*.) But the benefits conferred upon mankind through the advance of knowledge in regard to the causes of disease and the conditions necessary for health, especially in communities, have been obvious, great, and numerous. In the time of the great medical author Sydenham (1624-87) the largest part of the mortality of London was produced by four diseases—plague, smallpox, scurvy, and dysentery. Of these, the first has long disappeared from Great Britain and the continent of Europe; the second has been, by prevention, shorn of most of its destructive power; the third is now seldom known except in places remote from civilized life; and the fourth is at least very much less mortal than formerly, especially in cities. Mearns, in his *History of England*, estimated that the difference between London in the seventeenth and the same city in the nineteenth century is as great, in regard to mortality, as between that of the time of prevalence of epidemic cholera and that of ordinary years. In Constantinople, in 543 A. D., 10,000 people died daily during one season of plague alone; in 1665, 68,000 died of that disease in the city of London; in 1682, not a sickly year, the deaths in London were 1 in 20 of the inhabitants; now they average about 1 in 40. In France in 1772 the annual proportion of deaths was 1 in 25; in 1846, 1 in 45. The mean duration of life in the same country was, in 1806, 28½ years; now, 34½ years. At Geneva the mean probability of life in the sixteenth century was 8 or 9 years; in the seventeenth century, 13 to 14 years; in the eighteenth, about 30 years; in the nineteenth, 40 to 45 years. Life may be safely said to have been, on the average, prolonged 25 per cent. during the last fifty years. While improvements in medical and surgical practice no doubt have had their share in effecting this result, the greater part of this very important change must be ascribed to increased knowledge and appreciation of the laws of health. Yet much remains to be done before the ideal of perfect sanitation is attained. Yellow fever and cholera are still at times the deadly scourges of cities and of some other places; malarial fevers render certain localities almost uninhabitable; and the mortality of towns, especially with young children, continues to be far in excess of what it ought to be were the conditions of health properly maintained. The best hope of the sanitarian and philanthropist on this subject is that which is derived from the increased and increasing interest in all that concerns health, now prevailing in all civilized communities amongst educated men.

The modern literature of hygiene had its beginning chiefly in France. Boerhaave in Holland (1668-1738), Locke (1632-1704) in England, and Cullen (1712-90) in Scotland, had written upon physical culture and other sanitary subjects, but French writers first gave a definite form to the science. Prominent among those who have dealt with it in France have been Tourtelte, Hallé, Du Chatelet, Tardieu, Villermé, Fodéré, Cabanis, Boudin, Levy, and Motard. A comparatively early English writer upon personal health was Dr. Andrew Combe. Climatology has been ably treated of by Johnson, Martin, and Johnston. Public hygiene has had its later lights in Great Britain in Chadwick, Southwood, Smith, Simon, Letheby, Rumsey, Greenhow, and Florence Nightingale. On the general subject of hygiene must be added the names of Angus Smith, Parkes, Wilson, Mapother, Guy, Cameron, and Tilt. On the continent of Europe, outside of France, most noted as sanitarians have been Quetelet, Friedländer, Mühy, Casper, Hufeland, Thiersch, and Pettenkofer. In America, Dr. Benjamin Rush (1746-1813) wrote ably upon some sanitary subjects. The first American treatise on the *Elements of Hygiene* was that of Prof. Robley Dunglison, of which a second edition was published at Philadelphia in 1844. No

second work with a similar title appeared until the issue of a *Treatise on Hygiene, etc.*, by Dr. W. A. Hammond, then surgeon-general of the U. S. army, in 1863. Dr. John Bell of Philadelphia wrote with much ability and learning on *Regimen and Longevity* (1812), and not long after on *Baths and Mineral Waters*. The number of authors upon subjects connected with personal and public health has latterly become so large that to name a few may seem invidious.

It may be justly mentioned, however, that the late Drs. Forrey and Gouverneur Emerson wrote usefully upon climatology and vital statistics; the best treatise on mental hygiene yet published has been that of Dr. Isaac Ray; and the late Dr. Wilson Jewell of Philadelphia, the late Dr. George Derby of Boston, Drs. H. I. Bowditch, Jarvis, and Curtis of the latter city, Dr. Snow of Providence, R. I., the late Dr. J. H. Griscom, and also Drs. E. Harris, A. N. Bell, and others of New York, Dr. Barton of New Orleans, and the late Dr. Drake of Cincinnati, O., have contributed much by their labors to the progress of sanitary science. The oldest periodical published chiefly in the interest of the same class of subjects is the *Annales de Hygiène Publique*, issued now for many years at Paris. Amongst other journals at present in circulation are *Public Health* in London, and the *Sanitarian*, established in 1873 in New York. Associations devoted to hygienic investigations and to the promulgation of their results are the Epidemiological Society of London and the American Public Health Association. The latter was founded in 1872. The Social Science Associations, both of Great Britain and of the U. S., take cognizance of public health as constituting one of their leading departments. No subject has of late years advanced more rapidly in public interest, or in the actual development of practical knowledge concerning it.

A natural classification of the departments belonging to this branch of science is that into *Personal, Domestic, and Public Hygiene*. The second of these, however, may be merged into the two others. Connected also with public health is the hygiene of *encampments* (military or otherwise) and *maritime* (or naval) hygiene. Moreover, certain topics are necessary to be considered as affording facts, theoretical and practical, fundamental to the above departments; e. g. *Vital Statistics and Etiology*, or the causation of disease. Personal hygiene may either refer to adults or to persons of all ages and both sexes, or it may be considered especially in reference to children or to women. Most of its practical precepts, as well as its essential principles, are common to all human beings. We may therefore divide personal hygiene in a physiological manner, according to the functions of the body, thus: *alimentation* (food and drink); *respiration*, including all atmospheric influences; *circulation of the blood*; *clothing*; *bathing*; *excretion*; *reproduction* (sexual hygiene); *exercise and muscular development*; and *cerebro-nervous* (including mental) hygiene. Public hygiene embraces measures for the exclusion of certain causes of disease from communities, commonly named under quarantine, and the methods of preserving health by internal regulation and supervision, designated as sanitary police. The latter refers to the maintenance of cleanliness in streets, markets, dwellings, wharves, etc.; drainage and sewerage; abatement of nuisances; inspection of water and food supply; public vaccination; oversight of certain avocations in reference to health; and medical attendance upon the poor.

In the present article, considering personal hygiene chiefly, our space may be best occupied with a brief and summary statement of some of the most important conditions of health, in connection with the different functions, as well as with the causes of disease.

*Alimentation*.—Requisites in connection with food are, that material be furnished to supply the needs of the body for two purposes—(1) to form and repair its *tissues* or solid structures and fluid secretions for special uses; (2) to generate and maintain *force*, which is consumed in the *external* activities of the body and also in its *internal* functions—i. e. in external and internal work. The latter sort of work is exemplified by the propulsive contraction of the heart and the slower "*peristaltic*" movement of the stomach and intestines; also by the chemical manufacturing processes, from which result complex materials, such as the gastric juice, milk, etc. For *tissue-making*, food-substances must be obtained which contain the elements of which the body is composed (carbon, hydrogen, nitrogen, oxygen, sulphur, phosphorus, iron, calcium, etc.); these must be in an organic state (vegetable or animal, not mineral, except salt), and of such consistence as to be broken up or crushed by the teeth and dissolved by the digestive fluids. The same kinds of materials avail also for *force-food*, the amount of force, as manifested in animal heat, muscle-power, nerve-force, growth-force, etc., being about equivalent to that which may be obtained from the *oxidation* of the same substances in ordinary combustion. For healthy alimentation



food must be taken in sufficient quantities at such intervals as will meet the waste of the body. It must also be eaten slowly, chewed thoroughly, and at a time of repose both of body and mind. Since the same ultimate elements exist, in nearly the same states of elaboration, in plants and in animals, it is sometimes asserted that vegetable food alone is necessary or advantageous to man. It may be admitted that men can, under favorable circumstances, exist through long periods without meat. This is shown in the instances of many tribes in Asia and Africa, who live almost entirely on rice and other grains, and also by many of the peasantry of continental Europe and the Scotch Highlanders, who are confined to a diet containing very little animal food. Yet it is equally true that men can exist on meat alone, as is done by the Indian riders of the South American pampas for months together, and by some impoverished dwellers by the sea, who live constantly on fish, as the Pecheurs of Terra del Fuego, the poorer Norwegians, and also the Esquimaux and other natives of the frigid zone. The teeth and digestive organs of man, compared with those of other animals, show him to be adapted to a mixed diet. Experience shows, moreover, that, at least in the artificial circumstances of ordinary civilization, such a diet is the most favorable to the maintenance of full vigor in an active or laborious life. Concentrated diet is especially needful for those engaged in severe or protracted brain-work. Not more than one-fourth of the whole amount of food consumed ought to consist of animal substances. Nature's model food is milk, consisting of representatives of three classes of substances—(1) caseine and albumen, nitrogenous (*i. e.* containing carbon, hydrogen, oxygen, and nitrogen); sugar of milk or lactic, saccharine (non-nitrogenous, composed of carbon, hydrogen, and oxygen); and fatty substances (making butter); these last also being non-nitrogenous. It is an absolute rule in alimentation that with man and all the higher animals life can be sustained for a length of time only by a diet containing at least two of the above-named three classes of food-principles. Milk contains also saline ingredients (chloride of sodium, other chlorides, sulphates, phosphates, and carbonates); and these are requisite in certain proportions either in our solid food or in our drink.

Errors concerning diet are chiefly the following: (1) Eating too fast, thus promoting indigestion, which when chronic or habitual is termed dyspepsia; (2) excess in the amount of food taken; (3) insufficiency in amount or defect of quality for full nutrition; (4) unwholesome conditions of food—*e. g.* commencing putrefaction, or changes produced by disease in animals whose meat is eaten. Cooking our food aids digestion, extending the range of articles available for human diet, besides often giving a more agreeable flavor to things which we eat. Raw vegetables, as celery, lettuce, radishes, etc., and fruits in moderation, are wholesome. Raw meat frozen, and thus made tender, is so also. One danger attends the consumption of underdone meat—namely, that of thus receiving parasites into the body; in the case of beef, *Tenia*, the tapeworm; of pork, the more dangerous, sometimes fatal, *Trichina*. (See *TRICHINA*.) This danger is entirely obviated by thoroughly cooking meat. *Scurvy* is produced especially by long deprivation of fresh vegetable food. Captain Cook first ascertained this to be the mode of causation of this disease about 1770.

*Condiments* are articles used in diet in small amounts for seasoning, as salt, vinegar, pepper, mustard. Salt is needful as an ingredient in the blood and secretions of the body. Vinegar is innocent at least, when moderately used. Pepper and mustard are most serviceable in hot climates and for persons of weak digestion, especially in old age. For the stomach, as for other organs, it is a true principle that all unnecessary stimulation involves a waste of force in proportion to the degree of excess.

Water is indispensable to the sustenance of life. From 20 to 40 fluidounces of it, alone or in the form of some beverage, are needed by every adult daily, the greatest amount under active exercise or in warm weather. Its purity is of great importance. Excess of mineral ingredients (most commonly carbonate, sulphate, and chloride of calcium, making hard waters) may irritate the stomach and bowels. More injurious is excess of organic matter, as in rivers or wells poisoned by sewage, streams flowing through graveyards, etc. Typhoid fever, cholera, and other disorders are thus produced or promoted. A pure and abundant water-supply is one of the most essential requisites for every habitation, and, on a large scale, for every city. Filtration through charcoal and gravel will improve that which is defective; but if no good supply can be obtained from terrestrial sources, rain-water may be used. This also requires filtration when it passes through the air over a crowded city. Spring-water is mostly the best; well-water, free from contamination, is about equal to it. Wells for drinking-water should never be placed near

privies, cess-pools, or barnyards. Artesian wells yield water free from organic matter, but often warm and containing an excess of mineral matter. Good drinking water should contain not more than 1.5 organic matter per gallon; total of solids, not more than 30 or 35 grains per gallon. Variation in the mineral constituents, so perceptible in many rivers (the Mississippi, Nile, and Ganges especially), does not necessarily render water unwholesome. The water of a large, deep river is more generally desirable than that of a small, shallow stream, as water grows purer as it flows by oxidation of impurities and deposition of sediments. Sea-water is absolutely undrinkable. At sea, sometimes distillation is resorted to for a supply. Distilled water is tasteless, but may be made more agreeable by agitation with the air.

On the subject of the effects of *stimulants*, weaker and stronger, as tea, coffee, cocoa, alcohol, etc., on health, reference must be made to the articles in this work treating of those substances. We may repeat, with emphasis, in connection with them, the important hygienic law, that all unnecessary or excessive stimulation involves a waste of force in proportion to the degree of excess above the level of natural, healthy action. Cocoa is scarcely to be called a stimulant; it is, for most persons, an entirely wholesome beverage. Black tea, in moderation, is innocent for all, and under the wear and tear of ordinary life an often useful means of refreshment. Coffee is too powerful an excitant of the heart and nervous centres to be beneficial to most persons as a daily drink. Its best place is that of a prop under special strain of muscular or mental fatigue. Arctic travellers and navigators find tea and coffee the best of stimulants under exposure to cold, wet, anxiety, and exhaustion. Alcohol has been and continues to be a subject of much contention. Avoiding extreme views, it may be stated that during perfect health it is never necessary, and therefore never wholesome. In great prostration from disease it is often the most valuable of supporting agents. States occur, also, between illness and full health, in which, under the judgment of physicians, dilute alcoholic beverages (ale, wine, etc.) may be employed in regulated quantities with advantage. No such article does good when it hurries the pulse, flushes the face, or disturbs the brain—*i. e.* acts as an inebriant narcotic. By actual observation, Drs. Parkes and B. W. Richardson, and Count Wollowicz, have proved that alcohol unnecessarily used consumes force by excessive action of the heart, reduces muscular strength, and lowers the bodily temperature. Excess causes subsequent depression, begetting a craving for renewal of the stimulation, and thus grows the habit of indulgence, with loss of power of the will to resist the increasing demand. Intemperance in this manner becomes a frequently incurable disease. (See *METHOMANIA*.)

*Hygiene of Respiration*.—On this extensive topic we can here remark but very briefly. The conditions necessary for healthy respiration are as follows: (1) Sound lungs and air-tubes; (2) muscular power and nerve-force; (3) pure atmosphere; (4) renewal of the air, including removal of the exhaled carbonic acid and organic matter, and a sufficient supply of oxygen. (See *ATMOSPHERE*, *DISINFECTION*, *RESPIRATION*, and *VENTILATION*.)

*Clothing*.—This must, for health, be—(1) sufficient; (2) not excessive in amount or pressure; (3) properly distributed over the body; (4) permeable to air and moisture; (5) changed frequently enough for cleanliness. Being insufficiently clad in cold weather is depressing to the system, inviting attacks of disease, especially of the organs within the chest. Wearing too much clothing makes the skin delicate and the whole body morbidly susceptible to changes of temperature. The order of warmth in materials is as follows: (1) furs and wool; (2) silk; (3) cotton, as muslin; (4) linen. In distribution over the body, the chest needs especial protection in winter and in cold climates, the abdomen in warm seasons and countries, and the feet in all times and places, unless near the tropics. Habit of course makes a difference in this respect with every one, but exposure never hardens any one, unless the system reacts at the time, so as to suffer no chilling or depression. It is needful in hygiene, as in constructive engineering, to keep within the limits of perfect recovery. Children should be at least as warmly clad as adults, since their power of resisting exposure is less than that of grown persons. Aged people also suffer more from cold than adolescents or those of middle age.

On *Bathing*, see the article on *BATHS*.

*Excretion*. Health requires the constant or regularly periodic removal from the body of the results of waste of the tissues and combustion of material for the generation of force. These are analogous to the smoke and ashes of the locomotive-engine. By the lungs we excrete carbonic acid; other matters by the skin, kidneys, and large intestine. If either of these eliminative processes be arrested, disorder



must at once occur in the body; a continued interruption of either of them will be fatal. Insufficiency or irregularity in the action of the kidneys or bowels promotes or causes disease. Neglect of the proper action of the bowels is a frequent error, often bringing on habitual constipation. Evils connected with this, always endangered, though not always resulting, are—(1) irritation or inflammation of the bowels; (2) hernia or rupture, with possibly fatal strangulation; (3) irremediable obstruction of the bowels; (4) sympathetic disorder of other parts of the system, as the liver, brain, etc.; (5) blood-poisoning from non-excretion of effete putrefiable matter. To prevent constipation the most important measures are—sufficient daily exercise in the open air; a varied diet, including a moderate amount of fresh or dried fruit; bran bread; and, if these fail, rhubarb-root or some other laxative medicine.

*Exercise.*—Referring, for much that might be said on this head to GYMNASTICS, the most general statements are the following: Every organ, including the muscles, requires for its healthy development while growing, and afterwards for maintenance of vigor, these conditions: (1) a sufficient supply of blood of good nourishing quality; (2) innervation—i. e. a supply of nerve-force; (3) exercise, according to its function; (4) intervals of repose. Violent exercise is not conducive to health, because it tends to exhaust instead of adding to the strength, and also because it agitates the heart, sometimes, when often prolonged and repeated, producing morbid enlargement of that organ. Increase of strength follows exercise only when it is followed by periods of rest sufficient to remove all the effects of fatigue. Dr. Windship's rule has been never to exert himself up to the top of his capacity, and not to continue any very severe muscular efforts long at a time. Upon this principle, by frequent and considerable though still moderate daily exercise, the strength of most persons may be doubled in a few months. Invalids require to be very cautious in the amount of their exercise. Many cases of feeble health require absolute rest, or only passive exercise, as riding in a carriage, sailing, etc.

*Sexual Hygiene* is a subject not adapted to this work. *Mental Hygiene* is too extensive a topic to be embraced within the limits of the present article. The best treatise upon it is that of Dr. Isaac Ray (Boston, 1863). (See VITAL STATISTICS for facts of importance bearing upon hygiene; also, PUBLIC HEALTH and STATE MEDICINE.)

HENRY HARTHORNE.

**Hyginus**, a name which occurs in Roman literature prefixed to a variety of treatises, most of which are now lost. Suetonius in his lives of distinguished grammarians has given a brief account of C. Julius Hyginus, whom he calls a freedman of Augustus and a Spaniard by birth, although, he adds, some consider him a native of Alexandria, and say that he was brought to Rome when a boy by Julius Caesar. He studied under Cornelius Alexander, and was placed by Augustus over the library founded by him in the temple of Apollo on the Palatine Hill. He was an intimate friend of Ovid. Hyginus wrote scholia on the poems of Virgil and of Helvius Cinna; lives of illustrious men, a work similar to that of Cornelius Nepos, in at least six books; on the cities of Italy; on the gods, and on agriculture. These are all lost. To this writer also are assigned by some critics two works still extant—the first entitled *Fabularum liber*, containing 277 fables, considered by some an extract from a work entitled *Genealogie* by C. J. Hyginus; and the second an astronomical treatise of the signs and constellations, interspersed with fables, in four books, entitled *Poeticón Astronomicón libri IV*. Many, however, regard these as of much later date than the time of Augustus. The best edition of the two works is in the *Auctores Mythographi Latini* of Van Staveren (Leyden, 1742, 4to). To a different writer, styled Hyginus Gromaticus by way of distinction, of the time of Trajan, are assigned several treatises on surveying and mensuration and a work on castrametation. The remains of the former treatises are collected in Lachmann's and Rudorff's *Gromatici Veteres* (vol. i., Berlin, 1848), and the work *De Munitionibus Castrorum* by C. C. Lange (Göttingen, 1818). (See, for the former writer, Teuffel's *Hist. Latin Lit.*, § 257; and for the latter, § 339.) H. DRISLER.

**Hyginus**, SAINT, reckoned the ninth bishop of Rome, is thought to have been an Athenian philosopher at one time, and to have been bishop 139–142? A. D.; but very little is certainly known of his life.

**Hygrom'etry** [Gr. *hypsos*, "moist," and *metron*, "measure"]. This term is applied to the measurement of the amount of vapor in the air. The atmosphere over every part of the earth contains a greater or less quantity of invisible vapor, which gives it the variable qualities denominated humidity, dryness, dampness, and aridity. As these are elements of climate, and as the human body is very much affected

by these states of the air, the subject is one of much practical importance. Before speaking of the methods which have been devised for measuring the amount of vapor in the atmosphere, it will be necessary to say a few words in regard to the relation which exists between air and vapor. In former times it was supposed by the meteorologists that water in the form of vapor was dissolved in the atmosphere, and that it could hold in solution, at a given temperature, only a definite quantity, and when this quantity was present the air was said to be saturated. It was, however, proved by Mr. Dalton that vapor exists in the atmosphere in an almost independent state, its quantity depending, where water is present for its generation, entirely on the temperature. In studying this subject, Mr. Dalton placed two barometers near each other in the same vessel, containing mercury. One of these barometers was used as a standard, and into the other was introduced a small quantity of water, which ascended through the mercury up into the vacuum at the top of the column. A portion of this water immediately flashed into vapor, and by its elastic or expansive force depressed the column of mercury. The tube and its contents were then gradually heated through a series of degrees of the thermometer, and the diminution of the height of the column corresponding to each degree, as compared with the standard, was noted. At each increase of temperature a new portion of vapor was given off from the water, as shown by the diminution of the latter; which vapor, being forced into the same space, increased the density of that already existing, and consequently its elastic force, in accordance with the law of Mariotte; the elastic force, however, was also increased by the increase of temperature, and hence in the table formed from these experiments the increment of elastic force, or of tension of the vapor, as it is called, as measured by the depression of the mercury in the barometer-tube, was in a geometrical ratio, while that of the temperature was only in an arithmetical ratio. By making similar experiments with a small quantity of air, not sufficient to drive the mercury entirely from the tube, and forming a table of the increase of expansive force of the air for every degree of heat, and then allowing a small quantity of water to ascend through the mercurial column, a portion of this would spring into vapor less rapidly than before, and would occupy the interstices of the air, as it were, and, exerting its own elastic force, would depress the mercury an additional quantity to that due to the elasticity of the air. A new table being formed of the elastic force of this mixture for different degrees of the thermometer, and the corresponding figures of the table of elastic force of air subtracted from it, the result was found precisely the same as that given by vapor alone. Another point to be determined was the density or weight of a given volume of vapor of a liquid formed at a given temperature. For this purpose a large barometer-tube was employed by Gay-Lussac, and a known volume of water, contained in a bubble of very thin glass, was allowed to ascend to the top of the mercurial column, where, by a gentle increase of heat, the bubble was burst, in consequence of the more rapid expansion of the liquid than the glass. The water thus exposed was then converted into vapor by gradually increasing the heat, and at the moment the liquid entirely disappeared the elastic force was noted, and also the volume. By repeating this experiment with different quantities of water at different temperatures, a table of the density of vapor was formed. A table of this kind indicates the ratio of a given volume of the vapor to that of the same volume of air at the same pressure and temperature.

What we have given in the preceding is merely a general view of the process by which the elastic force and density of vapor at different temperatures existing over the water from which it is formed is determined. To form accurate tables exhibiting these relations requires more refined processes, especially such as have been used by Regnault of Paris, for which we must refer to the articles ELASTICITY, DENSITY, etc. Mr. Dalton inferred from his experiments that air and vapor are vacuums to each other—that an equal quantity of each may exist in the same space at the same time, each, however, exerting its own elastic pressure on the sides of the containing vessel. He also arrived at a similar conclusion in relation to the diffusion of different gases through each other, each acting as if it were a vacuum to the other, and repelling only its own atoms. This hypothesis is in accordance with the dynamic theory of heat, and also of the diffusion and elasticity of gases and vapors through each other. That the air is a vacuum to the vapor of water is true only in their statical condition, after time has been allowed for the diffusion of the latter through the former; during the process of diffusion a resistance has to be overcome, and the air itself is expanded.

At no part of the surface of the earth is the air entirely devoid of moisture, and it is rarely at any point so charged with aqueous vapor as that the quantity is equal to that

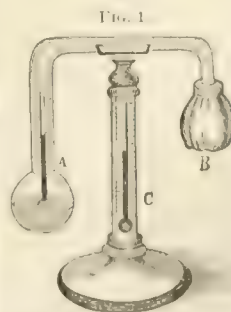


which a given space could contain at the given temperature. This is owing to the prevalence of wind and the slow permeation of the air by vapor. If the air is entirely filled with vapor—that is, if there is as much vapor in it as the space can contain at that temperature—the slightest diminution of the temperature will cause a precipitation of the vapor in the form of dew or mist. If, for instance, at a higher temperature there be present not quite as much vapor as the space can contain at that temperature, then, if the air be cooled down only a few degrees, some of the vapor will be deposited in the liquid state. The temperature at which this takes place is called the *dew-point*. From this it is evident that if the quantity of vapor in the air at its existing temperature be great, the dew-point will be high. All substances exposed to the air will be affected by the deposition of moisture when the dew-point is reached, but many substances will be affected long before this takes place; our bodies, for instance, will experience dampness, although the vapor of the air is far above the dew point. On the other hand, if the temperature be far above that of the deposition of moisture, the air will have a condition of dryness. From these facts it may be inferred that the sense of dryness or dampness does not depend upon the absolute amount of aqueous vapor present in a given quantity of air. If the temperature be very low, although the air does not contain much vapor, yet this may approach very near to the maximum amount which the space can contain at that temperature, and being near the point of precipitation, it will have the characteristics of wetness. If the same mixture of air and vapor be heated up many degrees, the vapor will represent only a small fraction of the amount which can be retained at the higher temperature, and hence the air will feel very dry. In a space saturated with vapor, water ceases to evaporate; and conversely, in a space where there is little vapor in relation to the temperature, water evaporates rapidly. The condition of dryness or dampness of the air is expressed numerically by the conception of relative humidity which is the fraction expressing the ratio between the tension (that is, elastic force) of vapor actually present in the air at a given temperature, and that of the greatest amount of vapor which it can contain at that temperature. The amount representing complete saturation is generally indicated as 100, and on this principle 10, 50, 30, etc., will denote that the air contains 40, 50, or 30 per cent. of the maximum amount which can be contained at that temperature.

We shall now proceed to describe various instruments made use of in hygrometry. For determining the relative dryness or dampness of the air various modes and instruments have been employed; most of the latter in use previous to the experiments of Mr. Dalton would more appropriately be denominated hygroscopes than hygrometers. They consist principally of three different classes: 1st, those composed of substances which are augmented or diminished in weight by a change in the humidity of the air; 2d, those of substances which increase or diminish in volume; and 3d, those of substances which twist or untwist by changes of moisture. Of the first class are sulphuric acid; various deliquescent salts, such as the chlorate of potassa, sulphate of soda, and nitrate and chloride of lime; sponges, paper, etc. A given weight of these substances being suspended from one end of the beam of a balance, counterpoised at the other by a weight, so that the beam will be horizontal when the substance is in a state of extreme dryness, or, in the case of sulphuric acid, in the condition of a given degree of density, by an increase in the moisture of the air the weighted end of the beam rises, and by an index indicates the change in the moisture of the atmosphere. All the instruments of this kind are affected by temperature, as well as by the moisture of the air. The amount of water absorbed by sulphuric acid is less at a high temperature, and the affinity of all substances for moisture varies with the temperature. Hygroscopes of the second class, those that depend upon change of volume of bodies, consist chiefly of hair, of threads of silk, of linen, of hemp cords, of goldbeaters' skin, of slips of whalebone, of ivory, and of wood. The most celebrated of these is that of the hygroscope of Saussure, which consists of a human hair deprived of grease by boiling it in a weak solution of carbonate of soda. This, being fixed at its upper end, is stretched by a small weight after passing round a delicate pulley to which a hand is attached; by an increase of moisture the hair expands, the weight at the other end descends, and the pulley turns, giving motion to the hand or pointer, which indicates the degree of moisture by pointing to the division on a graduated arc. This instrument is graduated experimentally by placing it in air which has been dried by sulphuric acid, and afterward in a vessel saturated with moisture; the extreme positions of the pointer in these two conditions is divided into 100 parts called degrees. In using the instrument a correction must be applied for

temperature, which is also ascertained by direct experiment. A simple hygroscope which will serve to indicate a greater or less degree of humidity is formed by a long fishing-line (previously boiled in a weak solution of carbonate of soda), fastened at one end and passed backward and forward along a corridor over pulleys, with a weight to keep it tense at the farther end. By increase of dampness a greater amount of water is absorbed, the transverse diameter of the cord is increased, its linear extent diminished, and the weight consequently rises. A pointer attached to the weight indicates changes in the moisture by an arbitrary scale. An amusing hygroscope of this class can be constructed of two pieces of wood glued together, one of which is soft and readily absorbs moisture. For this purpose a rectangle is formed of one piece of say 6 or 8 inches in length and 2 inches in width, the longer axis of which is in the direction of the fibre of the wood; to this is glued another piece of the same dimensions, of which the fibre is at right angles to the length. If the gluing has been effected in a dry condition of the wood, the compound structure will be straight; if, however, the air is afterwards charged with vapor, the wood will absorb moisture and expand unequally in different directions, assuming the form of a bow. If, now, into the slip of wood having longitudinal fibres four stiff wires, sharpened at the outer end, be inserted, so as to resemble the legs of a table, with the exception that each is inclined at an angle of 30° or 40° to the perpendicular, and then the arrangement be placed on a long shelf of soft wood, it will travel in the course of a season from one end to the other. By an increase of moisture the upper surface will become convex, and the hinder feet will be drawn forward, while the fore ones, on account of the direction of their action, remain fixed; when the moisture diminishes, and the wood resumes its straight form, the fixed points will be the hind feet, the fore ones being projected forward. In this way a progressive motion will be produced with every variation of moisture. The effect will be increased by making the lower slip of some hard wood and covering it with varnish, while the upper slip with transverse fibres is of soft wood and exposed to the action of the air. The wood may be cut into the shape of an animal. An example of the third class of hygroscopes is catgut, which untwists when moist and twists when dry. There is a well-known toy in which there are two figures, a man and a woman, suspended by a piece of this substance, and so adjusted that the man comes out of the door when it is damp, and the woman when it is dry.

All these instruments, as we have said, indicate, rather than measure, the hygrometric state of the air. We shall now proceed to describe instruments by which the state of the air with regard to moisture can be determined with precision; and such are denominated hygrometers. The first of these is Daniell's dew-point hygrometer. This instrument (Fig. 1) is composed of two glass bulbs; the one, A,



Daniell's dew-point hygrometer.

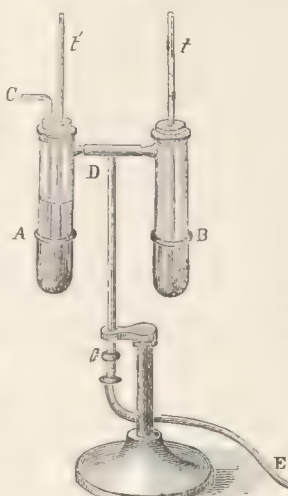
is more than half filled with ether, and contains a delicate thermometer, the bulb of which is plunged in the liquid. The space above is void of air and of everything but the vapor of ether. The bulb B is covered with fine muslin, upon which, during the experiment, ether is dropped. The evaporation of this produces intense cold, in consequence of which the ether vapor inside B is rapidly condensed, and hence the ether in A as rapidly evaporates. The evaporation of the ether in A cools the bulb until the air surrounding it sinks below the dew-point. Dew is therefore deposited on the outside of A, which is made of black glass, in order that this deposition may be more readily observed. At the moment of the deposition the temperature is read from the column of the thermometer in A. When the dew disappears as the temperature rises by ceasing to drop ether on the bulb B, the same thermometer is read again, and the mean of the two readings is taken as the temperature of the dew point. A thermometer, C, placed on the outside of the column which supports the instrument, gives the temperature of the air at the moment of observation. B, taken from a table the elastic force or tension of vapor at the temperature of the air, as given by C, and also the tension of vapor at the temperature of the dew-point, the ratio of the two numbers, the first being called 100, will give the relative humidity. The dew-point may also be obtained approximately by suspending a thermometer in a bright metallic



tumbler half full of water at a temperature a little above the dew-point, and gradually cooling it by pouring in ice-water until dew begins to appear on the surface of the metal; at this moment the temperature of the dew point is indicated by that of the immersed thermometer. In making this experiment care must be taken to stir the water in the tumbler, and not to suffer the moist breath to fall upon the tumbler. The objection to this method is its want of delicacy, and the liability to produce a local dew-point by the evaporation of the water.

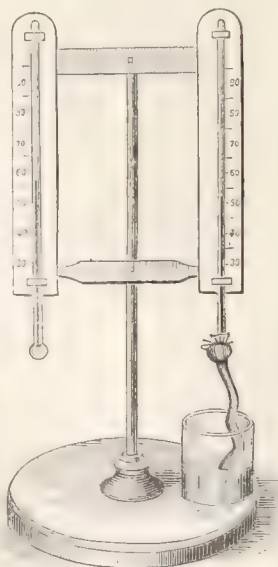
Regnault's dew point hygrometer is an improvement upon that of Daniel. It consists (Fig. 2) of two tubes or

FIG. 2.



Regnault's dew-point hygrometer.

FIG. 3.



Mason's wet and dry bulb hygrometer.

ment that the evaporation is greater when there is a current of air, but it must be remembered that the same current tends to elevate the temperature of the covered bulb in nearly the same proportion. By comparing the indications of this instrument with that of the Regnault hygrometer, a table may be formed experimentally by which the dew-point and elastic tension of the air can be determined at once by inspection. Dr. Apjohn of Trinity College, Dublin, who has given much attention to this subject, has obtained the following formulas:  $f' = f \frac{d}{81 + \frac{h}{30}}$ , in which  $f$

denotes the maximum elasticity or tension of vapor corresponding to the temperature of the wet-bulb thermometer;  $f'$  the elasticity of vapor present in the air which we desire to find;  $d$  denotes the difference in degrees of Fahrenheit's scale between the two thermometers; and  $h$  the height of the barometer when accuracy is required. This formula is for temperatures above  $32^\circ$ . For temperatures below this point the formula is  $f' = f \frac{d}{96 + \frac{h}{30}}$ . Having found  $f'$ , or

the elasticity or tension of vapor present in the air, we have only to look in our table for the temperature of saturated vapor  $f$ , which gives the dew-point. A series of tables for facilitating the process of obtaining the relative humidity by means of the wet and dry bulb thermometers, as well as by the dew-point instrument, have been constructed for the Smithsonian Institution by Prof. Guyot of Princeton College, which are now in general use in this country and in various parts of Europe. JOSEPH HENRY.

**Hyk'sos, or Hykshos** ("shepherd kings"), the name given by Manetho to the kings of the fifteenth, sixteenth, and seventeenth dynasties in Egypt. Their capital was Tanis in the Delta, the "Zoan" of the Old Testament, now called *Sân*. Important discoveries recently made there by Mariette throw much light upon this very obscure portion of Egyptian history. The Hyksos were not, as some have supposed, the Hebrews, but probably a collection of the nomadic hordes of Arabia and Syria, mostly Canaanites. They were not mere savage conquerors, but adopted Egyptian manners and customs and worshipped Egyptian gods. They held the country for about 500 years—according to Mariette, from about 2200 B. C. to about 1700 B. C.; Poole and Wilkinson say from about 2000 to about 1500 B. C. The present inhabitants of *Sân* and the shores of Lake Menzaleh have exactly the same Semitic cast of features as compared with the regular Egyptian type. R. D. HITCHCOCK.

**Hylosaurus** [Gr. *hyla*, a "forest," and *sauros*, a "lizard"], a large extinct reptile from the Wealden of England, belonging to the order Dinosauria. It was described by Mantell in 1832. The teeth are small in proportion to the size of the animal, close together, and set in sockets, with a subcylindrical fang and a somewhat compressed, expanded, and incurved crown, having the borders of the apical half straight and converging to a blunt apex, but not serrate, and indicating, according to Owen, a mixed or vegetable diet rather than a carnivorous one. The skin appears to have been defended by subcircular bony scales, and large bony spines indicate the existence of a strong crest along the back. The length of this animal may have been twenty-five feet, and the particulars of its structure, so far as known, correspond with those of other Dinosauria, for which see article on *HADROSAURUS*. O. C. MARSH.

**Hy'lidæ** [from *Hyla*, the ancient name of the "tree-frog"], a family of batrachians of the order Salientia or Anura, with the vertebrae proœlian; the sacral diapophyses dilated at their extremities; the coccyx articulated by condyles; the external metacarpals bound together; the terminal phalanges articulated below to the extremity of the penultimate, swollen at the base, and with slender curved and claw-like ends; fronto-parietal bones shortened anteriorly, and usually embracing a fontanelle; superior plate of ethmoid never covered by fronto-parietals, and usually produced anteriorly between the fronto-nasals. The family, with the limits thus given, embraces the ordinary tree-frogs of America and forms related in structure inhabiting other parts of the world. It has been thus limited by Prof. Cope, independently of adaptation to arboreal life, and solely with reference to the agreement of its members in the particulars of structure implied in the definition. Almost all the species of the family, however, are arboreal, living among the branches of trees. Some of them, at least, undergo their development out of water, and come out from the egg with the form of the adult, the tadpole stage being very transitory, or suppressed and limited to intraovial life. The toes are dilated at the extremities into round pellet-like extensions which act as suckers. Prof. Cope has recognized 17 genera and 132 species with the characters assigned to the family. These are distributed in the northern



hemisphere, as well as in South America and Australia, but none are found in Africa. The types of structure, however, are distributed in a very unequal manner; thus, of the known species, more than half belong to the genus *Hyla*, and most of these are South American, a number, however, being found in Australia and North America. Of the other generic types, 13 are peculiar to tropical America, and except *Trachycephalus* have only one to three species each, while Australia has only a single peculiar and monotypic genus (*Romoides*), in addition to its *Hyla*. Two genera (*Acis*, with one species, and *Chorophylus*, with five) are peculiar to North America, and twelve species of *Hyla* are also inhabitants thereof. (See Cape, *Trans. Acad. Nat. Sc. Phila.*, n. s., vi, 83-88, etc.) THEODORE GILL.

**Hylobat'ine** [Gr. *hyla*, "wood," and *batein*, to "walk"], a sub-family of apes embracing the long armed gibbons, and contrasting with the group Simiinae (including the gorilla and chimpanzee), and distinguished from them by the slender form; the ilia of the pelvis not alate; the cerebrum scarcely or not at all projecting backward over the cerebellum; the molars of the upper jaw with no oblique ridge; and the buttocks provided with callosities. The gibbons thus form an intermediate link between the large apes and the typical monkeys of the Old World, although they are most nearly related to the apes. They live chiefly among the trees, swinging to and fro with their very long arms. They delight in fruit. When walking they generally apply their knuckles to the ground, and yet stoop but little, but sometimes walk erect with their long arms thrown upward and used as balancing-poles. To this group belong two genera, *Siamangus* and *Hylobates*. THEODORE GILL.

**Hymen** [Gr. *hymn* or *hymenos*], the Greek god of marriage, perhaps a personification of the nuptial song, called also *hymen*, and probably related etymologically to *hymn*. The mythus of Hymen varies greatly. He is represented as a comely youth bearing the bridal torch.

**Hymenoptera**. This extensive and interesting group of insects comprises the bees, paper, wood and sand wasps, ants, ichneumon-flies, gall-flies, and saw-flies. There are estimated to be 25,000 species, of which perhaps 5000 species inhabit the U. S., the number of ichneumon-flies and their allies carrying the number up. Their range is not confined to the tropics and temperate zone alone, but a few species occur near the North Pole, a humble-bee and several species of ichneumon-flies having been found in Polar Bay, the northernmost point yet reached. Their geological range is not great, the earliest species known occurring in the Jurassic formation, while other well-developed insects (Neuroptera) have been found as low down as the Devonian formation.

The Hymenoptera (so called from *hymen*, a "membrane," and *pteron*, a "wing") are usually characterized by the four membranous, naked wings, with a peculiar arrangement of the veins, the hinder pair being much smaller than the others; by the large head; the complication of the mouth-parts, the jaws being adapted for biting as well as seizing prey, while the maxilla and labium are much elongated and adapted for lapping the sweets of flowers; the ligula, or so-called tongue, which is a prolongation of the labium or under lip, sometimes attaining a great length; by the presence of a well developed ovipositor—in the ants, wasps, and bees modified to form a sting. The more important character separating the Hymenoptera from other insects is the fact that in all except the saw-flies the thorax consists of four rings, the fourth being the basal ring of the abdomen, which in the course of the transformations of the bee or wasp is thrown forward on to the thorax or middle region of the body. This indicates a transfer of force headward, an admirable instance of the law of cephalization discovered by Prof. Dana. For these and other anatomical features, their social instincts, the differentiation of the sexes in certain groups, and their complete transformations, the Hymenoptera stand at the head of the insect series. The young, or larvae, are white, soft, fleshy, and worm-like, without feet, except in the young of the saw-flies, which closely resemble caterpillars. All except the latter are fed by the parents either directly or from stores of honey and pollen or animal food laid up before their birth by their parents. The pupa is inactive, closely resembling the adult, and protected by a thin silken cocoon, except in the saw-flies, which approach the Lepidoptera in spinning a dense cocoon, as well as in the caterpillar-like form of the larva.

The anatomy of the Hymenoptera is very complicated, and greatly modified in accordance with the varying habits of the different species. They have a sucking stomach opening into the long oesophagus. The salivary glands consist of two short ramified tubes, often contained entirely in the head. The honey is formed, by some chemical change as yet unknown, from the food contained in the crop, which

is regurgitated into the honey-cells. A characteristic of those species provided with a sting is the two large poison-glands situated in the end of the abdomen. The poison secreted in them is discharged into a pear-shaped sac lodged near the base of the sting, which is provided with a peculiar muscular apparatus for its sudden extension and withdrawal. The poison has as a base formic acid, which imparts the poisonous properties to the secretion. The sting may be seen in a rudimentary condition under the integument of the larva. At that period it consists of three pairs of simple appendages or buds, which, by their increase in length and by changes in the form of the segments at the end of the body towards the close of the pupa state, form the sting. Just previous to this period the three pairs of long blades may be separated, the two outer pairs ensheathing the inner, which are barbed, and constitute the sting proper.

Another feature of much interest in the bees is their power of secreting wax. This is accomplished by special minute one-celled glands lodged just under the skin, opening externally by pores connecting with a fine chitinous tube in the integument. In the honey-bee these pores and glands are situated on the under side of the abdomen. In the stingless bees (*Trigona*) the wax is secreted on the upper side. The jaws of the bees and wasps are rounded at the extremity, with slightly marked teeth. This form is of use in the honey and pollen gathering bees, while in those species which build clay nests they are used as trowels. In the carnivorous wasps, such as the *Sphex* and *Pompilus*, the jaws are sharp and hooked, adapted for seizing and retaining large insects. The legs are also exposed to much variation in the different genera. For example, in the hind legs in the pollen-gathering bees, such as the honey and humble-bee, the tibia or shank is very broad and hollowed out on the outer side, while stiff bristles project over the depression from each side, forming the honey-basket (*corbiculum*) in which the masses of honey and pollen are piled up. The mode in which the bee collects the pollen is very curious. She gathers it from the flowers with her mandible, from which it is removed by the anterior pair of legs. From there it is passed to the intermediate pair of legs by manifold scrapings and twistings of the limbs, whence it is by similar manoeuvres deposited on the hind legs. (Shuckard.) In the fossorial species, on the contrary, the legs are slender, but very hairy. The sand-wasp, or *Sphex*, for example, by the aid of its large sickle-like mandibles, which are of use in removing small stones and gravel, digs a hole from four to six inches deep in half an hour. The hairy legs are used much as a dog does its paws, and with perhaps nearly equal intelligence. The carpenter-bee and wood-wasp by means of their powerful jaws tunnel regular holes several inches deep in solid wood, the stems of plants and shrubs, or the trunks of trees. The complicated, many-chambered nests of the ants are familiar objects. Indeed, there are no insects which in their structure are more highly differentiated than the various genera of Hymenoptera, and we find in them an intelligence and power of adaptation to new and unforeseen circumstances which evince something more than "blind instinct," in fact, a reason perhaps not inferior to that shown by many of the vertebrate animals, and differing but in degree from that of man.

Not only is the individual structure of the Hymenoptera highly complicated, but in certain genera of bees, wasps, and ants there is a differentiation of the individual into three instead of two sexual forms—i. e. males, females, and workers (wrongly called neuters), the latter being sexually undeveloped females. In the bees and wasps the workers differ from the queen in having undeveloped ovaries and incomplete accessory organs, but differ externally only in size, being a little smaller than the females. In the ants, however, while the workers are much smaller, they are also wingless, and differ in the proportions of the body.

The honey bees and certain wasps and gall flies lay eggs which produce young without being fertilized by the male. Von Siebold discovered that only the queens' and workers' eggs are fertilized by the spermatozoa stored in the *receptaculum seminis* of the female. These she can fertilize at will—the only animal known to possess this power of producing either sex at pleasure, and retaining the power for a period of five years, as the muscle generating the dart leading from the sperm bag are supplied with a reserve, being thus rendered voluntary and subject to her will. When she wishes to lay an egg to produce a male, the egg is allowed to slip out of the oviduct past the entrance of the receptaculum seminis, kept closed by the voluntary muscle. Drone eggs are also laid by unfertilized queen bees, and in some cases even by worker bees. It is well known that bees when deprived of their queen select several worker eggs or very young larvae for the purpose of rearing queens. "The cells in which these eggs are situated are lengthened out



and the end turned downward." Whether, as Leitch (from whom we have quoted) thinks, the development into a queen is caused by the increased temperature of the queen-cell, or, as Huber previously thought, by being fed with different food (the royal paste or jelly), is not entirely settled. Probably both causes—i. e. a higher temperature and richer food—taken together, are sufficient to produce an increased development of the young and an acceleration in the development of the ovaries. We know that the virgin reproduction of the *Aphis* is terminated on the approach of cold weather, and that differences in temperature and the density of the saline lakes in which the *Artemia*, a crustaceous animal, lives, causes it to develop either by laying eggs in the normal way or to reproduce parthenogenetically. Von Siebold has also ascertained that the common European *Polistes Gallica* reproduces parthenogenetically, the workers laying eggs without intercourse with the males. The Cynipides, or gall-flies, have long been supposed to reproduce in this manner, but it has recently been proved to be the case by an American entomologist, Mr. Walsh. He ascertained that a species of *Cynips* in Illinois in the autumn is represented by females alone. These lay eggs, and the spring brood consists of males and females. He proved this by colonizing certain trees with a number of individuals of *Cynips quercus-ovoidata*, and finding the next spring that the eggs laid by them produced *C. quercus-spongifica*. The autumn brood of *Cynips* consists entirely of agamous females, while the vernal brood consists of both males and females; and Mr. Walsh declares, after several experiments, that "the agamous autumnal female form of this *Cynips* (*C. q. aciculata*) sooner or later reproduces the bisexual vernal form, and is thus "a mere dimorphous female form" of *Cynips q. spongifica*. Mr. H. F. Bassett states in confirmation that in Connecticut *Cynips quercus-operator* is double brooded; thirty of one brood of females ovipositing in the buds of *Quercus ilicifolia*, while some of a second brood oviposited in the young acorns of the same species of oak. From these and other facts he infers "that all our species that are found only in the female sex are represented in another generation by both sexes, and that the two broods are, owing to seasonal differences, produced from galls that are entirely distinct from each other." Here again, we find temperature the main active agent in inducing an abnormal mode of generation, the eggs laid by the fertilized female in the heat of summer producing agamous females.

With the exception of the white ants, which belong to the Neuroptera, the Hymenoptera is the only group of insects affording species which are truly social and live in colonies. In the social species there are almost invariably three sexual forms, the workers forming the large majority and doing most of the work of the colony. They even assist largely in rearing the young, the males and females not usually laying up food or providing for their offspring. This division of labor is carried on unequally in the different species, and is best marked in the honey-bee, whose colony contains but one female, the queen. In the colonies of the ants there are numerous males and females, and in some genera (*Phidole*, *Eciton*) two sorts of workers—one with a large head, called a worker major or soldier, and the usual form or worker minor. In the honey-ant of Texas and Mexico, while the normal workers are of the usual shape and perform the active duties of the fornicarium or nest, the large worker is inactive and does not quit the nest, but lies almost immovable in its gallery, and elaborates a kind of honey in its abdomen, which swells up as large as a pea. Certain ants also enslave other species, making them do the work of the colony. They also herd aphides in their underground nests, and entertain as permanent visitors certain beetles, thus adding much to their labors and to the complexity of their social life.

The following synopsis presents briefly the characters of the more important families of Hymenoptera, beginning with the lowest:

1. Body short, abdomen sessile, and provided with an ovipositor forming a saw; larvæ caterpillar-like, with 9-11 pairs of legs: *Tenthredinidæ* (saw-flies).
2. Like saw-flies, but the body longer; larvæ with six thoracic legs, and abdomen ending in a horn: *Uroceridæ* (horn-tails).
3. Minute, with a short compressed abdomen, and a slender long ovipositor: *Cynipidæ* (gall-flies).
4. Body slender, with a long prominent ovipositor: *Ichneumonidæ* (ichneumon flies).
5. Body usually short and small, ovipositor short, inconspicuous; antennæ elbowed; wings with one vein, with metallic colors: *Chalcididæ* (ichneumon-flies).
6. Minute; wings with one or no veins: *Proctotrypidæ* (egg-parasites).
7. Body oblong; skin very dense, with a powerful sting: *Chrysididæ* (cuckoo-flies).
8. Body slender; antennæ elbowed; wingless workers: *Formicidæ* (ants).
9. Ant-like; body very hairy, with a powerful sting: *Mutillidæ*.
10. Body hirsute, with short, hairy, spiny legs; eyes often lunate; species often of large size and gayly colored: *Scoliidæ*.
11. Antennæ long; body compressed; color usually blue: *Pompilidæ* (sand-wasps).
12. Like the *Pompilidæ*, but the body not compressed, and abdomen petiolated: *Sphegidæ* (sand and mud wasps).
13. Somewhat like the *Sphegidæ*, but with the abdomen sessile and oval, conical: *Larridæ*.
14. Head large, body flattened, highly colored: *Bembecidæ*.
15. Body with a long, club-shaped, or a conical sessile abdomen; antennæ clavate: *Nysionidæ*.
16. Head large, cubical; fore legs of males variously modified in form; body high colored, like the wasps; tongue short: *Craheonidæ* (wood wasps).
17. Males, females, and workers; fore wings folded once longitudinally: *Vespidæ* (paper-wasps).
18. Males, females, workers; social in the higher genera. Body usually hirsute; tongue long; living in nests or underground tunnels: *Apidæ* (bees).

A. S. PACKARD, JR.

**Hymettus**, a mountain-ridge of Greece, 44 miles S. E. of Athens, 2680 feet high. The honey collected here has been famous from remote antiquity to the present time for its exquisite flavor.

**Hymnology** [Gr. ὕμνος, a "festive song" or "ode," and λόγος, "discourse"], the science of sacred lyrical poetry. A hymn, according to St. Augustine, "must be praise to God in the form of song." By the looser definition which prevails now, it is a lyric expressive of religious feeling, or celebrating, however indirectly, the object of worship. The Greek pagan hymns were in honor of gods and heroes, and were usually sung at their festivals. (See a fine example, translated, in Mr. PALGRAVE'S *Lyrical Poems*, p. 258.) A parallel may be traced between these and the Christian hymns for saints' days, etc. The more ancient Greek hymns, as Homer's, are chiefly descriptive, and are considered epic; the later ones, as of Callimachus and Pindar, lyric. In most of these, to a modern mind, the devotional and ethical elements are wanting; not, however, in Cleanthes' "Hymn to Zeus," and in the noble (unmetrical) outburst of Epictetus, "Of Providence," end of chap. xvi., B. 1. The Oriental sacred books, especially the Vedas, contain many hymns, which have received no little attention of late. Of all the sacred poems of antiquity, the Jewish Psalms of course are the most familiar and most precious. They have become practically incorporated with Christian hymnody, and their influence has been great on all its developments.

Christian hymnody is coeval with Christianity; from the Christmas song of angels the lyrical element had large place among the belongings of the new religion. Every language in which the gospel was proclaimed had probably very soon its own supply of sacred verse. The "Tersanctus," the "Gloria in Excelsis," and the "Te Deum" are of early though unknown date. The Syriac hymns of Ephrem (d. 381) have been translated. (For primitive Greek hymns in an English dress see *The Voice of Christian Life in Song*.) Clemens Alexandrinus and Gregory Nazianzen are the earliest Christian hymnists or hymn-writers known. In later times Anatolius, Andrew of Crete, John Damascene, Cosmas, Stephen the Sabaite, Theodore and Joseph of the Studium, Methodius, Theotistus, Metrophanes, and others supplied the wants of Greek worship till the tenth century. Some of their productions are exquisitely translated in Dr. NEALE'S *Hymns of the Eastern Church*. (See also MRS. BROWNING'S *Greek Christian Poets*.)

The seed of religious song was soon carried into Latin soil, where it bore yet more abundant though hardly richer fruit. (See Dr. NEALE'S paper on "Sacred Latin Poetry," *Encycl. Metrop.*, vol. "Roman Literature.") The great name here is Ambrose (d. 397); he founded a school of hymn-writers, and had many now forgotten imitators, whose work is often indistinguishable from his own. The Ambrosian hymns are marked by a severe simplicity, which to readers unfamiliar with them may seem hard and dry. After him came Prudentius (d. about 413), Venantius Fortunatus (d. 609), Gregory (d. 604), Bede (d. 735), Theodulph (d. 821), Rabanus Maurus, Godeschalvus, and many others. By degrees these mediæval hymnists assume a more ornate style and a more passionate devotion. St. Bernard (d. 1153) and his namesake, the monk of Cluny, have given us glowing strains, than which none are more precious to English and American worshippers of our day. Peter Damiani (d. 1072), Hildebert (d. 1133), Hildegarde (d. 1179), Adam of St. Victor (d. 1192), and Thomas Aquinas (d. 1274) were also no mean poets. Some of the world's



most famous hymns, produced at this period, are of doubtful origin or by authors who are known by a single piece: thus, eminent for grandeur, "Veni Creator Spiritus" and "Dies Irae" (by Thomas à Celano), and for loveliness or pathos, "Veni Sancte Spiritus" (Robert II. of France), "Stabat Mater" (by Jacopone), and "O Deus, Ego amo Te," unquestionably ascribed to Xavier. One or two moderns have written good Latin hymns, as the brothers Santolius Maglorianus and Victorinus (d. 1684, 1697), and Charles Coffin (d. 1749). For this department of literature see the Roman and Parisian *Breviaries* and DANIEL'S *Theaurus*; and for translations, the works of Newman, Chandler, Mant, Isaac Williams, Caswall, Copeland, Campbell, Blew, Neale, Chambers, Kynaston.

With the Reformation came a new birth of lyric fervor, and great waves of sacred song in the vernacular rolled over the Protestantizing lands. Clement Marot rendered the Psalms into French metre, and Calvin himself wrote a hymn or two. But the effort was naturally greatest in Germany, where arose by degrees what is probably the largest, and claimed by many to be the finest, body of hymns in any language. (For this subject see MISS WINKWORTH'S *Christian Singers of Germany* and MR. KÜBLER'S *Historical Notes to the Lyra Germanica*, and especially KOCH'S *Geschichte des Deutschen Kirchenlieds*, 3d ed. 7 vols.) Luther led the van, and was closely followed by Hans Sachs, Paul Eber, M. Weiss and other "Bohemian Brethren," N. Hermann, Selnecker, Nicolai, etc. We can mention but a few names of the following centuries, in chronological order: Stegmann, Meyfart, John Heermann, Rinkart, Rist, Geisnius, Clausnitzer, Alberti, Paul Gerhardt (1606-76), by common consent the greatest of German hymnists; John Frank, Neumark, Scheffler or Angelus Silesius, Von Rosenroth, Tersteegen; J. Neander, Von Canitz, C. F. Richter, Rodigast, G. Arnold, Laurenti, A. H. Franke, Bogatzky, Zinzendorf (who was followed by other Moravian writers), S. Frank, Schmolke; Gellert, Klopstock, Novalis, Fouqué, Spitta, Knapp, Lange, Meta Heusser. The various schools among which these poets divide are elaborately discriminated by Mr. Kübler. An immense and valuable collection of over 3000 hymns has been made by Albert Knapp—*Liedererschatz*. Many German hymns have been rendered into English by John Wesley, 1739-40; by Jacobi and Haberkorn, 1722-60; by the Moravians, 1754, etc.; and more recently by Miss F. E. Cox, A. T. Russell, R. Massie, Miss Borthwick, and others; specially by Miss Winkworth, whose *Lyra Germanica* (2 vols.) and *Chorale Book* have added much to our English stock.

The Scandinavian countries have their own hymnic supplies, and are proud of them, but these are little known to English readers. In Italy and France there is not so much material of this sort. Many sacred lyrics of Madamo Guyon (d. 1717) were translated by Cowper in 1782.

In England hymnody was a plant of late growth; its place was long filled by psalmody. Myles Coverdale, one of the Reformers, in 1535 put forth forty *floridly Psalmes and Spiritual Songs*, but there is no evidence of these having come into use. A better fortune attended Thomas Sternhold's *Psalmes* (1549), completed by Hopkins and others in 1562: this *Old Version* became popular, and was bound up with the Prayer Book for nearly three centuries. It was afterwards in part superseded by the *New Version* of Tate and Brady (1696). Meantime, the Puritans used the Scotch version by Francis Rous (1645). Hymns, as such, were not written till later, for George Herbert and his contemporaries were sacred poets rather than hymnists. A beginning on a small scale was made by Bishop Jeremy Taylor (1655), and followed up by John Austin (1668), R. Baxter (1641), and eminently by John Mason (1683), whose hymns were perhaps the first to be sung to any extent in England as accessories of worship. William Barton, Joseph Stennett, and Bishop Ken had also the honor of preceding Dr. Watts. The latter is properly the father of English hymnody; the appearance of his *Hymns* in 1707-09, and of his *Psalms* in 1719, introduced a new era; they were hailed with delight by the bulk of Dissenters, and for a long time by them used exclusively, or nearly so, in Britain and America. The publication of Charles Wesley's first hymns in 1739 marked another era. He is the most voluminous of sacred poets, and one of the most gifted. For fifty years he continued publishing, and his verses, recently collected, fill thirteen volumes. The influence of these lyrics was great in promoting the Wesleyan revival. John Wesley also wrote hymns, though but few. His great *Collection* (1779), composed chiefly of his brother's pieces, was long used by the Methodists everywhere, and is still the basis of their various hymn books. The other hymnists of the eighteenth century, except Addison, Pope, and Byron, were chiefly followers either of Watts or Wesley, or of both. To the first school belong Simon Browne, the Scotch Paraphraser, Gibbons, Beddome, Fawcett, Hawes, S. Stennett, T.

Scott, Needham, Mrs. Barbauld; to the second, Cennick, Hammond, Olivers, Toplady. Hart, Cowper, Newton, Medley, W. Williams, Ryland, Grigg, Perronet, Seagrave, Robinson, Shirley, and others, show the influence of both masters. (Much of our knowledge of these old authors is due to Mr. Daniel Sedgwick of Bishopsgate, London, who for many years has made hymnology a special study.)

With the present century arose James Montgomery, whose services and influence in this field were great, and Thomas Kelly. The year 1827 was marked by the appearance of Bishop Heber's *Hymns* and of Keble's *Christian Year*. About the same time Sir J. Bowring, Sir R. Grant, Conder, Edmeston, Reed, Lyte, Miss Auber, and Mrs. Adams wrote; more recently Charlotte Elliott, Dr. Bonar, George Rawson, T. T. Lynch, T. H. Gill, and many others. Faber, Caswall, and Bridges belong to the Romish Church. That of England, long negligent in this particular, was awakened to its importance by the Oxford movement of 1833, and a fresh and increasing tide of lyric life has since been poured in. Dr. Neale, Dean Alford, Bishop Wordsworth, Dr. Monsell, Mrs. Alexander, Sir H. W. Baker, Earl Nelson, F. T. Palgrave, W. C. Dix, J. Ellerton are noticeable names. New and carefully prepared hymnals are constantly appearing, and the material for them is increasing every day. In no previous age, perhaps, were more and better hymns written than now.

In America, having the literature of England at her back, comparatively little has been done or was needed. Davies, Dwight, Doane, Onderdonk, Muhlenberg, Bryant, Alexander, Pierpont, Furness, Cox, Ray Palmer, Sears, and others have given us hymns, a few of which will not die. Here, as in England, attention is being paid to hymnology, and the improvement in this department of knowledge and worship is already visible. We have better hymnals than our ancestors had, and the next generation will have still better. Various books have been written on the bibliography of hymnology, but none that thoroughly covers the entire ground. The best thus far is Josiah Miller's *Singers and Songs of the Church* (1872).

FREDERIC M. BIRD.

Hynes, tp. of Russell co., Ala. Pop. 1120.

**Hynobi'idæ** [etymology uncertain], a family of salamanders established by Prof. Cope, and with the cranium deficient in an anterior axial bone; the palatines contiguous and prolonged over the parapsphenoid, and with teeth on their posterior external margins; the prefrontals and pterygoids are well developed; the frontal not embraced by parietals and prefrontals; the orbito-sphenoid separated by a membranous wall from the prootic; the postfronto-squamosal arch is atrophied, and the occipital condyles are sessile. The family includes a single genus (*Hynobius*) from Japan, and is most nearly related to the Desmognathidæ and Plethodontidæ of the U. S. THEODORE GILL.

**Hyodon'tidæ** [from *Y*, *i. e.* the U-shaped or hyoid bone, and *δόντις*, "tooth"], a family of isospondylous teleostcephalous fishes, having a herring-like form; cycloid scales; head scaleless; the margin of the upper jaw formed by the supramaxillaries on the side, and with those bones articulated to the extremities of the intermaxillaries; and the dorsal fin behind the anus; the stomach is not cæcal, and has only one pyloric appendage; the air-bladder is simple; the ovaries discharge their eggs first into the abdominal cavity. This group has been constituted especially for the reception of the "moon eye herring" (*Hyodon tregianus*) of the lakes and Western rivers, to which it is peculiar. It is most nearly related to the Clupeids (herrings, shad, etc.).

THEODORE GILL.

**Hyoganoi'deæ** [from *Y*, *i. e.* the U-shaped or hyoid apparatus, and *Γαοίδια*], a super order of ganoid fishes, characterized by the completely ossified skeleton; development of the intermaxillary and supramaxillary bones; the external nasal apertures; the development of the opercular apparatus; and the complete hyoid apparatus (whence the name). It embraces the existing families Amidae and Lepidosteidae, and numerous extinct forms. (See FISHES.)

THEODORE GILL.

**Hy'oid Bone**, a bone comparatively unimportant in man, supporting the tongue, but represented either in an osseous condition or by rudimentary cartilages throughout the Vertebrata, and of great importance in the lower classes, in which it is of increased complexity, forming the support for the branchial apparatus.

**Hyopotam'idæ** [from *ἵκς*, a "hog," and *ποταμός*, "river"], a family of ungulate mammal, belonging to the sub-order Artioductyla and the group with "elenodont" molars (*i. e.* like those of ruminants), with the upper molars crowned with five (ante- + 2 post-) well-developed crescentiform lobes; the canines of the lower jaw simulating and parallel with the incisors; incisors persistent 3-2 in both jaws; dental series interrupted by very long diaste-



mata above and below; and the canine teeth of the upper jaw well developed; the snout was correspondingly elongated; the mastoid processes but slightly developed, and the zygomatic processes of the squamosals were directed forward and backward from their bases: the lower jaw had its rami produced backward, and frequently armed with tubercles projecting outward from the sides towards the front. This family was richly developed in the early Tertiary period, and especially in the Eocene and Miocene ages. The name *Anthracotheiidae* has been also given to the group. It embraces numerous genera and species, among which are *Hypotamias* (with its synonyms or sections, *Ameobius*, *Cyplogasthus*, *Bothriodon*), *Anthracotheiium*, *Tapinodon*, *Diplopus*, etc. The richest field in which their remains have been found are the Miocene deposits of Auvergne in France, and near relations have been found in this country in the Oreadontidae or Merycodontidae. The species varied in size, from dimensions little more than those of a rat to those of an ass. The members of this family have lately (1875) been the subjects of a very elaborate monograph by Dr. Kowalevsky ("On the Osteology of the Hypotamidae," part i. in the *Philosophical Transactions of the Royal Society of London* (vol. clxiii. pp. 19-95, pl. 33-40). THEODORE GILL.

**Hyop'sodus** [Gr. ὅσος, "hog," ὅςος, "appearance," and ὀδός, a "tooth"], an extinct genus of small mammals from the Eocene of Wyoming, named from its supposed resemblance to the suillines, but now known to belong to the Quadrumana. (See QUADRUMANA, FOSSIL.) O. C. MARSH.

**Hyocyanus.** See HENBANE.

**Hyph'ia** [*Ynaria*], daughter of Theon, a Greek of Alexandria, no less renowned for her knowledge of mathematics than of the Neo-Platonic philosophy, which she taught with applause in her native city. Her beauty and modesty were also celebrated, but the clergy believed that she made use of her influence with Orestes, prefect of Alexandria, to the injury of St. Cyril, then the archbishop of Alexandria. Accordingly, she was set upon by a mob led by priests, who carried her into a church, stripped her of her clothes, and then tore her in pieces (415 A. D.). Theodoret accuses Cyril of instigating this murder, but of his guilt there is no proof.

**Hyper'bola** [Gr. ὑπερ, "over," and βάλλειν, to "throw"], a plane curve that may be generated by a point moving in such a manner that the difference of its distances from two fixed points is always equal to a given distance. The fixed points are called *foci*, and a straight line drawn through them and limited by the curve is called the *transverse axis*. The *centre* is that point of the transverse axis which is midway between the foci, and a line through this point perpendicular to the transverse axis is called the *conjugate axis*. This axis does not cut the curve, but it is limited by the condition that the diagonal of the rectangle describes upon it and the transverse axis shall be equal to the distance between the foci. The *eccentricity* is the distance from the centre to either focus, divided by the semi-transverse axis. The diagonals of the rectangle described on the axes indefinitely prolonged are *asymptotes* to the curve; as we recede from the centre the curve continually approaches these lines, becomes tangent to them at an infinite distance, but never crosses them. These asymptotes are the limits of the curve. If *b* is less than *a*, the angle between the asymptotes is acute and the hyperbola is *acute*; if *b* is greater than *a*, the hyperbola is *obtuse*; if *b* is equal to *a*, the hyperbola is *rectangular* or *equilateral*.

The hyperbola is one of the conic sections. The conic surface from which every variety of hyperbola may be cut by a secant plane is a surface that may be generated by a straight line moving in such a manner as to touch a given circle and pass through a given point. The directing circle is called the *base* of the cone, the fixed point is called the *vertex*, the moving line is the *generatrix*, any position of this line is an *element*, and a line through the vertex and centre of the base is the *axis*. The surface thus described consists of two parts, united at the vertex, which are called *nappes*; the lower nappe is the one that is on the side of the base; the other one is called the upper nappe. By varying the position of the vertex with respect to the base, the cone may be made right or oblique, acute or obtuse. If we pass a plane through the vertex of this general cone, it will cut out two elements, and by suitably varying the position of this plane these elements may be made to have any inclination to each other. If we pass a second secant plane parallel to the first, it will cut from the cone a hyperbola whose asymptotes are parallel to the elements cut out by the first plane. The plane of the hyperbola cuts all the elements of the cone except the two to which it is parallel, half on one nappe and half on the other. These points of intersection make up two branches, one lying on the lower and the other on the upper nappe of the cone.

A system of planes parallel to the first cut out a system of similar hyperbolas—that is, hyperbolas whose axes are in a given ratio. If this system of hyperbolas is projected on the plane through the vertex by projectors parallel to the line that joins their centres with the vertex of the cone, these projections will be equal, in all respects, to the curves themselves, and will all have the same rectilinear asymptotes; they will also be curvilinear asymptotes to one another. The lines cut out by the plane through the vertex may be regarded as a hyperbola whose axes are infinitesimal; that is, they may be regarded as the limiting case of this group of similar hyperbolas. If we take the case of an oblique cone, and suppose the vertex to move towards the plane of the base, and ultimately to coincide with it, the cone will reduce to a sector of that plane, the elements cut out by the plane through the vertex will coincide with each other, and planes parallel to the first plane will cut out straight lines limited towards the centre; that is, indefinite straight lines with a part removed. Such lines may be regarded as hyperbolas whose foci are at the vertices of the transverse axis.

Two hyperbolas which are so related that the transverse axis of either is the conjugate axis of the other are called *conjugate hyperbolas*. Two conjugate hyperbolas have the same asymptotes, and their four foci are all on the circumference of the same circle. Conjugate hyperbolas are so related that a complete discussion of either necessitates that of the other; in fact, they ought to be regarded as a single curve with four branches. From this point of view the equation of the complete curve may be written thus:  $\frac{x^2}{a^2} - \frac{y^2}{b^2} = 1$ , in which *a* and *b* are the semi-axes; the upper sign corresponds to the branches whose semi-transverse axis is *a*, and the lower sign to the branches whose semi-transverse axis is *b*. An examination of the above equation shows that there are four values of *y* for each value of *x*, and that these values, taken in pairs, are equal with contrary signs; also that there are four values of *x* for each value of *y*, and that these, taken in pairs, are equal with contrary signs; consequently, the entire curve is symmetrical with respect to both axes. All values of *x* between  $-a$  and  $+a$  render one pair of values of *y* imaginary and the other pair real; all values of *x* less than  $-a$ , or greater than  $+a$ , make both pairs of values of *y* real. In like manner, all values of *y* between  $-b$  and  $+b$  make one pair of values of *x* imaginary and the other pair real; all values of *y* less than  $-b$ , and greater than  $+b$ , make both pairs of values of *x* real. The equation of the common asymptotes of the four branches is  $y = \pm \frac{b}{a}x$ , as may

be shown by a discussion of the general equation of the curve.

Two conjugate hyperbolas may be cut from a pair of conjugate cones, or from a pair of conjugate hyperboloids. Let there be two straight lines intersecting each other at right angles, and let there be a third line lying in their plane and passing through their common point; if the last line is revolved about each of the others in turn, it will generate a pair of conjugate cones tangent to each other, and any plane parallel to their axes will cut from these cones a pair of conjugate hyperbolas whose asymptotes are parallel to the elements of contact. (For particular properties of the hyperbola refer to special treatises on conic sections, of which SALMON'S *Conic Sections* is probably the most full and complete.) W. G. PECK.

**Hyper'boloid**, a surface such that the sections made by passing planes in certain directions are hyperbolas. There are two classes—*elliptical* and *parabolic* hyperboloids. In the former all the plane sections that are not hyperbolas are ellipses, and in the latter all the sections that are not hyperbolas are parabolas. The elliptical hyperboloids are divided into two species—hyperboloids of one nappe and hyperboloids of two nappes. The former are warped surfaces, and the latter are surfaces of double curvature. In the hyperboloids of one nappe every section made by a plane parallel to a tangent plane is a hyperbola, and all other plane sections are ellipses; in the hyperboloid of two nappes every section made by a plane parallel to a tangent plane is an ellipse, and all other sections are hyperbolas. If two conjugate hyperbolas are revolved about either axis, they will generate a pair of conjugate hyperboloids of revolution, and their common asymptotes will generate a cone which separates the two and is a common asymptote to both. The hyperbola that revolves about its conjugate axis generates a hyperboloid of one nappe; that which revolves about its transverse axis generates a hyperboloid of two nappes; and the asymptotic cone is their common limit. Any plane parallel to two elements of the asymptotic cone will cut from the system of surfaces a pair of conjugate hyperbolas.

The parabolic hyperboloid is a warped surface which



may be generated by a straight line moving so as to touch two straight lines and be parallel to a given plane. The fixed lines, which must not be parallel, are called *directrices*, the plane is called the *plane director*, the moving line is called the *generatrix*, and any position of the directrix is called an *element* of the surface. If we take a new plane director parallel to the given directrices, and any two elements of the surface as directrices, and generate a surface in the same manner as before, it will coincide with the surface just described. The surface has therefore a double mode of generation. Through any point of the surface two straight lines can always be drawn that will coincide with the surface, and the plane of these lines will be tangent to the surface at that point. Any plane parallel to a tangent plane intersects the surface in a hyperbola; every other plane, in a parabola.

W. G. PECK.

**Hyperbo-reans** [Υπερβορεοι, "beyond the north wind," or Boreans], a mythical people who, as the ancient Greeks supposed, dwelt in the far North in a happy clime, where sickness, old age, and sorrow were unknown. Herodotus believed that the myth of the Hyperboreans was based upon facts; which opinion, it need not be said, is now known to be incorrect. The myth is variously given.

**Hypercor'acid** [Gr. ὑπέρ, "upper," κόραξ, "crow," and εἶδος, "form"], the upper bone apposed to the inner surface of the great scapular cincture of the typical fishes. It is one of three bones which together are homologous with a single cartilage in the more generalized fishes—i. e. ganoids—and was regarded by Cuvier as the radius; by Owen, as the ulna; and by Gegenbaur and Parker, as the scapula.

THEODORE GILL.

**Hyperides**, a patriotic Athenian orator, b. about 400 B. C., a friend of Demosthenes and a pupil of Plato and Isocrates; began life as a practitioner of law; was faithful to the interests of the people in the contests with Philip, and in 338 B. C. proposed to free all the slaves and enfranchise the resident aliens and the disfranchised Athenians. In 324 he was for a time at variance with Demosthenes, whom he accused of receiving money from Harpalus. In 322 B. C. he was cruelly murdered at Ægina by the emissaries of Antipater. His private character was not above suspicion, but his public acts appear to have been uniformly disinterested and wise. The ancients speak in high terms of the purity and grace of his style, but of his many orations only slight fragments existed up to 1847, when four orations were discovered in Egypt, one of which, ὑπὲρ Εὐξενίππου ("in defence of Euxenippus"), only was entire. Published by Babington (in fac-simile), London, 1850, 1853, and 1858; edited by Blass, Leipzig, 1869, and by Müller in *Orationes Atticæ*, Paris, 1858. (See *Journal of Philology*, vol. i. pp. 109-124.)

**Hyperoar'tia** [Gr. ὑπερῶς, "palate," and ἄριστος, "perfect"], an order of marsipobranchiates distinguished by the development of the skull and the coecal nature of the median external nasal aperture; no duct perforating the palate, which is therefore left entire (whence the name). The branchial apertures are on each side behind the head, and seven in number; the inner branchial ducts debouch into a separate common tube. The ova are small, and superficially like those of fishes. The young undergo a complete metamorphosis after leaving the egg. The larvæ have an elongated slit-like mouth, and are without teeth or eyes. In this condition they were formerly considered to be members of a peculiar group, *Lamprocyti*. At maturity the mouth is circular, surrounded by a lip, and armed with dentigerous lamellæ on its disk, as well as with lingual teeth; enlarged plates above and below the antrum of the œsophagus have been called maxillary and mandibular, but they have no homological relation with the upper and lower jaws of ordinary fishes, and the lower jaw in them is absolutely wanting. This order embraces only a single family of existing species (the Petromyzontidae or lampreys), of which there are at least five genera, three of which are represented in North America. THEO. GILL.

**Hyperotret'a** [Gr. ὑπερῶς, "palate," and τρητός, "perforated"], an order of marsipobranchiates characterized by the structure of the cranial cartilages and the complete tubulation of the median nasal aperture, and its perforation of the palate (and hence the name). The branchial apertures are developed on each side far behind the head, and are variable in number; the inner branchial ducts communicate directly with the œsophagus; the ova are large, and provided each with an oval horny case constricted at each end, and with numerous filaments thereto. The embryology is still unknown. In the adult condition the mouth has no lips and no plates on the disk, but a median tooth is above the entrance of the œsophagus, and two pectiniform rows of teeth on the tongue. The order thus defined is composed of two families—viz. 1. Myxodidae, with

one genus, *Myxine*, represented by species in the northern and southern hemispheres; and (2) Bdellostomidae, whose species are confined to the Pacific Ocean, one of them ascending as far northward as California. THEO. GILL.

**Hypersthene** [Gr. ὑπέρ, intensive, and σθένος, "strength"], the Labrador hornblende, or, more strictly, the thin-leaved, brittle, and bronze-colored variety of pyroxene, an impure ferro-silicate of magnesia. It is often quite handsome, and is cut as an ornamental stone.

**Hypertrophy** [Gr. ὑπέρ, "over," and τροφή, "nourishment"], in pathology, the overgrowth of any part or organ, or the disproportionately large size of such an organ. Hypertrophy is simple, homœoplastic, heteroplastic, or hyperplastic, these terms defining the character of the added material which gives the increased size. It may be caused, 1st, by an increased exercise of the part, an exemplification of which we have in the blacksmith's arm; 2dly, by an increased supply of blood to a part, the part being healthy; 3dly, from some local derangement, as may be seen in exostoses, fatty tumors, etc. The treatment of hypertrophy has been very unsatisfactory; in fact, we can do next to nothing for patients suffering from the first and second varieties. The third should be removed by the knife if any inconvenience is caused. EDWARD J. BIRMINGHAM.

**Hypnotism.** See MESMERISM.

**Hypnum** [Gr. ὑψων, a very large genus of mosses of the sub-order Pleurocarpi and tribe Hypnæe. Many of them are large, and grow on wet ground or on old logs. The U. S. have some 100 species, many of which are European also. There are many sub-genera, some of which are probably worthy of being considered genera.

**Hypochlorous Anhydride; and Hypochlorites, or Bleaching Salts.** The compounds that belong under these heads comprise many of the most valuable of our bleaching and disinfecting agents. *Hypochlorous anhydride*, formerly called hypochlorous acid (a name we now use for the product of its union with water), has the composition  $\text{Cl}_2\text{O}$ , containing its own volume of gaseous chlorine, and by weight 81.6 per cent. of that element. It is a pale yellow gas, which explodes, though without much energy, when heated. It differs much in odor from chlorine, and is condensed by snow and salt to a deep red, very explosive liquid. It is prepared in the gaseous form by reaction of dry precipitated mercuric oxide on chlorine gas, an oxychloride of mercury being formed:  $2\text{HgO} + \text{Cl}_2 = \text{Hg}_2\text{Cl}_2\text{HgO} + \text{Cl}_2\text{O}$ . Both the liquid and the gas combine with water to form hypochlorous acid:  $\text{Cl}_2\text{O} + \text{H}_2\text{O} = \text{H}^2\text{Cl}_2\text{O}_2$ . Solutions of the acid in water may be prepared also by several other methods; as by distilling together, with special precautions, bleaching salt and a mineral acid; by passing air and muriatic acid gas together through a heated solution of permanganate of potash in a retort; by passing chlorine into water in which carbonate of lime is suspended. In the latter case carbonic acid is set free, and the reaction is as follows:  $\text{CaO} \cdot \text{CO}_2 + \text{Cl}_2 + \text{H}_2\text{O} = \text{CaCl}_2 + \text{CO}_2 + \text{H}^2\text{Cl}_2\text{O}_2$ . The aqueous hypochlorous acid that distills over in each case is yellowish, smells like the gas, has a strong peculiar but not acid taste, and corrodes the skin more rapidly than nitric acid. It cannot be preserved in concentrated form, decomposing spontaneously in time, though it is sufficiently stable to be distilled. With hydrochloric acid it evolves chlorine, as follows:  $\text{H}^2\text{Cl}_2\text{O}_2 + 2\text{HCl} = 2\text{H}_2\text{O} + \text{Cl}_2$ . It is of course a very powerful, and would be a very useful bleaching and oxidizing agent, were it not for its instability, which unfits it for storage and transportation. The immensely valuable properties of this substance must be secured, therefore, by means of compounds, which are capable of evolving or producing it.

*Hypochlorite of potash* is the active ingredient of what has been known as "Javelle water," or "eau de Javelle," also called "chloride of potash." This is a colorless liquid, of peculiar smell, which is prepared by passing chlorino gas through a cold solution of carbonate of potash:  $2\text{K}_2\text{O} \cdot \text{CO}_2 + \text{Cl}_2 = 2\text{CO}_2 + 2\text{KCl} + \text{K}_2\text{ClO}$ . It, therefore, contains both potassic hypochlorite and chloride of potash. The potassic carbonate solution must be kept cold, and the operation must cease before an excess of chlorine over two equivalents for each one of potash-carbonate has been used; as, unless an excess of the latter is present, potassic chloride and chloride may be formed with an increased proportion of chloride of potash. Hence, strong Javelle water of necessity contains an excess of unchanged potassic carbonate. Another method of preparing Javelle water is by adding to a solution of "bleaching powder" or "chloride of lime" (see below) a concentrated potassic carbonate, in quantity sufficient to precipitate all the lime as calcic carbonate. The clear decanted liquid will contain the same constituents as before, but will be likely to be less potent, or to contain less, in proportion, of the active constituent. Javelle water is used for taking out stains, such



as those of fruit, from white textile fabrics, and for bleaching wood, straw, etc.

**Hypochlorite of soda**, in solution, constitutes what is called "Labarraque's disinfecting liquor," after a Parisian druggist who manufactured and sold it for disinfecting purposes. It is also called "chloride of soda," and in medicine "chlorinated soda." The methods of preparation are precisely similar to those given above for the potash-hypochlorite, using sodic instead of potassic carbonate. In making the Labarraque solution, for which sodic carbonate and gaseous chlorine are the materials, but half the amount of chlorine needed for complete reaction is used, and no carbonic acid is evolved, being retained apparently as sodic bicarbonate. This is stated to furnish a more permanent or stable preparation than the other method. The sodic hypochlorite solution, as prepared for commerce, has a feeble chlorine-like odor, alkaline reaction, and strong bleaching and disinfecting powers. It is considered a very valuable medicinal material.

**Hypochlorite of lime**.—Under this head it is proper to treat the important commercial product known as *bleaching powder* or *chloride of lime* (Ger. *Chlorkalk*; Fr. *chlorure de chaux*). It is proved, however, by recent researches that *solid dry bleaching powder* does not contain calcic hypochlorite, which is first formed by the action of water or moisture upon it. The chloride of lime of commerce is prepared by exposure of dry or slightly damp slacked lime to chlorine gas. The lime is spread on trays placed in a stone chamber whose interior can be inspected through glass windows. The gas must be passed in slowly at first, to prevent heating of the lime, which would promote the formation of chloride of calcium, to the detriment of the product. The whole time required is about four days. If the process be too rapid, and heating occurs, there is formed, according to Scheurer-Kestner, some calcic chloride,  $\text{CaCl}_2$ . It forms a dry or slightly moist grayish-white powder, having a peculiar, highly nauseous odor, differing from, though suggesting, that of chlorine. It gradually decomposes and deteriorates with time, and cannot be preserved in sealed packages, by reason of slowly evolved gas, probably chiefly oxygen. Barreswil proposed to compress it into cakes or blocks made as hard as stone, asserting that it was thus rendered far more permanent.

**Chemical Composition and Constitution**.—This has been the subject of much controversy, and various theories have been successively supposed, proved, adopted, and abandoned. Of these the one even now generally in vogue, and taught in the textbooks of all countries, makes it to be a mixture of calcic chloride and calcic hypochlorite,  $\text{CaCl}_2 + \text{CaCl}_2\text{O}_2$ , which would be simply formed by the interaction of  $2\text{CaO}$  and  $4\text{Cl}$ . As long since, however, as 1862, Fresenius showed that cold water, when first added, dissolves from it chiefly calcic chloride, and that to get much hypochlorite requires successive washings and time. He suggested that hypochlorite may not pre-exist, but may be formed from some unknown ingredient by reaction with the water. Since 1867 this fact has been confirmed, and the view rendered certain by J. Kolb, who found that pure dry hydrate of lime, when completely saturated by chlorine, forms a mass containing 38.5 per cent. of the latter, and having the empirical composition  $\text{Ca}_3\text{H}_6\text{O}_6\text{Cl}_4$ , in which the three equivalents of water and the three equivalents of oxide of calcium (hypothetically or possibly present) are wholly essential, and cannot be eliminated without a complete destruction of the constitution of the body. Water, by its solvent action, leads to a breaking up into hydrate, chloride, and hypochlorite:  $\text{Ca}_3\text{H}_6\text{O}_6\text{Cl}_4 = \text{CaO}(\text{H}_2\text{O}) + \text{CaCl}_2 + \text{CaCl}_2\text{O}_2 + 2\text{H}_2\text{O}$ . If we suppose the last factor of this equation, the  $2\text{H}_2\text{O}$ , to pre-exist, as such, in the bleaching powder, then the latter is a hydrate of an unknown compound whose empirical formula is  $\text{Ca}_3\text{Cl}_4\text{H}_2\text{O}_4$ . The whole question of the true nature and constitution of this product in the solid form would appear, therefore, to be now reopened, and to be a matter for speculation and investigation. It is regarded now as proved that in the atmosphere, by virtue of its moisture, the same breaking up occurs as represented above with liquid water, and that then, by the carbonic acid of the air, hypochlorous acid is set free from the hypochlorite that has been formed; to which latter acid the *disinfecting* action is due, and not to the evolution of free chlorine, as has been most generally believed.

**Chlorimetry—Testing the Value of Bleaching Powder**.—This is a highly important laboratory operation. The practical point to be settled is of course the relative amount of active chlorine, or its equivalent, that is present. At the present day this must be, and is almost altogether, effected by rapid methods of the volumetric class, in which very closely and accurately measured quantities are employed, of solutions of known strength or value, of appropriate reagents. One simple method that has been much

used is to prepare a solution of the lower oxide of iron (ferrous oxide) of known strength, and ascertain how much of it a certain weight of the bleaching powder will oxidize up to the higher, or ferric oxide; the point being determined by testing—after every addition of the normal ferrous solution—a drop of the solution examined with red prussiate of potash. Another method is to mix the weighed bleaching powder with muriatic acid and iodide of potassium, iodine being thus set free in amount equivalent to the effective chlorine, and coloring the liquid brown. A normal solution of *hyposulphite of soda* is then added, in successive measured quantities, until the color vanishes, when the quantity of hyposulphite that has been used will be a datum for the calculation of the value. Many other methods, similar in principle, have been used. A first-class, fresh-made article should furnish 28 to 30 per cent. of effective chlorine.

**Hypochlorite of Magnesia**.—This, in solution—formed either by passing chlorine into a mixture of magnesia with water, or by precipitating a solution of chloride of lime with sulphate of magnesia—is recommended for bleaching uses by Bolley, on the grounds that its action is more rapid than common bleaching-powder by reason of the more ready decomposition of the magnesia compound, and that magnesia hydrate is less caustic, and hence less liable to injure delicate fabrics, than the calcic hydrate.

HENRY WURTZ.

**Hypochondria** (pl.). [Gr.  $\tau\alpha\ \upsilon\pi\omicron\chi\omicron\delta\omicron\delta\iota\alpha$ , the regions "under the cartilages"], in anatomy, the regions of the abdomen on either side of the epigastrium. The name is also given to the diseased condition of late more frequently called hypochondriasis by the medical profession.

**Hypochondriasis** [so-called from the old belief that the hypochondria were the seats of the disease], a morbid state of mind, more common in men than in women, in which the patient imagines that he suffers from diseases which he does not possess, and in which he suffers from subjective sensations entirely unaccounted for by the objective signs of disease in his case. The disease itself is real. It may result from dyspepsia, from sexual excess, or from other causes interfering with the nutrition of the nerve-centres. The disease may amount to positive insanity, and is then classed as *melancholia*. Medicine and hygienic regimen often do but little good. Cheerful companionship, fishing, hunting, and boating, long journeys, even the reading of well-selected novels—in fact, anything which will divert the mind from its habit of morbid self-observation—will be found useful.

**Hypocoracoid** [Gr.  $\upsilon\pi\omicron$ , "under,"  $\kappa\omicron\rho\alpha\varsigma$ , "crow," and  $\epsilon\iota\delta\omicron\varsigma$ , "form"], the inferior bone connected with the inside of the great scapular girdle of the typical fishes. It is one of three bones which together are homologous with the intrascapular or coracoid cartilage of the ganoid fishes, and was regarded by Cuvier as the ulna; by Owen, as the radius; by Gegenbaur, as the precoracoid; and by Parker, as the coracoid.

THEODORE GILL.

**Hypocycloid** [Gr.  $\upsilon\pi\omicron$ , "under," "within," and  $\kappa\upsilon\kappa\lambda\omicron\epsilon\iota\delta\omicron\varsigma$ , "circular"], a curve whose course is generated by a point in the circumference of a circle rolling on the concave side of a fixed circle. When the rolling circle has a radius equal to just half that of the fixed circle, one revolution of the smaller circle will generate a hypocycloid equal to the diameter of the greater circle. If the rolling circle is the larger, the hypocycloid becomes equivalent to an epicycloid. If the generating point of a hypocycloid be in the plane of the rolling circle, but not in its circumference, the curve generated is a hypotrochoid; and if the radius of the fixed circle is double that of the rolling one, the hypotrochoid becomes an ellipse.

**Hyp'ogene** [from the Gr.  $\upsilon\pi\omicron$ , "under," and  $\gamma\iota\gamma\iota\omicron\mu\alpha\iota$ , "to be" or "to be born"], a term in geology, proposed by Lyell to designate rocks that are nether-formed, or formed at great depths, and consequently underlie sedimentary and ejected volcanic rocks, which are of superficial origin. Granite, gneiss, and diorite are examples of hypogene rocks.

**Hypnitric Acid**. See NITROGEN, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.

**Hypophosphites**, salts of hypophosphorous acid. In medicine the term is currently used as referring to potassium, sodium, and calcium hypophosphite, which are considered by some to yield the medicinal effects of phosphorus, while free from the latter's poisonous qualities. They were not long since highly vaunted as remedies for consumption, but have not sustained their reputation in that particular. (See PHOSPHORUS.) EDWARD CURTIS.

**Hypophosphorous Acid and Hypophosphites**. See PHOSPHORUS, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.



**Hypophthal'midæ** [Gr. *ὑπό*, "under"—*ὄψ*, "inferior or low down"—*ὄφθαλμος*, "eye," and *ἰδα*, the family termination], a family of nematognathi or silurids distinguished by the persistent distinction and very slight modification of the anterior dorsal vertebrae, and with the head depressed; opercula developed; the inferior pharyngeal bones united for their entire length; branchiostegal rays numerous; the dorsal fin developed from the caudal portion of the vertebral column; and the skin naked. This family is confined to South America, and is represented there by two genera—*Hypophthalmus*, with several species, and *Helogenes*, with a single one. These differ from all other representatives of the order in the separation of the anterior vertebrae in contradistinction to their confluence into one, as in the other members of the group; the eyes are situated very low down behind and below the angle of the mouth; and from this peculiarity the typical genus and family have received their names. In other respects they have considerable superficial resemblance to the cat-fishes of our own waters.

THEODORE GILL.

**Hyposulphites**, salts of hyposulphurous acid. Medicinally, the alkaline hyposulphites may be used for the same purpose as the corresponding sulphites. (See SULPHITES.)

EDWARD CURTIS.

**Hyposulphurous and Hyposulphuric Acids, Hyposulphates and Hyposulphates.** See SULPHUR, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.

**Hypotheca'tion** [Gr. *ὑπό*, "under," and *τίθημι*, to "place"]. In the civil law this was a kind of pledge in which the possession of the thing pledged remained with the debtor instead of being delivered to the creditor or lender, as in cases of pledge properly so called. Strictly speaking, it applies to immovable things, not susceptible of delivery from hand to hand. (See PLEDGE.) The term is but little used at common law, but is sometimes employed with reference to bottomry bonds, which are given to obtain a loan of money by making a vessel security for the repayment. (See BOTTOMRY.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

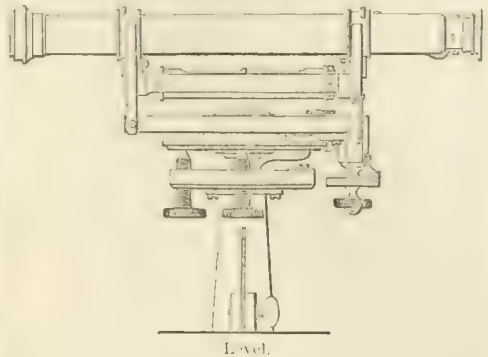
**Hypothesis** [Gr. *ὑπόθεσις*, from *ὑποτίθημι*, to "place under," to "suppose"], a judgment which is provisionally proposed as an explanation for some fact or group of facts in science, and which may be discarded if found untrue. When an examination of a sufficient number of the facts of the case shows that the hypothesis will stand the tests of experience, and is not inconsistent with known facts and principles, it becomes a *theory*. The *hypothesis* is the work of imagination, the *theory* the fruit of observation and reasoning. The *hypothesis* is the temporary scaffolding by means of which the arch, the perfect theory, is constructed.

**Hypsometry** [Gr. *ὑψος*, "height," and *μετρον*, "measure"], a branch of geodesy which treats of the measurement of heights, either absolute, when referring to the sea-level, or relative, between any two distant places on the earth's surface. There are three principal and independent methods in use. The first and most accurate depends on the property of fluids when at rest to present their surfaces at right angles to the direction of gravity; the second depends on the angular measure of elevation, in combination with the known distance of the object, and having regard to the effect of atmospheric refraction; the third and least accurate method depends on the law of the decrease of pressure of the atmosphere with an increase of altitude. The first method employs the levelling instrument, the second the theodolite, the third the barometer. Since the introduction of the aneroid barometer (an instrument of precision and of great simplicity and portability) the method of measuring differences of elevations by means of the temperature of boiling water has almost been abandoned; it depends on the known relation between the variations in the atmospheric pressure and the corresponding changes in the boiling-point of water, as measured by a very sensitive thermometer; the results, however, are subject to considerable uncertainty. The second or trigonometrical method is the only one applicable in case one or both stations are inaccessible.

(1) Spirit levelling is generally conducted as follows: The levelling instrument is set up nearly midway between any two consecutive stations, A and B, on the line of levels, and after its adjustment the readings of the staves placed over the stations are successively taken; the line of sight having been made horizontal, the difference in the readings equals the difference of heights (A—B). The instrument is next placed midway between stations B and C, and the difference of heights B—C is ascertained in a similar way; this process is repeated until the terminal point is reached, which is frequently many hundred miles distant from the starting point. The principal adjustment of the instrument consists in placing the optical axis or line of collimation, as determined by the centre of the objective and the intersec-

tion of the cross-threads, parallel to a tangent to the level, thus rendering the sight line horizontal. For accurate measure the level must be very sensitive; it is filled with

FIG. 1.



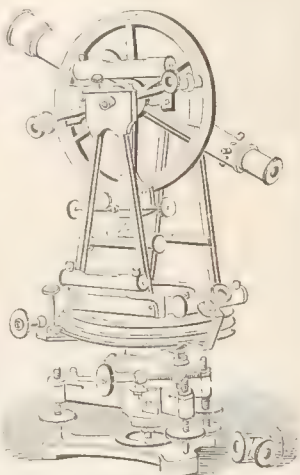
alcohol or ether, and its inner surface is generally ground to a radius between 50 and 250 metres, and its least count usually varies between a few seconds and less than a single second for the best levels. The magnifying power of the telescope employed is generally within the limits of 20 and 40 for the better class of instruments. To render the effect of any imperfection in the various adjustments the least possible, also to make the effect of refraction in the line of sight and of the earth's curvature insensible, the instrument is placed midway between any two stations; if this should not be the case, corrections for difference of refraction and for difference of curvature for the distances to the staves must be applied. This is done readily by means of tables. The distances may be stepped off, or may be measured by a tape-line, but are most readily ascertained by a telemeter arrangement in the telescope; such, for instance, as two horizontal threads equidistant from the central thread, the number of divisions on the staff included between them being read off, from which the distance becomes known. If the distance between telescope and staff is not limited by the slope or configuration of the ground, it should be taken as great as the optical power of the instrument and the sensibility of the level will permit without detriment to accuracy; ordinarily, the distance varies between 50 and 150 metres, though occasionally it may even be double the last-mentioned distance. The staff should be divided decimally (the unit being the metre or foot); and if read by the observer through the telescope, which is preferable, should be divided into block spaces with block figures, so as to be seen at the greatest possible distance; if the pointing is to be made by means of a movable target, time will be saved, after the assistant has placed the target very nearly at the correct height, by effecting the exact pointing through dislevelling the instrument and correcting the result for change of level. Respecting the accuracy attainable, the mean error may be stated to be about  $\frac{1}{75000}$  of the distance for telescopes magnifying ten times, but will decrease to about  $\frac{1}{250000}$  with the best instruments. By convention, the average surface of the ocean has been chosen as the zero-level from which to count absolute heights; to connect a line of levels with it a series of consecutive high and low waters must be observed, from which the mean or half-tide level is to be deduced. It follows that if we could level from the equator to the pole, we would find no difference of height, though we approached the earth's centre by nearly 13 miles. The difference of height between any two distant stations should be the same, no matter over what route the levels have been carried; that is, the local deflections of the direction of gravity will not affect the result, provided the intermediate stations have not been too far apart in passing over a region of rapidly changing deviations of the plumb-line. (For detailed information the reader may consult *Theoretische und praktische Anleitung zum Nivellement*, von S. STAMMER (Wien, 1845); *Tables of Heights, etc.*, determined by the Great Trigonometrical Survey of India (Calcutta, 1863); *Nivellement de précision de la Suisse*, sous la direction de A. HIRSCH et E. PHILIPPON (Genève, Bâle, Lyon, 1871.)

(2) Trigonometrical levelling consists in measuring the vertical angle between the zenith of the station occupied and the distant object the height of which is to be determined; the horizontal distance to this object must be known, and is generally given by triangulation, and the measured angle must be increased on account of refraction, which may be taken roughly as proportional to the length of arc of junction, and ordinarily equal to about  $\frac{1}{4}$  of the corresponding angle at the earth's centre. We may either measure the double zenith distances one-half of the operation with



position of theodolite, say circle left, the other half with circle right (the instrument having been turned  $180^\circ$  of azimuth)—or if the zenith point (or horizontal point) of the vertical circle be previously determined, it will suffice to measure the single zenith distance (or altitude, a depression being a negative altitude). Irrespective of other adjustments of the theodolite, those for collimation, for verticality of the vertical axis, and for horizontality of the horizontal axis of the telescope must be carefully attended to; the observer should also examine the verticality of the plane of his circle to the last-named axis. The principle of repetition (use of the repeating circle) is not recommended unless the graduation be very inferior in comparison with the optical power of the telescope and the sensitiveness of the level; the accuracy depends mainly on the level, which must be read before and after reversal. We may also measure differences of zenith distances or small angles of elevation (or depression) micrometrically, either by an eye-piece micrometer or by a micrometer screw, as shown in the cut of the levelling instrument. All measures of zenith distances are affected by any deflection of the plumb-lines which may exist in the vertical planes of the stations, but the uncertainties in the results for height depend chiefly on the variations of the atmospheric refraction, on account of which, for accurate work, the distances may be limited to about 20 and 25 kilometres (say 12 and 15 statute miles). For such distances very accurate results may be had by observing only within about two hours of apparent noon, during which period the refraction is steady and is near its minimum value; observations taken on objects at great distances, say 100 kilometres and above, should of necessity be restricted to this period of the day (from 10 A. M. to 2 P. M.). Although the refraction exhibits daily variation, and is a function of the temperature and pressure of the atmosphere, yet it is extremely irregular; in its ordinary variations the coefficient keeps within the range of  $\frac{1}{3}$  to  $\frac{1}{6}$ , but occasionally and abnormally it may be several times greater, or it may become zero, or even take a negative value. The refraction is slightly greater for lines crossing water than for lines over land; it diminishes with altitude and with increasing temperature, but increases with increasing atmospheric pressure; in general, its value depends on the law of the distribution of temperature with height. Thus, the more rapid the decrease of temperature the smaller the refraction, and the slower the decrease of temperature the greater the refraction; with a sufficiently rapid decrease of temperature it may become zero, with no decrease, or for a constant temperature the refraction is large, and will still increase should the temperature increase with height. If we measure only one zenith distance, a value of the refraction must be adopted suitable to the circumstances; if we measure the zenith distances at the two stations, the difference in the two results for difference of heights will indicate a change in the value of the coefficient and the error of the assumed value combined: if we measure reciprocal and simultaneous zenith distances, the coefficient of refraction can be eliminated under the supposition that it is the same at each station, and that there is no effect from station errors, and from such measures its value may be determined. If, besides, the difference of level between the two stations has been ascertained by the spirit-level, the angle of refraction may be deduced for each station, and we shall generally find the refraction at the upper station less than at the lower one. Observations of the sea-horizon in connection with an assumed value for the refraction will roughly determine the height of the station; the state of the tide may also be considered. (For the usual trigonometrical formulæ applying to these cases see art. GEODESY, also the account of the principal triangulation of the ordnance survey of Great Britain and Ireland, by Lieut.-Col. H. James (London 1858).)

FIG. 2.



Theodolite.

length the equation to the path of a ray of light passing through the atmosphere, based upon Laplace's differential equation for the atmospheric refraction. (*Mécanique Céleste*, tome iv. p. 246.) An application of this to experiments made in California will be found in *Coast Survey Report* for 1871, Appendix No. 11.

(3) Passing now to the measure of heights by means of the barometer (see BAROMETER), this instrument, in the form of a mercurial barometer, may be regarded as essentially a balance in which, under the influence of gravity, the mass of the superincumbent atmosphere is equilibrated by a mass of mercury; in the ANEROID BAROMETER (which see), on the contrary, the atmospheric pressure is counteracted by the elasticity of a corrugated metallic vessel (generally filled with gas, sometimes supplied with a spring). A change of gravity could not therefore be indicated by an instrument of the first form, but would be by one of the second form. Thus, if two such instruments, side by side, were to read alike at the equator, they would, if they could be transported to the Pole, differ at the latter place, the mercurial barometer remaining unchanged, but the aneroid indicating the greater pressure existing at the Pole. This distinction should be kept in view in hypsometry: the aneroid barometer, however, is generally used only as a differential instrument, and as such may possess great accuracy, especially when the following reductions are carefully attended to.

According to Mariotte's law, the elastic force of the atmosphere is proportional to its density; further, the densities decrease in a geometrical progression when the altitudes increase in an arithmetical one; this leads directly to the simple logarithmic formula for the difference of height,  $H = N \log \frac{b}{b'}$ , where  $b$  and  $b'$  are the respective heights of the mercurial columns at the lower and upper stations, and  $N$  represents a numerical coefficient, found either theoretically or practically by comparisons of results by the spirit-level or vertical angles and the barometric pressure.  $N$  equals nearly 18,100 metres. The mercurial columns should be at the same temperature; if not, they may be reduced to  $0^\circ \text{C}$ , or  $H$  may be corrected by means of the expression  $\left( \log \frac{b}{b'} - \frac{T - T'}{12780} \right)$ . Since we must rise higher in warmer than in cooler air for the same decrease in height of the mercurial column, a correction for temperature is needed; taking the coefficient of expansion for air =  $\frac{1}{273}$  for the centigrade scale, and for  $t$  and  $t'$  the atmospheric temperatures at the lower and upper stations, the factor becomes  $\left( 1 + 0.00367 \frac{t - t'}{2} \right)$ ; further, multiplying with the factors  $\left( 1 + 0.00262 \cos 2\phi \right)$  to allow for change of gravity with change of latitude  $\phi$ , and with  $\left( 1 + \frac{2a + h}{R} \right)$ , to allow for decrease of gravity with height,  $a$  being the altitude of the lower station above the sea,  $R$  the earth's radius (about 6366740 metres), and  $h$  an approximate value for  $H$ , we obtain finally the expression—

$$H = 18400 \left[ \log \frac{b}{b'} - \frac{T - T'}{12780} \right] \left( 1 + \frac{t - t'}{546} \right) \left( 1 + 0.00262 \cos 2\phi \right) \left( 1 + \frac{2a + h}{R} \right).$$

This formula is only intended as a typical one; numerous expressions have been given in various forms, of greater or less complexity, with various numerical coefficients, for different units, and for use either with or without logarithms, most of them accompanied by tables to facilitate their application. They may be divided into two classes—those adapted to a mean state of humidity of the air, such as Laplace's (see *Mécanique Céleste*, tome iv. p. 292), and those taking into consideration the actual amount of the vapor pressure, such as Bessel's (see *Astronomische Nachrichten*, Nos. 279, May, 1835, and 356, 357, Sept., 1835), which contain perhaps the most complete investigation made on the subject. The first height determined barometrically was that of the Puy de Dôme in 1648, at the suggestion of Pascal, and Dr. Halley was the first (in 1686) to establish the correct theoretical basis for computation of heights; many of the formulæ constructed since his time have been collected by Dr. Rühlmann, who also gives an extensive list of authors showing the great extent of the literature on the barometer. (See *Die barometrischen Höhenmessungen*, etc., von Dr. R. RÜHLMANN, Leipsic, 1870. For a selection of formulæ and tables, see the *Smithsonian Meteorological and Physiological Tables*, by Dr. A. GUYOT, Washington, 1859.)

Respecting the accuracy in resulting heights attainable by means of the barometer very divergent opinions exist, but it is believed that with close attention to sources of error, instrumental and local, and especially to the effect of the daily variation of the pressure and temperature,

In Nos. 1478-1480 and 1587-1590 of the *Astronomische Nachrichten* (1866), Dr. Bauernfeind has developed at







Syrian king and army by an earlier return to Judæa. As soon as Antiochus was dead, Hyrcanus hastened to secure the independence of his own realm, and sent an embassy to Rome in order to get the alliance concluded during the reign of Simon confirmed by the senate. In this he succeeded. He also conquered Sichem in Samaria, destroyed the temple of Gerizim, subdued Idumæa, and extended the boundaries of Judæa. Meanwhile, Demetrius II., the brother and successor of Antiochus, returned from his captivity in Parthia, and prepared himself to invade Judæa, but was prevented by an internal war, in which he was killed, 125 B. C. Hyrcanus now ruled for several years in peace, but at last, deeming himself strong enough for the task, he invaded Samaria with a great army and laid siege to the capital. The Samaritans invoked the assistance of Antiochus Cyzicenus, but this king was defeated by Antigonus and Aristobulus, two sons of Hyrcanus, and Samaria was taken and razed to the ground, 109 B. C. Hyrcanus reigned three years longer, but these latter years of his government were disturbed not a little by the quarrels of the two powerful sects, the Pharisees and Sadducees. Hyrcanus belonged originally to the former party, but left it and allied himself to the latter; he d. 106 B. C. (2) **JOHN HYRCANUS II.**, grandson of the foregoing, son of Alexander Jannæus; was appointed high priest by Alexandra, his mother, 78 B. C., and on her death (69 B. C.) assumed the sovereignty, which in 66 he resigned to his more energetic brother, Aristobulus; fled for protection and assistance to Aretas, king of Stony Arabia, 65; engaged in a civil war, but without success until 63, when he was reinstated by Pompey and made high priest and ethnarch; was deprived of the latter title 49, but in 47 the actual sovereignty was restored to him by Julius Cæsar. Meanwhile, his brother Aristobulus and Alexander, son of Aristobulus, who made him much trouble, were put to death by the Romans. Antipater, the able lieutenant of Hyrcanus, was poisoned with the consent of the high priest 44 B. C., and the young Herod, afterwards called the Great, a son of Antipater, became the virtual ruler. In 40 B. C., Antigonus, son of Aristobulus, induced the Parthians to send an army against Hyrcanus, who was by treachery taken prisoner, deprived of his ears, and then allowed to live in peace at Babylon, where he remained until 33 B. C., when he returned to Jerusalem, but, falling under the suspicion of having plotted against Herod, he was put to death 30 B. C.

**Hyre, de la** (LAURENT), b. in France in 1605, and d. in 1656. He belonged to the so-called school of Fontainebleau, whose founders were Primatice and Rosso, and which developed chiefly under Italian influence.

**Hyria, or Hyrium**, an inland city of ancient Calabria in Southern Italy, situated on the Apian Road, about midway between Brundisium and Tarentum. Herodotus represents it as having been the metropolis of the Messapians, founded by a colony of Cretans on their return from Sicily. Strabo mentions that a palace of one of the ancient native kings was shown there in his time. In early times it was a place of importance, and near the modern town of Oriia inscriptions have been found in the Messapian dialect, and numerous coins in Roman characters bearing the name of Orra. There was at least one other place of the same name in Southern Italy, as is proved by coins of another class found in Campania.

**Hymenrude, or Ermentrude**, a daughter of Eudes, count of Orléans, was married Dec. 14, 842, to Charles the Bald; d. Oct. 6, 869. She did not mix in politics, but many religious institutions were founded and endowed by her.

**Hyrtacina**, city of Crete, S. E. from Polyrrhenia, on the southern coast of the island, near the temple of Artemis Dictynna. Ruins have been found by Mr. Pashley, being numerous vestiges of polygonal masonry, on a hill near the modern village of Temenia. Coins of the ancient city are also found.

**Hyrtl** (JOSEPH), M. D. b. Dec. 7, 1811, at Eisenstadt, Hungary; was educated at Vienna, where in 1833 he became professor in anatomy; was professor of anatomy at Prague 1837-45; professor of anatomy at Vienna 1845-74, and for a part of the time was rector of the university. He founded the Vienna Museum of Comparative Anatomy, and made an incomparably fine private collection of materials illustrative of some departments of comparative anatomy (now in possession of Prof. E. D. Cope, Haddonfield, N. J.). Hyrtl was the first German to give much attention to regional anatomy, and has made many discoveries in human and comparative histology. Author of *Topographische Anatomie* (2 vols., 1847), *Lehrbuch der Anatomie* (1847; many editions since), *Handbuch der praktischen Zoologie* (1860), *Ueber eulose Nerven* (1865), *Ueber Anipullen am Ductus Opticus der Fische* (1868), *Die Blutgefäße der menschlichen Nachgeburt in normalen und abnormalen Ver-*

*hältnissen* (1870), *Das Nierenbecken der Säugethiere und des Menschen* (1870).

**Hysia**, town of Boeotia, at the northern foot of Mount Cithæron, was situated on the high-road from Thebes to Athens, and formed an important point in the strategic disposition to the battle of Plataea. In the time of Pausanias it was in ruins; an unfinished temple of Apollo and a sacred well were still extant; now nearly every trace of it has disappeared.

**Hyssop** [Gr. ἵσσωπος; Heb. עֵשְׂבָא], the *Hyssopus officinalis*, a half-shrubby labiate plant, a native of Europe, sparingly naturalized in the U. S. It is an aromatic stimulant, abounding in a volatile oil. In domestic medicine it is a very useful expectorant. Hedge hyssop is the popular name of various species of *Gratiola*, of the order Scrophulariaceæ. As the hyssop of Greek authors is conceded to be the common plant of that name, it has been inferred that it was also that of the Old and New Testaments, but this is by no means certain. Celsius has enumerated eighteen different plants which have been considered as the scriptural hyssop. Dioscorides, a Greek botanist, described two kinds, and the Talmudists have done the same, distinguishing the wild hyssop from the garden plant used for food. It is mentioned of Solomon that he "spake of trees, from the cedar tree that is in Lebanon even unto the hyssop that springeth out of the wall;" and in Psalm li. it is said, "Purge me with hyssop and I shall be clean," etc.; from which indications Dr. J. F. Royle has, after a careful study of the ancient and modern notices, identified the hyssop of Scripture with the modern caper-plant (*Capparis spinosa*, Linn.), which is still found in abundance in Egypt, Sinai, and Palestine.

**Hystaspes**, author of a prophetic-apocalyptic work, *Vaticinia Hystaspis*, which was much read by the early Christians, and believed to contain predictions of Christ and the future of his kingdom. Of his life nothing is known, and the book itself has vanished; but it is often mentioned by the early Christian Fathers. Justin says of it that "the bad demons, in their efforts to prevent man's knowing the truth, succeeded in establishing a law which forbids the reading of the βιβλίον Ὑστάσπου. . . under penalty of death; but the Christians, notwithstanding this law, not only read the books themselves, but even incited the heathen to study them." Clement of Alexandria says of it that "the Christians found in it, even more plainly than in the books of the Sibyllines, references to Christ and the future of his kingdom, and especially a reference to Christ's divine Sonship, to the sufferings which awaited him and his followers, and to his final return."

**Hysteria** [from ἰστέρα, the "womb"], a peculiar nervous affection which in former times was supposed to have had its seat in the womb, but at the present day Hasse's theory of its origin is generally received—viz. that it arises from a nutritive derangement of the general nervous system, both central and peripheral. This may be caused by any organ of the body being diseased, and there can be no doubt but that it is dependent most frequently upon disorders of the uterus and ovaries, simply because these affections produce a deeper impression upon the nervous system. Sometimes irritation of the genitals, arising from excessive sexual intercourse, has as marked an influence on the general nervous system as a well-marked lesion of an internal organ; but we must not be too ready to ascribe a case of hysteria to deranged sexual function, for Hasse attributes these cases to a psychological rather than to a physical cause. This condition of the nervous system may also be produced by improper nourishment. There is a predisposition to the disease manifested. A tendency, either congenital or acquired, plays a much more important part in inducing this affection than all the causes enumerated.

Hysteria generally attacks women from the age of puberty to the decline of menstruation. It is of rare occurrence among men, and in them is produced in a manner similar to that in which it is produced in the opposite sex. Hysteria may manifest itself in a great variety of ways; in fact, it simulates almost every known disease, and often with the greatest care the practitioner is unable to differentiate them. The most common form, however, is the hysterical fit. In some cases this consists merely of the twitching of the muscles of a particular region, as of the face, arm, or leg. In other cases the whole body is affected at once. The patient generally laughs and cries alternately; this is due to spasm of the group of muscles which operate in producing these acts. Another very common accompaniment of these paroxysms is the so-called *globus hystericus*; this consists in the sensation as of a ball rising from the uterus and ascending through the abdominal and thoracic cavities to the throat, and is caused by a spasmodic contraction of the oesophagus. The patient may scream, tear her hair and clothes, and beat her breasts. In severe cases



we sometimes have loss of consciousness and convulsions; when this occurs it is almost impossible to distinguish it from epilepsy. The fits usually terminate with the discharge of a large quantity of almost colorless urine. Perhaps the next most common manifestation of the disease is hyperæsthesia, either general or localized, but most frequently the latter. Under this heading would come hysterical peritonitis, in which the patient will complain of great pain and tenderness over the region of the abdomen; she will jump and cry out upon the slightest touch. Accompanying this condition there will be a rapid pulse and increased temperature. The characteristic of the hysterical affection is that the pain is not aggravated upon deep pressure, and if you distract the patient's attention from her trouble, you can very often knead the abdomen without the least discomfort to her. The "stitch in the side" of young girls and women can generally be ascribed to hysterical hyperæsthesia. The opposite condition, anæsthesia, may occur, sometimes, to such an extent that the patient will allow your finger to be thrust into her eye or needles to be plunged deeply into the flesh without wincing. Hysterical hemiplegia and paraplegia very often occur. They are very perplexing cases, and can hardly be differentiated by any but a careful and experienced observer. Paralysis of the muscular fibres of the bladder, or spasm of its sphincter, is sometimes simulated. Hysterical patients very often pretend that they are suffering intolerably from retention of urine, and can only be relieved by the introduction of the catheter several times a day; which, indeed, seems to be all that they desire. When such an affection is made out beyond a doubt to be feigned, it is best to leave the patient to her own resources. Even in cases where this has been done, the patients have been known to drink their own urine in order to carry out the deception. Gravel and stone in the bladder are other diseases simulated; the patient will put common gravel in the urine after it has been voided and pretend to have passed it, or she may even place sand in the urethra. Watson records a case in which a young woman made the surgeons in one of the London hospitals believe that she had stone in the bladder, and who actually submitted to be tied upon a table in the position usually adopted for operations for lithotomy, before a theatre full of students, before the deception was discovered. Hysteria very commonly mimics affections of the spine and joints. Patients have been known to have been kept on their backs for months, and even years, and to have had blisters, leeches, and issues almost constantly applied for supposed disease of the spine, which subsequently was ascertained to be purely nervous. So with hip-joint disease, etc.

There are many hysterical affections referred to the fauces, aphonia or loss of voice, mock laryngitis or pharyngitis, stricture of the œsophagus, and many curious sensations. One patient imagined that a number of tape-worms came up from her stomach to her throat, filled her ears, and came out upon her tongue. Every time she attempted to catch them with her finger they would disappear. This occurred several times a day, and it was impossible to persuade her that such a thing could not happen. Among the other more common affections simulated by hysteria are pleurisy, consumption, cough, hicough, indigestion, in which the patient swallows a quantity of air, and then pretends to be suffering from tympanitis and eructations; vomiting also sometimes accompanies this hysterical dyspepsia, simulating cancer of the stomach. Very often patients suffering from hysteria have a depraved appetite; they eat very little of anything, especially at table, and will hardly touch meat at all, except it be a little ham; they will devour slate-pencils, wafers, chalk, pickles, lemons, and such out-of-the-way articles. Notwithstanding this mode of life, their health does not materially deteriorate.

We next come to speak of the treatment. This may be divided into two modes—*viz.* that of the paroxysm, and that between the paroxysms. In the first variety the dress should be loosened and plenty of fresh air admitted into the room. An emetic should then be administered and cold water dashed in the face; sometimes it is necessary to continue doing this for quite a while (fifteen or twenty minutes), but the patients will generally succumb at last. If at the end of this time no improvement be noticed, the strong aqua-ammonia should be held to the nostrils, and when the patient draws her head away, it should be followed by the bottle. You should get the confidence of the attendants, and be very careful not to say anything in the presence of the patient that you do not wish her to hear. Having done this, if there is still no improvement, order, so that the patient can hear you, two or three flat-irons to be heated nearly red hot; say that it is a very urgent case, and that you intend applying them along the spine. The cases in which the patients will give the irons time to heat will be very few, and sometimes, when they have resisted

every other means, the mention of such harsh treatment will make them start up instantly. However, should they still resist, the irons should be applied *ice-cold* along the spine, at intervals of two or three minutes. In the intervals between the paroxysms, or in the other forms of hysteria, laxatives, tonics, and the correction of any diseased function should be our first care. Besides this, the patient may take assafoetida pills, infusion of quassia, or, what seems to be much better now, the ammoniated tincture of guaiac.

EDWARD J. BIRMINGHAM.

**Hysterotomy** [Gr. *ὕστερα*, "womb," and *τομή*, "a cutting," from *τεμνω*, "to cut"), or **Cæsarean Operation**, the delivery of a child by opening the abdomen of the mother. Pliny (lib. vii. cap. ix.) says that Cæsar was so called from being taken by incision out of the womb of his mother, and that such persons were called *cæsares*, from the Lat. *cædo*, to "cut." There is an obvious improbability in this story, for there were other Cæsars in the family before the man who made the name illustrious. It may be that Julius Cæsar was born in the manner described, but it is very unlikely that this was the origin of his name. If the story be true, the mother must have survived, as Aurelia was alive when her son invaded Britain. The incision is made in or near the middle line of the body, to the length of six or seven inches. The uterus is exposed, carefully opened, the child lifted out, and then the after-birth. The uterus contracts, the wound is closed, and opium is given to allay pain and nervous irritability. Anæsthetics should of course be given. In recent times the Cæsarean operation has repeatedly been performed with complete success, the life not only of the child but the mother having been saved. Some women, indeed, have had several children, each removed through an abdominal incision; one woman submitted to it seven times. Practitioners are not quite agreed as to all the circumstances which justify the performance of this operation. The late Dr. Gibson of Philadelphia, who performed the operation twice on the same woman with entire success, considered the operation comparatively safe if commenced early, before the patient's strength has been impaired by labor. It appears that out of 17 operations performed during or at the close of the first day of labor, 14 of the children and 12 of the women were saved. (See *American Journal of Medical Sciences* for July, 1872, pp. 290, 291.)

REVISED BY WILLARD PARKER.

**Hystric'idæ** [Gr. *ὕστρις*, "porcupine"], a family of symplicidentate rodents, of moderate size, with a large anteorbital foramen; four molar teeth (on each side of the upper as well as lower jaw), traversed by re-entering valleys from the inner as well as outer walls, and with pit-like excavations of the surface; the alveolar portion of the supramaxillary normally connected; the clavicles rudimentary or obsolete; the fibula and tibia separate from each other; the claws of all the feet acute or little blunt, and hairs developed as robust spines. To this group belong the porcupines of the Old World, but not those of the New, they being distinguished from the former by the completely developed clavicles, as well as differences of the skull and dentition. About a dozen species are distributed in the tropical as well as temperate portions of the Old World, and especially in Africa and India. They have been combined under three genera, *Hystrix*, *Acanthion*, and *Atherion*.

THEODORE GILL.

**Hythe** [Ang. Sax. *hyde*, a "haven"], a parliamentary and municipal borough and market-town in the county of Kent, England, 14 miles S. of Canterbury. Though formerly one of the Cinque Ports, it is now half a mile from the sea, while the adjacent ancient Roman port of Lynne (*Portus Lemania*) is now nearly 3 miles from the coast. In ancient times an important battle must have taken place here, as is shown by the piles, containing many hundreds of human bones and skulls, still to be seen under the chancel of the well-preserved Norman church. Many of the skulls are of extraordinary size, and have deep sword-cuts in them; local traditions make them Danes, and fix the date of the battle at about 1000 A. D., but no certain account has been preserved. During the last century smuggling was carried on at Hythe to a great extent, but since it became a summer watering place and the seat of the national school of marketry (1844) smuggling has ceased. Pop. of municipal borough, about 3000.

**Hytú, Hítu, or Itú**, town of Brazil, in the province of São Paulo, on the Tieté, which becomes navigable here, just below the great cataraet, is neatly built, and is one of the most prosperous provincial towns of the country. The plain in which the town stands extends along the Tieté at the foot of a plateau of considerable elevation, and is extremely fertile, covered with plantations of sugar and cotton. The trade in mules and asses is a considerable one. Pop. about 10,000.



## I.

**I**, the ninth letter of the Roman alphabet, was once interchangeable with *J*, which is a form of the same letter, although at present of very different power. *I* is a vowel, and in English has three well-marked sounds: (1) the sound of long *i*, as in *narcissus*, *maritime*; this is the sound almost invariably given to it in all other languages which have this letter; (2) the "long sound," that heard in *mind*, *sign*; this sound is strictly a diphthong between a broad and long *e*, and (3) the "short" sound, heard in *pianissimo*. As a numeral, *I* stands for one (1). In chemistry it is the symbol of iodine.

**Iaba'dius**, the name under which Ptolemy described a vast island of the East Indies, near the Golden Chersonesus. It was fertile in grain and produced gold; the capital was called Argyre. From the similarity of names, both of which mean "barley," it is generally thought to be identical with *Java*, though Humboldt argues for *Sumatra*.

**Iac'chus**, the mystic name of the god Dionysus at Athens and Eleusis. (See ELEUSINIAN MYSTERIES.) It is probable, however, that Iacchus, the Roman Bacchus, was originally distinct from the Theban Dionysus; the former being a Phrygian divinity, represented as a child, the son of Zeus and Demeter, while the latter was always called the son of Zeus and Semele.

**Ial'ysus**, one of the three principal Doric cities in Rhodes, anciently the chief place of the island, and often taken as a synonym of the island itself. It was very flourishing in the time of the Homeric poems, and some remains of its ancient greatness are still seen at the modern village of *Ialiso*. The foundation of Ialysus was ascribed to a mythical personage of that name.

**Iam'bie** [Lat. *iambicus*, from *iambus*; Gr. *iambos*], a poetic metre much used in Greek, Latin, and modern verse, consisting of a succession of *iambi*. An iambic foot is formed either of one short and one long syllable, as in *amāns*, or of an unaccented syllable followed by one accented, as in *metēon*.

**Iam'blichus**, a Neo-Platonic philosopher of the fourth century after Christ, was a disciple of Porphyry, and resided in Syria. With him that combination of Greek philosophy with Oriental mysticism which was the characteristic of the Neo-Platonic philosophy became mere theurgy. He taught that it was possible for man to put himself in direct communication with the Deity by means of certain rites and ceremonies. Five books of his work on Pythagoras, and his book on the Egyptian theology, are still extant.

**Ian'thina** [Gr. *ianthros*, "violet-colored"], a genus of mollusks including the ocean-snails or violet snails. They have a snail-like shell, and float on the open sea, supported by a cartilaginous raft, containing air-vesicles. The float is a part of the operculum. They have no power of rising or sinking in the water. The eggs and young are attached below the float. They are carnivorous gasteropods of the family Haliotidae, and feed on little aculephs. There are six known species. They are named from their purple juice.

**Iap'etus** [Gr. *Iapetos*], in Grecian mythology, a son of Uranus and Ge, brother of Kronos and Oceanus, and father of Atlas, Prometheus, and Epimetheus. He was regarded by the Greeks as the father of all the human race, and the name is supposed to be the same as the JAPHETH of Genesis (which see).

**Iatan'**, post-v. of Marshall tp., Platte co., Mo., on the Missouri River and on the Kansas City St. Joseph and Council Bluffs R. R. Pop. 129.

**Iba'gue**, town of Colombia, department of Cundinamarca, 70 miles W. of Bogotá. Pop. 6000.

**Ibar'ra**, town of Ecuador, at the foot of the volcano Imbaburu, 60 miles N. E. of Quito. The surrounding country is exceedingly fertile and the inhabitants are mostly engaged in the cultivation of cotton and sugar. It suffered severely from an earthquake 1868. Pop. 13,200.

**Iberá**, or **Yberá**, a series of marshy lakes in the province of Corrientes, Argentine Republic, between the rivers Paraná and Uruguay.

**Ibe'ria**, one of the names under which Spain was known to the ancients, was chiefly used by the Greeks, and probably derived from *Iberus*, the Ebro.

**Iberia**, parish of Louisiana, bounded on the S. by the Gulf of Mexico. Area, about 600 square miles. It is divided into three portions by Grand Lake and Vermilion Bay. It has very important deposits of rock-salt. The soil is very fertile, the surface low, level, and well timbered. Cotton, corn, rice, molasses, and sugar are staple products. Cap. New Iberia. Pop. 9042.

**Iberia**, post-v. of Washington tp., Morrow co., O., on the Cleveland Columbus and Cincinnati R. R. Pop. 238.

**Iberville**, fertile county of Quebec, Canada, on the E. side of the river Richelieu. Area, 189 square miles. It is traversed by the Stanstead Shefford and Chambly R. R. Cap. Iberville. Pop. 15,413.

**Iberville**, a v. (P. O. St. ATHANASE), cap. of Iberville co., Quebec, Canada, on the E. bank of the river Richelieu, opposite St. Johns, with which it is connected by a fine bridge. It is the seat of Canadian Institute. Pop. of sub-district, 1497.

**Iberville**, parish of Louisiana, extending eastward from the Atchafalaya River, and having the Mississippi as a part of its eastern boundary. Area, about 450 square miles. Its surface is low, but fertile, and it is sometimes subject in part to inundations. Cotton, corn, sugar, molasses, staple products. Cap. Plaquemines. Pop. 12,347.

**Iberville**, d<sup>r</sup> (PIERRE LEMOINE), the brother of the Sieur de Bienville and of five other able public men, b. at Montreal July 20, 1681; captured Fort Nelson 1686; served in the Schenectady affair 1690; in 1696 destroyed St. Johns, and took nearly all of Newfoundland from the British, whom he defeated in Hudson's Bay in the naval fight of 1697. In 1699 he fortified Biloxi, and in 1700 ascended the Mississippi River. In 1702 he fortified Dauphin Island and founded a settlement near Mobile. In 1706, with three ships, he attacked and captured the Isle of Nevis. D. at Havana, Cuba, July 9, 1706.

**Ib'ex** [Lat.], a genus or sub-genus of the goat family, distinguished by very large horns and rather scanty beards. The species of *Ibex*, as generally recognized, are *I. Alpinus* (the BORQUETIN (which see) or ibex of the Alps), *I. Pyrenaicus*, *I. Hispanicus*, *I. Caucasius*, *I. Sibericus*, *I. Nubianus*, *I. Himalayanus*, and others; but it is likely that some or all are mere varieties. The Alpine ibex breeds freely with the goat.

**Ibiapába**, a mountain-chain in Brazil, in the province of Ceará.

**Ibicui**, a large river in the Brazilian province of Rio Grande do Sul, flowing W. into the Uruguay.

**I'bis** [Gr. *ibis*], a genus of wading birds of the family Tantalidae, allied to the snipes and herons, and having very long legs, neck, and bill, and a very short tail. The American species are *I. falcinellus*, the glossy ibis, common also to the Old World; the white ibis (*I. alba*) of Florida (believed with some reason to be a mere variety of the sacred ibis, hereafter noticed), and the scarlet ibis (*I. rubra*). All these are handsome birds, found mostly in warm regions. The wood-



Sacred Ibis.

ibis of America is *Tantalus luculator*. The sacred ibis (*I. religiosa*) of Egypt, as well as the glossy ibis, is frequently found embalmed in that country. It was regarded as an incarnation of the god Thoth, and was looked upon with peculiar reverence by all classes of the people. The staw-necked ibis (*Geronticus spinicollis*) is a large Australian bird of this family.

**Ib'rahim Pasha'**, a son of Mehemet Ali, b. at Kavala, Roumelia, in 1789. His father was appointed viceroy of Egypt in 1806, and Ibrahim very soon gave brilliant proofs of the great personal qualities of which he was possessed by subduing the wild tribes of Upper Egypt in 1812, by reducing the Wahabees and conquering a great part of Arabia in 1819, by reorganizing the Egyptian army after European models and founding a navy, and by his campaign in the Peloponnesus from 1824 to 1828. His greatest exploit, however, was his Syrian campaign in 1831. Having defeated the Turks in decisive battles at Tripoli and Homs, he conquered the whole of Syria in one year,



and pushed forward into Asia Minor to Kouieh. Here he completely routed the Turkish army, Dec. 20, 1832, and as his fleet had chased the Turkish fleet from place to place, the way to Constantinople was open to him. But Russia interfered. Peace was concluded, and the whole of Syria was ceded to Mehemet Ali. Ibrahim was appointed governor of the new province, and in this position he showed that he had talents not only as a general, but also as a statesman and administrator. In 1839 war again broke out between Egypt and the Porte, and Ibrahim again succeeded in routing the Turkish army completely at Nezib, June 24, but this time too the Ottoman empire was saved by the interference of the European powers. England, Austria, and Russia agreed to compel Mehemet Ali to give up Syria and Arabia, and content himself with the hereditary possession of Egypt; and after a short resistance Mehemet Ali had to submit. Ibrahim Pasha lived for several years as a private gentleman on his estates at Heliopolis, where he established large and very fine cotton and olive plantations. But about 1844, Mehemet Ali began to fall into dotage, and the government now devolved on Ibrahim Pasha. In 1848 he went to Constantinople, and was confirmed as viceroy of Egypt, but he d. very soon after his return, at Cairo, Nov. 9, 1848.

**Ibycus**, b. at Rhegium in the sixth century B. C., and lived for some time in Samos at the court of Polycrates. Of his poems only a few fragments are left, but the story of his death is known by all. He was attacked by robbers and mortally wounded while travelling through a desert place near Corinth, but before dying called upon a flock of cranes flying over him to avenge his death. Shortly after it happened at Corinth that a flock of cranes flew over the theatre while a performance was going on, and one of the murderers cried out involuntarily, "Behold the avengers of Ibycus!" which led to the discovery and punishment of the crime. Edited by Schneidewin (Göttingen, 1833), and in the *Poeta Lyrici Graeci* of Bergk.

**Ica**, town of Peru, is situated in lat.  $14^{\circ} 41'$  S., and connected by railway with Pisco on the Pacific Ocean, through which it exports large quantities of wheat, maize, wine, and brandy. Its climate is very hot, but not unhealthy. Pop. about 8000.

**Icard**, tp. of Burke co., N. C. Pop. 929.

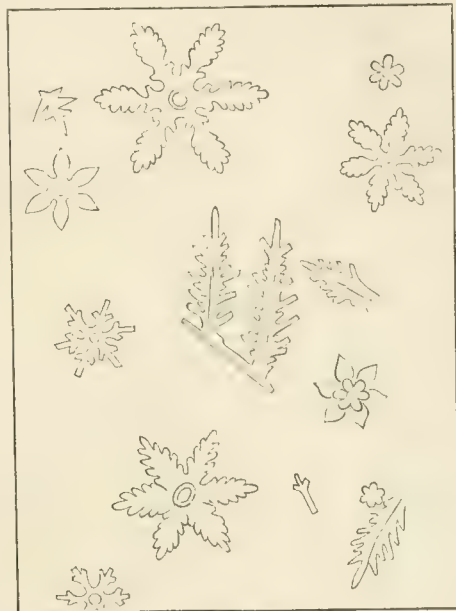
**Icaria**, or **Icarus** (*Nikaria*), an island of the Ægean Sea, W. of Samos. It is some 15 miles long from N. E. to S. W., and rather narrow; area, 50 square miles. It has a population of 8000, and, as of old, is valued for its pasturage.

**Icarus**, the son of Dædalus, who forgot, according to the old myth, his father's advice on their flight from Crete, and flew so high that the sun melted the wax with which the wings were attached to his shoulders, and he fell down and was drowned in the sea which after him is called the Icarian.

**Ice**. The freezing-point of water is  $32^{\circ}$  F. or  $0^{\circ}$  C. The presence of salt impedes congelation; sea-water, therefore, requires a temperature several degrees lower than fresh water to solidify. Pure water placed in polished vessels may be reduced  $17^{\circ}$  below freezing-point (to  $15^{\circ}$  F.) without congeling if it be kept perfectly still; the slightest agitation or the introduction of a foreign body will, however, cause it immediately to freeze; in which case heat is engendered, and the frozen mass comes up to the usual temperature,  $32^{\circ}$  F. Ice in assuming the solid form expands by about one-ninth of its own volume, its specific gravity being 0.9184 at the temperature  $32^{\circ}$  F. or  $0^{\circ}$  C. As cold increases, solid ice contracts; the ice on ponds occasionally cracks from this cause with a loud report. Ice sometimes forms at the bottom of streams when the water above does not freeze; this is probably due to the extreme stillness below. This "anchovy ice," if detached from the body around which it has formed, rises and floats on the surface.

Ice is the normal condition of water. Ice, water, steam, aqueous vapor, fog, cloud, etc. are chemically identical; their physical difference is due, in the main, to the greater or lesser separation of the molecules by the action of heat. As heat is withdrawn from water its constituent particles approach, in accordance with the general law that heat expands and cold (or the absence of heat) contracts bodies. When the temperature  $39^{\circ}$  F. or  $4^{\circ}$  C. is reached, the volume of water begins slowly to expand; a new force, that of crystallization, coming in to modify the result. The particles of water are marshalled into orderly array, and their arrangement is so changed that in uniting they leave larger inter-atomic spaces than they possessed before freezing began. The expansion of crystallization compensates, and more than compensates, for the contraction of cold, and the mass expands by the difference of the opposing forces. Water in freezing gives out heat—i. e. that molecular force

which had been devoted to the work of holding asunder the particles of water and maintaining it in a liquid form, is released from its work as the mass solidifies, and becomes again the molecular motion known as heat. In crystallizing each molecule approaches every other under the controlling power of a fixed law; each spicule, as it forms, unites with every other at an angle of  $60^{\circ}$ . As a result, ice-crystals are formed infinite in beauty and variety, but all obedient to this law—six-rayed ice-blossoms and stars and feathery foliage, where every spine joins the central stem at the invariable angle  $60^{\circ}$ . The ice which covers every sea and lake and pond is built up of film upon film of just such exquisite frostwork as sometimes covers the inner surface of our window-panes. The architecture of the frost may be slowly undone, and the process, in the reverse, watched. A slab of ice, cut with its faces parallel to the plane of freezing, is placed in the path of the electric beam; liquid flowers and leaves start into view in the interior of the slab. (See fig.) A brilliant central nucleus



Ice-crystals.

appears in each figure with an audible click. The ice as it melts contracts; the space filled by the frozen flower is not quite filled by the liquid one, and the water, which has been rendered very cohesive by the elimination of the air in freezing, ruptures with a sound, producing the central vacuum. A property of ice discovered by Faraday in 1841 (see REGELATION) accounts for the advance of the great glacial ice-masses which move down the Alpine and Arctic valleys. (See GLACIERS.) The magnificent icebergs of the northern seas are generally only the terminal masses of the Arctic glaciers, which have crept over the beach to the sea, and there been worn away and broken off by the action of the waves and the tides. The ice-caves described by Alpine travellers as existing in the glaciers are very beautiful; stalactite and stalagmite of pellucid ice, clustering branches, pillars, and domes adorn their roofs, floors, and walls. One of them shows in every crevice and depression of its walls the lovely blue tint characteristic of glacial ice in shadow, while the roof, which is thin enough to permit the sun's rays to penetrate it, glows with a delicate rosy tint. Ordinary ice, though crystalline, is not prismatic, but that which has frozen at a temperature below  $32^{\circ}$  F. shows a decided prismatic structure. In many of the ice-caves of France and Switzerland this structure is found; sometimes the stalactites are formed of common ice surrounded with a shell of the prismatic. The interior, being the softer, melts, leaving the stalactite hollow. Some ice-prisms, as mentioned in *Poggendorff's Annalen* (vol. iv. p. 475), when examined by polarized light, manifested a feeble double refracting power. The sudden disappearance of enormous sheets of lake-ice is explained by the breaking up of the vast mass into prismatic blocks. A slab of ice through which the beam of the electric lamp is sent will mark its path by the formation of innumerable little luminous spots, as the notes mark the path of a submarine. The spots form in any plane, but in those which are parallel to the plane of freezing they shoot out spicules, and finally produce the flowers before described. The planes of freezing of a block of ice may always be determined by thus



sending the beam through it and noting the formation of the flowers and leaves.

In lake-ice bubbles may be seen, with solid layers between, evidently marking the limits of successive acts of freezing, and with each block composed of such layers of solid ice and bubbles, a surface layer is associated, which gives evidence of having been acted upon by external influences. In this surface layer are numerous small air-bubbles around which a blob of water exists. This phenomenon Agassiz explains as being due to the arrest of heat by the air, and the melting of the surrounding ice by its elevation of temperature. Tyndall holds, and proves conclusively, that the melting of the ice in the interior of the block is due to its conducting power. In summer, ice is often only a congeries of water-cells in a skeleton of ice; a saw will go through the mass with comparative ease. In freezing, water excludes the largest part of any solid held in solution by it; this quality is used in the arts to concentrate certain liquids. As a geologic agent ice has been very prominent (see GLACIERS), not only by means of glacial action, but by the disintegration of rocks and mountain-masses, which have then been carried away and deposited as laminated strata on the lowlands or the ocean's bed. Hoar-frost, one of the most familiar forms of ice, is only frozen dew. (See DEW.)

Mrs. S. B. HERRICK.

**ICE. Its Relations to Navigation, Travel, and Transportation.**—The closing of rivers, bays, sounds, and estuaries by ice greatly impedes, and sometimes completely prevents, navigation for several months of the year. N. of the 40th degree of latitude in North America, and of the 50th degree in Europe and Asia, the navigable rivers are closed for three or four months, and in the higher latitudes for six or seven, to all passage of steamers or sailing vessels. In exceptionally cold seasons the estuaries, harbors, bays, and sounds of these regions are sometimes closed for several weeks. The obstruction of the East River, or the estuary between New York and Brooklyn, and of the Narrows and inner harbor of New York, the Kill von Kull, and Newark Bay for some days is not a very infrequent occurrence; the winters of 1857-58, of 1865 and 1866, and of 1874-75 are among recent instances of this obstruction, and during the last-named severe season Long Island Sound was frozen over at its western extremity except a narrow channel, and Cape Cod Bay was closed for two or three weeks. In 1741 it is said that Long Island Sound was frozen in its whole extent, and that an adventurous citizen drove over it from New York to Greenport in his sleigh or cutter. As we approach the Arctic regions the obstructions to navigation from ice become more formidable. The whaling fleet has met with heavy losses by the crushing of their vessels in the ice, and the numerous Arctic expeditions have almost without exception been thwarted or prevented by the ice from attaining their desired results. But, though these obstructions to navigation cause serious delays, and often occasion much suffering, they are in other respects a benefit. The Finns, Laplanders, Ostiaks, Kamtchadales, Esquimaux, and other Northern tribes regard the winter season as the most agreeable of the year. Warmly clad in furs which are impenetrable by the intense cold, they go forth from their huts built of the ice, and journey long distances on sledges drawn by dogs or reindeer, preferring for rapid travel the comparatively smooth ice of the bays and sounds to the rougher surfaces of the drifted snow and ice of the shores. In more civilized countries skating is not only a favorite amusement, but in Europe is turned to practical account, the pack-peddlers, messengers, and many of the servants performing their journeys on skates with great ease and rapidity. The ice boat, a triangular platform rigged with large and strong skating irons, and propelled by immense sails which enable it to scud before a strong wind at the rate of 50, 60, or even 70 miles an hour, is becoming a very popular though somewhat dangerous amusement on our Northern rivers; and the ice-bridges which span the larger streams above the 42d degree of N. lat., often for several months of the winter, furnish a safe and easy transit to thousands of teams and tens of thousands of foot-passengers, though to the manifest dissatisfaction of ferrymen and bridge-tenders.

**As an Article of Commerce.**—There is a large demand for ice as a commodity for three distinct purposes: viz. for its cooling qualities, for its antiseptic or preserving power, and for its use in medicine and surgery. In all tropical and semi-tropical countries there has been a demand in all ages for some means of cooling wine and other beverages, and imparting to the drinking-water of those countries sufficient coldness to make it palatable. The means naturally suggested was the use of snow brought from the mountains and stored up to be used in cooling the beverages in use. Solomon undoubtedly refers to this practice (which was even before his time in extensive use in Oriental countries) in Prov. xxv. 13: "As the cold of snow in the

time of harvest, so is a faithful messenger to them that send him; for he refresheth the soul of his masters." Repeated references are made to the practice by Greek and Roman writers. Theocritus, Aristotle, Horace, and Plutarch all mention it, the last describing minutely the methods adopted for preserving the snow. Nero established store-houses for ice and snow in Rome, but they were not sufficient to supply the demand. It is worthy of notice that snow is still gathered for this purpose on the Apennines by Italian peasants (or was, a very few years since), and brought into Naples, Rome, and Florence, where it is stored in cellars and sold to the wealthy inhabitants. Our countryman Mr. W. J. Stillman, when consul at Rome, undertook to introduce American ice there, importing a cargo of Wenham Lake ice, and offering it to the people at the price asked for this dirty snow; but he was informed that he could not be permitted to do this, as the right to gather and vend this snow was one of the vested privileges of the Italian peasants, and must not be disturbed. In Spain and Portugal, and in Sardinia and the S. of France, snow, and sometimes ice, was gathered from the mountains and stored to some extent in the cities and in icehouses on the estates of wealthy nobles and grandees, but was used very sparingly. In England and Scotland it has been the practice for two or three centuries, among the wealthy, to have icehouses on their estates, and fill them with ice each year from the nearest accessible lake, river, or mountain. In England, however, the ice was generally thin and not very pure. Ice was not for sale, to private customers generally, in London before 1845, and only a few of the first-class fishmongers and confectioners made use of it. Their supplies were brought from ponds, or after 1825 from Norway. The wealthiest citizens and some of the nobility had a small supply brought from their country-seats. In this country icehouses have been very common in the rural districts for almost two centuries. They were cheap affairs—a cellar dug in the ground, floored with stone on which straw or sawdust was thickly strewn; the sides ceiled with rough boards placed nearly a foot from the earthy wall, and the space between filled with spent tan-bark or sawdust; the peaked roof covered first with rough boards, then heavily thatched with straw, and then another roof of rough boards with broken joints; the ice put in during the coldest weather of the winter, with layers of sawdust or straw between, and then, if the weather was cold enough, water thrown over each layer to freeze it into a solid mass, and the whole covered closely, and the double or triple roof put on. Access to it was generally indirect, and it was only opened at night in hot weather. The expense was considerable, but the supply was generally sufficient for several families. In our large cities at the North as late as 1820 it was difficult to obtain ice even for the purpose of cooling water or other beverages, and the Southern cities were entirely without it. In the country, and to some extent in the cities, those who had no icehouses and no interest in any, made use of cool cellars or deep wells for keeping butter, milk, etc. cool, and for the preservation of wines. The pitcher of water was wrapped with a moistened napkin and cooled by the evaporation. Ice became a commercial product on a small scale in Boston about the beginning of this century; i. e. it was kept in storehouses, and probably carried abroad to the few customers who were disposed to buy at about that period. As early as 1805, as we shall see further on, ice was exported from that city to the West Indies. In New York City it was not a commodity to be generally bought and sold before 1825, though it was used by the butchers, fishmongers, and perhaps the confectioners, at an earlier date. The traffic has grown enormously in fifty years. It now employs in the seven or eight companies in New York City a capital of nearly \$8,000,000, gathers from 1,000,000 to 1,500,000 tons of ice annually (the ice-crop of 1875 exceeded 2,000,000 tons), employing over 10,000 men and over 4000 horses, and collects from \$6,000,000 to \$10,000,000 for its products, including the ice exported. Portland, Boston, Hartford, New Haven, Philadelphia, Albany, Rochester, Buffalo, Cleveland, Chicago, Cincinnati, Louisville, and St. Louis are all largely concerned in the ice-trade, though the last three draw their supplies from a distance and ship little or none to other points. Many of the smaller cities have a large local trade in the commodity, and a few of them export considerable quantities. The capital invested in the business is estimated at about \$30,000,000.

The first demand for ice had reference solely to its cooling qualities, but its antiseptic properties soon created for it a still larger market. Indeed, had men but comprehended the lessons taught them by nature, the antiseptic character of ice would have given it its first value. That meats and the carcasses of animals intended for food could be transported for a great distance when frozen, without injury, was a fact well known ages ago; but the practical



bility of using ice to preserve such meats and carcases, even without freezing them, does not seem to have occurred even to the keenest observers, though glimpses of the truth came to their eyes, from time to time; thus, in King Alfred's Anglo-Saxon version of Orosius's *Historiæ adversus Paganos*, lib. vi., in an addition by Alfred himself, giving the narrative of one Wulfstan, an early Northern navigator, in regard to the Esthonians, a Finnish tribe E. of the Vistula, whom he had visited, we find an account of their practice of keeping the bodies of their dead in their houses for a long time—from one to six months, according to their rank) unburnt and not embalmed; and then follows this remarkable passage (we use Thorpe's translation): "And there is among the Esthonians a tribe that can produce cold, and therefore the dead, in whom they produce that cold, lie so long there and do not putrefy; and if any one sets two vessels full of ale or water, they contrive that one shall be frozen, be it summer or be it winter." This, he it remembered, was in the eighth century, or perhaps in the latter part of the seventh. At a later period a more striking illustration of the antiseptic property of ice occurred. In 1703, after an unusually protracted period of rain and thaw, there was discovered near the mouth of the Yenisei and along the shores of the Frozen Sea in Siberia a vast deposit of the carcases of the mastodon and other pre-historic quadrupeds, with their flesh untainted and edible, preserved from putrefaction and decay by the protecting influence of the ice in which it had been imbedded for thousands of years. This flesh was greedily devoured by the Samoides, as well as by their dogs, the wolves, and other carnivorous animals who gathered to prey upon this mighty feast. In that region, according to Erman, an attempt to sink a well resulted in finding alternate layers of ice and gravel to a depth of 382 feet. In this vast natural refrigerator, flesh not salted or prepared in any way had been kept from putrefaction, change, or decay for, at the very least, several thousand years. Yet so slow are mankind to learn, that more than a century passed before the idea of preserving dead bodies by surrounding them with ice, or of preserving meats, fruits, butter, milk, etc. from putrefaction, fermentation, or decay by an artificial uniform low temperature produced by ice-packing, occurred to any one, or, at all events, before it was reduced to practice. Now, however, ice is regarded as absolutely necessary during the summer months in preserving the bodies of the dead until the time of burial; and it forms in the refrigerating closet or chest one of the most indispensable articles of household use for the preservation of meats, milk, butter, vegetables, or fruits. But its antiseptic value does not stop here. Refrigerating cars bring to us from the Pacific coast choice ripe fruits, game, and other articles which it would otherwise be impossible to obtain in this market, and bear back oysters and other shellfish, condensed milk, butter, and other articles from the Atlantic coast. Steamers fitted up with refrigerating chambers bring beef and mutton from Texas, ripe oranges, lemons, bananas, and guavas from the West Indies, South American fruits from Brazil, and carry in return milk, butter, oysters, apples, peaches, pears, etc. to tropical climates. Preserving houses in several of our cities preserve with a slight percentage of loss, oranges, lemons, grapes, apples, pears, peaches, etc. from one to three years.

The exportation of ice, which commenced in 1805 by the shipment of 130 tons to Martinique by Mr. Frederick Tudor of Boston, had a slow growth. For the first ten years Mr. Tudor made little or no profit by his ventures; in 1815 he obtained some exclusive privileges from the Cuban authorities, and between 1817 and 1820 began to send cargoes also to Charleston, Savannah, and New Orleans; but in all these years he met with frequent disasters, and from the long passages of the sailing vessels often lost the greater part of his cargoes. As late as 1832 his whole annual shipments amounted to but 1352 tons, all of which was taken from Fresh Pond in Cambridge, Mass. In 1833 he sent his first cargo to the East Indies, shipping 180 tons to Calcutta. Eighty tons melted before the arrival of the cargo at that port, but the remainder sold promptly at a large profit. From that time the business began to thrive. In 1836, 12,000 tons were exported from Boston alone; in 1846, 65,000 tons; in 1856, 146,000 tons; in 1866, nearly 250,000 tons; and in 1874, though other ports were, and had been for twenty years or more, participating in the export trade, the shipment from Boston was more than 300,000 tons. The entire export from the Northern cities, aside from the supply of New Orleans and other cities along the Mississippi River, which was drawn mainly from the North-west, was in 1870 about 500,000 tons, and in 1875 did not fall below 900,000 tons. In using this term *export*, however, it is proper to say that by far the largest portion of these shipments are to the cities of our own coast and of the interior, the entire export to foreign countries in the year

VOL. 11.—69

ending June 30, 1873, being only 53,555 tons, and in 1874, 51,372 tons, having a declared value in 1873 of \$188,095, and in 1874 of \$128,913, though probably realizing three or four times those sums. The trade with Great Britain in this commodity is increasing, though Norway is a large competitor for the traffic, and commenced it as early as 1821; and the Dominion of Canada is also competing. In the Southern cities of this country and of Europe, as well as in the West Indies and South America, artificial ice is supplying a considerable part of the demand.

*As a Remedial Agent in Medicine and Surgery.*—The use of ice for medical and surgical purposes is one of the additions made to our *matéria medica* in the present century. The Russians had, indeed, for 200 years or more passed from their intensely hot steam-baths into a bath of snow, but this was rather an experiment in hygiene than an item of medical treatment. Ice is now used medically, internally and externally; in the former way, by breaking it up into small bits to be swallowed by the patient, and in iced drinks in gastritis and gastric fevers, as well as in some diseases of the pharynx, larynx, or bronchial tubes. Its external uses are manifold; it is applied, pounded, in ice-bags to the head in acute mania, brain fever, or some injuries of the brain; to the temporal arteries and carotids in some fevers and in cases of diphtheria and scarlet fever; along the spine in ice-bags in cholera, yellow fever, etc.; over the bowels in cholera; locally in rare cases, to diminish sensation preparatory to surgical or dental operations, rhigolene and other frigorific preparations being more easily manageable and more convenient of application than ice. It is a remedial agent of great value.

*The Gathering and Storing of the Ice-crop.*—Although the act of freezing expels from the crystallized mass the salt and other mineral ingredients, leaving it when in a frozen state very nearly pure fresh water, yet ice formed from or floating in salt water gathers in the interstices between the crystals so much salt, brackish, or impure water that it becomes unfit for household purposes. Hence, the ice-crop must be gathered from fresh-water ponds or lakes or from rivers above tide-water. The supply of Boston, both for home use and export, is derived from several small lakes at no great distance from the city, such as Fresh Pond in Cambridge; Wenham Lake, about 18 miles from the city; Saugus Lake or Pond, etc. Portland and Bangor derive their supply from the Kennebec, Penobscot, and Androscoggin rivers, above tide-water, and from some of the great lakes of Maine; New York, from the Hudson above tide water, and from Rockland, Mahopac, Greenwood, and other lakes; Philadelphia, from the Delaware and Schuylkill above the Falls, and from several lakes of Pennsylvania and New Jersey; the North-western cities, from the great lakes and the numerous smaller lakes of Wisconsin, Minnesota, and Dakota. In most cases the ice-companies have secured the right to take the ice from these lakes and ponds by the purchase of the lands bordering on them, and have erected large storehouses on the shores in which to deposit the crop. These icehouses are sometimes of brick, but oftener of wood, from 100 to 200 feet in width and from 200 to 400 feet in length, with double, triple, or quadruple walls, and generally three, four, or five stories in height, with strong floors and doors closing tightly on each floor, but no windows. There are numerous inclined planes, movable and adapted to each story, and to service without as well as within; in the larger storehouses a steam-elevator is used to drag the blocks of ice up the planes. The capacity of these storehouses varies with the locality and the conveniences for shipping ice from them, many of them being capable of storing from 20,000 to 40,000 tons. The spaces between the walls are filled with sawdust, spent tan-bark, or some other poor conductor of heat.

When a favorable time has come for storing the ice, there is a scene of great activity in the vicinity of the storehouses. On the Hudson and its neighborhood the period for gathering the ice is rarely more than four or five days at one time, and sometimes not more than ten or twelve in all, and hence the greatest speed is necessary in securing the crop. The thickness of the ice being ascertained (and this should not be less than ten or twelve inches, and two feet is better), the ice-field is temporarily fenced, the snow, if there is any, scraped off by a broad scraper drawn by one horse, and the ice planed by another scraper armed with a steel blade to the depth of perhaps two inches, to remove the porous ice. In seasons like that of 1874-75, where the ice has not been covered with snow and is two feet or more thick, clear, solid, and transparent, very little scraping is required. The surface being cleared, the marker commences his work, using a kind of plough drawn by one horse, which makes a narrow groove about three inches deep, and running the lines five feet apart, and then turning and crossing these by another series of grooves, also



five feet apart, so as to make square blocks five feet each way. If the ice is thick, these blocks are reduced by an implement like a harrow with three parallel rows of long sharp teeth, one row running in the groove, and another plough, with a long, sharp, and comparatively thin blade, is run rapidly through the principal grooves. One row of blocks is then cut through by means of hand-saws, the blocks pushed under or hauled up on the ice, and run to the inclined planes or loaded on sleds. The succeeding blocks are pried off with a crowbar by one gang, and another catches them with boat-hooks and drags them up, or tows a sheet of perhaps fifty blocks, with a grappling-iron and rope or chain, by horse-power, toward the storehouse, where it is broken into blocks, run up the inclined plane by the elevator, and packed away, the blocks standing on end and being separated by sawdust, shavings, rice-hulls, or spent tan. As soon as a floor or story is filled the doors are closed tightly, and the inclined planes raised to the next story, which is filled in the same way. There are gutters and drainways near the walls which receive and carry off the drainings from the melting of the ice. During the moonlight nights the work is carried on by night and day until the storehouses are filled, all parties working with a will. The cutting and storing of 600 tons in an hour at a single storehouse is not an uncommon feat. The cost of the labor for gathering and storing the ice in a favorable season does not exceed eight or ten cents per ton.

Ice is very perishable if exposed to the air in the summer temperature, though that from Canada, Maine, and Massachusetts, being much more dense than that of the Hudson River, melts less readily. On the Hudson it is kept in the storehouses till just before it is wanted, and then loaded into barges, which, if possible, are brought directly to the storehouse, and a half dozen or more of these barges are towed by a steamer to the company's city wharves, where it is either received into a storehouse or loaded directly from the barges upon the heavy covered wagons which are waiting to receive it. The net cost of the ice delivered to city customers in New York or Brooklyn varies from \$2 to \$3 per ton, and in unfavorable seasons may reach \$4. It can be shipped in large cargoes from their wharves in most seasons profitably at \$1.50 to \$2 per ton. The profits on the business are immense, the prices to the large packing establishments and the larger hotels ranging from \$5 to \$15 per ton; to butchers, grocers, druggists, and confectioners, from \$8 to \$20 per ton; and to families and small consumers, from \$14 to \$30. These prices have provoked such competition that it is doubtful whether the maximum will again be reached in those cities. In 1874 ice was brought in large quantities from Maine and sold to consumers at half the prices which the New York companies had fixed, and a profitable business was done at those rates. Ice has within the past few years become a necessity of life, the loss of which entails great suffering, and should no more be subject to the caprices of speculating monopolies than wheat flour or any other indispensable article of food or clothing.

**Artificial Ice.**—That ice could be produced by mechanical and chemical processes has been long known, but until recently it has not been possible to do this at so low a cost as to make it profitable. Within the past fifteen years, however, there have been several processes patented and machines constructed which accomplish this at a cost sufficiently moderate to warrant their use in regions below the 35th parallel of N. lat. Siebe's ether ice-machine was the first of these, and made ice in thin plates by the vaporization of ether acting upon a strong brine which circulated through a cistern containing the ice-moulds. A better machine was Carré's ammonia ice-machine, which produced cylinders of ice by the vaporization of liquid ammonia, at a moderate expense, though with some danger of explosions. A German modification of this produced plates of ice with less danger and somewhat less expense, but the cost of the machines was so high as to prevent their general use; \$6000 being the price of one which would produce ten tons of ice per day by very hard work. An American company attempted the manufacture, using for the purpose one of the most volatile and inflammable of the naphthas produced in the distillation and refining of petroleum. Their machinery was simpler than that of the foreign processes, but it was rather a refrigerating than an ice-making process, and required some motive-power to keep the refrigerating liquid in motion, and the material used was so explosive and dangerous that their success was not great. By none of these processes could ice be produced at a less cost than \$1 or \$5 a ton, and by some of them the cost was from \$6 to \$3 per ton. In the Southern cities, like Charleston, Savannah, Mobile, New Orleans, and Memphis, they could be used to advantage, but not in Northern cities, where large consumers could ordinarily, by combining, obtain their ice from nature's manufactory at \$4 per ton, or even lower. There is, however, a wide field for the inventive genius of

man to signalize its power in the construction of a simple, cheap, and effective ice-machine, employing no dangerous or explosive chemicals, and making a pure ice in solid cakes, at a price so low as to compete favorably with the natural product.

L. P. BROCKETT.

**Ice'berg**, a great mass of ice floating in the sea. Icebergs are huge fragments of glaciers detached by the action of the water from the lower end of the glacier. Greenland, from the great number of its glaciers, is the fatherland of the iceberg. Icebergs are far more numerous in the northern than in the southern polar regions. They bring with them in their journeys masses of rock, earth, and sometimes seeds of plants. Polar bears and seals are sometimes thus transported from one region to another. Icebergs are often of prodigious size and most remarkable shape. They have often been observed to measure 300 feet in height. Only one-eighth of the mass is above the surface of the water. Icebergs are extremely dangerous to navigators in polar seas. These dangers are extended southward by the Labrador current, which brings great numbers of them into the Atlantic, where they are melted by the warmer waters of the Gulf Stream, and drop their loads of gravel and stone upon the banks off Newfoundland. The streams of water from their sides are always fresh.

**Ice'land** [*Dan. Island*], a large island subject to the rule of the king of Denmark, and situated between the Atlantic and the Arctic oceans, between lat. 63° 24' and 66° 33' N., and between lon. 13° 31' and 24° 17' W., 600 miles distant from Norway, 250 from Greenland, and 500 from Scotland. Area, 39,207 square miles. Pop. 69,763. Cap. Reykiavik. Iceland is of volcanic formation, and the double effects of the intense cold of a northern climate with its long, bleak winter and short, dreamy summer, and the tremendous volcanic powers which, under one form or another, seem to be active at every minute and on every spot, have given the whole island a most singular appearance—desolate but grand, poor but interesting. With the exception of the southern part, which presents some tracts of low and level land, the whole coast is high and precipitous; on the eastern and northern sides barren and inhospitable, on the southern and western sides indented with numerous deep and narrow fjords, which afford excellent harbors, and along which stretch the inhabited valleys. The interior is a high table-land resting on Plutonic rocks, covered with immense beds of lava, and broken now and then by hot springs (geysers), which throw columns of boiling water sometimes 200 feet high into the air, and form steaming streams, which after a short course disappear under the lava. It is studded all over with conical hills of smoking ashes and boiling pits of sulphur, and traversed by ranges of mountains whose summits are often connected with glaciers, which form wherever the ground rises above 4000 feet, and which often descend to the ocean, making it dangerous, almost impossible, to travel from one valley to the other. Oerífa Jökul (*jökul* being the Icelandic name for glacier) is the highest point of the island, 6426 feet above the level of the sea, and forms in the south-eastern part the centre of an immense system of glaciers and volcanoes. Its first eruption within the historic period took place in 1724, when it suddenly burst forth, filling the valleys with red-hot lava, raising up islets far off in the ocean, and sending its clouds of ashes hundreds of miles over the sea. The famous HECLA and GRYSER (which see) are situated in the south-western part; Krafla in the northern. The activity of these volcanoes is not continuous; there seems to be 70 or 80 years between each great eruption of Hecla. Meanwhile, an innumerable multitude of smaller mud-volcanoes and hot springs are playing, and these are often of so changeable a nature that they may be formed in one month and disappear in the other. The climate of Iceland has changed, and seems to be still changing. It would seem that the island had formerly large forests. Sulphurized remains of them, forming a peculiar kind of brown coal, are found in many places, and are used, together with the white turf and drift-wood, for fuel. Now there is not more than one tree on the whole island, the mountain-ash at Akureyri on the N. coast, 25 feet high. The Thingvall Forest, covering an area of about ten square miles, and composed of willows and birches, consists of shrubs which are only between three and four feet high. Different sorts of grain, which were extensively cultivated 300 years ago, cannot now be raised at all. The winter is not extremely severe, but it is very long; in July, and even in August, ice may be found drifting along the coast. Only a few garden vegetables and potatoes can be raised, and bread made from imported meal is a luxury. But in the valleys grow good grass and many fine herbs, among which Iceland moss constitutes a considerable item of exportation. The rivers and the fjords abound in fish—salmon, trout, and cod. Numerous seals and whales gather along the coasts and



swarms of wild sea-fowls, among which are the eider-duck and the swan, visit the shores. Thus, hunting, fishing, and rearing of sheep are the chief pursuits of the Icelandic life, and eider-down, dried and salted fish, wool—generally manufactured into socks and mittens—tallow, and fish-oil are the main articles he can give in exchange for manufactured goods, coffee, tea, wine, tobacco, coal, and grain. Among minerals, sulphur is found in enormous quantities; also iron, rock-crystals, and the famous double-refracting spar, but the mineral wealth of the country is very little developed. The value of the total annual exportation is about \$3,000,000. Iceland was discovered and colonized in the ninth century by the Norwegians, who here formed an independent republic. In a short time the country attained a high degree of prosperity, and developed a civilization which far surpassed that of the mother country. But feuds between the different families, in which whole estates, with all their occupants and all the property belonging to them, were burned down, brought the independence of the republic to an end, and made the country a dependency of Norway. In 1280 it was, together with Norway, united to Denmark, and remained so until 1814, when Norway was separated from that country. Iceland was governed by a *Stjórnting*, who had the executive power, and was appointed by the king, and an *Althing*, which had the legislative power, and consisted of deputies chosen by each county. It required an annual support of \$60,000 from Denmark. But in 1874, upon the celebration of the one-thousandth anniversary of the colonization of the island, Iceland became entirely independent of Denmark, though subject to the king as the head of the Icelandic government. Its new governmental institutions are entirely republican in spirit, all citizens having equal rights and perfect religious liberty.

The Icelanders are a noble race of people—brave, of pure morals, and intellectual in a very high degree. The old tongue, which is the foundation of the three Scandinavian languages, they have kept during 3000 years in its original purity, and the humblest workman can read and write, and is thoroughly conversant with the Sagas, the history and the laws of his country, and with his Bible. A comparatively large number of students come yearly to the University of Copenhagen, and many of them have acquired celebrated names in science. Nay, there are Icelandic poems so thoroughly imbued with the loftiest ideas and sentiments of modern civilization, and so thoroughly impregnated with the elegance and brilliancy of modern art, that in reading them nobody would believe that they were written in a low hut built of lava-blocks and moss, and looking out on the dreary gloom of a winter of nine months.

CLEMENS PETERSEN.

**Icelandic Language and Literature.** Under the name of *Dänsk tunga* ("Danish tongue") or *Norrœna* ("Northern speech") one language was generally spoken throughout the three Scandinavian countries, Denmark, Sweden, and Norway, during the pagan times and down to about the eleventh century. There were no doubt local modifications of this language, the more so as the Goths had come into the country in two different swarms, on two different roads, and probably also at two different periods. But the skalds travelling from court to court, or visiting the great jarls (earls) on their estates, were universally understood, and the Runic inscriptions spread over the whole of Scandinavia show no differences. In the ninth century this language was brought to Iceland by the Norwegians who settled on the island, and here, in a distant corner of the world, where a little republic flourished for more than three centuries (from 928 to 1262), it was consolidated into a rich, and even brilliant literature, and has been preserved, almost without any changes, up to this very day. For the study of the languages of the Teutonic family this Icelandic language, as it is now generally called, is of paramount importance; for although its literary monuments are much younger than, for instance, Ulfr's translation of the Bible, still its growth was more independent, its development more energetic, than that of any of its sister-tongues, and it is extant in a literature whose study is necessary for a full understanding of the history of Europe during the Middle Ages. Its most characteristic features, when compared with other Teutonic languages, are these: it has no indefinite article, and the definite is not put before the noun, but appended to the end of it; the first and second personal pronouns have a dual form, the verbs have a passive form unknown to other Teutonic languages; and while in the Germanic tongues the infinitive always ends with a consonant, it ends in Icelandic invariably in a vowel. When compared with modern languages, its purity, flexibility, and richness of forms give it a peculiar charm. Etymology, which in English, for instance, is a dead knowledge, employable only by a process of reflection, is in Icelandic a living principle in the mind of the speaker, work-

ing instinctively. New words, expressive of new ideas or new shades, are formed with the greatest facility, universally understood, and easily kept alive as long as the idea lives, but with the idea they die. Originally, this language was written with Runic characters, but with the introduction of Christianity the Roman alphabet came into use. The letters *c* and *g* were dropped as fully represented by *s* and *k*, and two new letters, *ð* and *þ*, were formed to represent the aspirated *d* (*th* in *though*) and the aspirated *t* (*th* in *thought*). For the complete representation of the somewhat intricate system of vocalization the vowels were provided with dots and strokes. The oldest monument of Icelandic literature is the poetical Edda, compiled by Sæmund Sigfússon (1054-1133), but whose single parts probably belong to the eighth or ninth century. This, as well as the prose Edda, compiled or written by Snorri Sturluson (1178-1211), is chiefly of religious or mythological interest, giving a representation of the contents of the old pagan faith. The prose Edda, however, gives also a kind of review of the art of poetry, of synonyms, of poetical words and phrases, of metres and strophes, etc. Proofs of this art have been left us, not only in the songs of the poetical Edda, and in fragments of songs occurring in the different prose works, where they are quoted as evidence or applied as ornaments, but also in about twenty complete poems or *drapas*. The Icelandic skalds and their art were highly esteemed, and the names of Egill Skallagrimson, Eyvind Finnsson, Thord Kolbeinsson, and Ivar Ingimundarson were celebrated throughout Scandinavia as much as those of the greatest kings and jarls. But most of their productions have perished, and we may add that not much seems to have been lost thereby. Periphrase, not poetry, artificiality, not art, were the character of these poems. Nothing was called by its true name or represented in a true manner. Figures, almost contorted into enigmas, stalked along in difficult metres, ringing with alliterations and rhymes. Quite otherwise with the prose literature, the *Sagas*. They are of great importance for the history of the Scandinavian countries, of still greater interest to the history of European civilization, and perfect in their artistic form. They are partly fictitious, taking their subjects from old songs—as, for instance, *Völsunga-saga* and *Frithjof-saga*—or from foreign tales, such as *Kuchinavassaga*, *Tristram-saga*, and *Trojanavassaga*; partly biographical, narrating the history of some great and powerful Icelandic family, as, for instance, *Njal-saga*, *Egils-saga*, *Laxdala-saga*, *Vatnsdela-saga* and *Grettis-saga*; and partly historical—as, for instance, *Knytinga-saga* and *Jomsrökings-saga*, treating Danish history, *Heimskringla*, treating Norwegian, and *Sturlunga-saga*, treating Icelandic. But of these three divisions of the sagas, the main importance rests on the second one, the biographical. With respect to form, the *Iliad* has nothing to boast of before *Njal-saga*, either in plasticity and precision of representation or in simplicity and grandeur of style. The form of the Icelandic saga is perfect, like that of the Greek epic, and probably produced in the same manner, though under such very different circumstances. In the solitude of that island, far away from the rest of the world, in the loneliness of that hearth, many miles distant from the nearest neighbor, and separated from him by flaming volcanoes and boisterous fjords, in the stillness of that long twilight, when people sat frostbound or snowbound for months, the father would tell about Njal slowly and with emphasis, and the son would listen, rapt and pondering. Then, when the time came for the son to tell the story to a younger generation, he would repeat it word by word, just as it had been fixed in his mind, and making no other changes than such as were inspired by enthusiasm and reverence. Thus worked out into perfection, the saga was at last written down some time before the middle of the fifteenth century, at which period literary life utterly declined in Iceland. Great, however, as the æsthetic interest of the sagas is, their historical interest is nevertheless still greater. They are the only pure and unmixed source from which any knowledge can be had of the primitive character of the Scandinavian races. Those conceptions of life and of the laws of life, and those representations of passions and of the ideals of passions, which the sagas contain, may be differently judged, but whether they are considered sublime or rude, it was nevertheless these which formed the German nation, and to some degree also the French; it was these which conquered Normandy and England, and it was these which made the Crusader and settled down at last in feudalism. The great importance of the Icelandic sagas for the study of European civilization has become more and more appreciated during the course of the present century.

CLEMENS PETERSEN.

**Iceland Moss**, a lichen belonging to the genus *Cetraria* (*C. Islandica*), so called from its habitat, but found in the northern parts of both continents. It is used as an article of food; boiled, having been freed from its bitter-



ness by repeated maceration, it forms a nutritious jelly, or it may be powdered and mixed in cakes or bread. It is also used as a medicine in pulmonary complaints.

**Iceland Spar**, transparent calc-spar, of which the best specimens are obtained from Iceland. It displays in great perfection the phenomena of double refraction.

**Ice-Plant**, an herb of Southern Europe and Northern and Western Africa, the *Mesembryanthemum crystallinum*, of the order Mesembryaceæ. Its succulent leaves are covered with vesicles which appear like crystals of ice. It is often seen in house-culture, and has demulcent, diuretic, and expectorant properties.

**Ichneumon** [Gr. *ἰχθυόμων*, the "tracker"], a name in its largest sense applicable to the numerous genera of small quadrupeds of the family Viverridae, sub-family Herpestinae—all Old-World carnivorous mammals of active habits and fierce disposition, preying upon serpents, birds, and small game of many kinds. But strictly, the name designates the *Herpestes ichneumon* of Egypt. It is famous as the devourer of the eggs of the crocodile and as a destroyer of venomous serpents. Hence it was worshipped by the ancient Egyptians. Spain has an ichneumon, *Herpestes Widdringtonii*. (See MUNGOS.)

**Ichneumon-flies** (Ichneumonidæ), a great family of hymenopterous insects which are of the greatest service to the agriculturist and to mankind, since they deposit their eggs either upon or within the eggs or larvæ of larger insects and spiders, the future larva of the ichneumon-fly devouring the insect upon which it is hatched. Immense numbers of noxious insects are thus destroyed. There are nearly 5000 known species (one-half American), of which some 300 species belong to *Ichneumon*, the typical genus.

**Ichthyology** [*ἰχθυος*, "track," and *λογος*, "discourse"], or the science of tracks, a name proposed by Dr. Buckland. The animals whose existence is made known by their footmarks upon stone may be called *Ichnozoa*. President Hitchcock has detailed sixteen permanent characters in footmarks which serve to distinguish satisfactorily different classes of animals. The following are examples of them: whether tracks of feet; trails made by the body or its caudal extremity drawn along in the mud; width of the track-way; relative size of hind and front feet; length of step; number of toes; mode of progression; spread of the toes; character of the heel, claws, and pellets. (See further under FOSSIL FOOTPRINTS.) C. H. HITCHCOCK.

**Ich'thin**, or **Ichthulin**, albuminoids found in the eggs of cartilaginous fishes.

**Ichthyocol**, or **Isinglass**. See GELATINE.

**Ichthyology** [*ἰχθυός*, a "fish," and *λογος*, "discourse"] is that branch of zoology which treats of the vertebrate animals formerly collectively known under the name of fishes, but which are now distributed among the classes (1) FISHES, (2) SELACHIANS or ELASMOBRANCHIATES, (3) MARSIPPOBRANCHIATES, and (4) LEPTOCARDIANS. Referring to the articles under those several heads, as well as that under VERTEBRATES, for information respecting the structure and relations of each, remarks will be here confined to the most important facts in the bibliography and history of the group of classes. In order to ensure clearness of conception, (1) the great general works on fishes will be first noticed, and then (2) the principal stages in the systematic arrangement of the class or its primary constituents.

I. *General Works and Numerical Acquisitions*.—Many ancient and mediæval authors had published compilations containing descriptions of various species of fishes, but none can be said to have advanced ichthyology. The chief authors after the revival of learning were Belon, Salviani, Rondelet, Gesner, etc. Their works, however, were chiefly of local interest, and related mostly to the fishes of the Mediterranean. The first general work that deserves special mention was the *Historia Piscium* of Willoughby and Ray, published in 1686. In 1735, Linnæus, in the first edition of the famous *Systema Naturæ*, first introduced to the world a synopsis of the arrangement of fishes and digest of known species, which Artedi, his fellow-student, had elaborated; but that author having come to an untimely death, his manuscripts were left to Linnæus, and published under his editorship in 1738 in five parts. In these parts were successively considered in his own words—(1) ichthyological bibliography, or the literary history of fishes, in which was given an enumeration of the authors who had written on fishes; (2) ichthyological philosophy, in which were elucidated the fundamental principles of the science; (3) the genera of fishes, in which a complete system of ichthyology was proposed, with classes, orders, characters of genera, specific differences, and many observations; (4) the synonymy of almost all fishes, in which was given an enumeration of the names of fishes mentioned by

all authors who had ever written of them; and (5) descriptions of the species of fishes which Artedi had dissected and examined alive; these subjects being entitled at length in Latin, with corresponding titles. Artedi admitted into the system 242 nominal species under 52 genera, but these are to be divided among 228 species and 45 genera of true fishes, and 14 species and 7 genera of Plagiuri or cetaceans, Artedi having, like all his predecessors, confounded these two groups in the same class. Linnæus, in (1) the first edition of the *Systema Naturæ*, which was published in 1735, enumerated 145 nominal species of fishes under 36 genera, and 10 cetaceans in 5 genera; (2) in the fourth titular (or second original) edition he had 238 species of fishes under 48 genera, and 8 cetaceans under 5 genera; (3) in the sixth titular (or third original) edition, published in 1748, he recognized 281 species of fishes, distributed under 47 genera, and 12 cetaceans under 6 genera; (4) in the tenth titular (or fifth original) edition (wherein the class was first restricted to the fishes proper, and the cetaceans separated to be united with the mammals) he increased the number to 414 species (including, however, the Amphibia Nantes), ranged under 57 genera; and (5) in the twelfth titular (or sixth original) edition (which was the last one in the lifetime of Linnæus) 477 nominal species of fishes (including the Amphibia Nantes) were described and placed in 61 genera. The eighth titular (or fifth original) edition was limited to the vegetable kingdom.

Between 1740 and 1749, Jacob Theodor Klein, secretary of state of Dantzic, published five numbers or "missus" of a work on ichthyology, remarkable for its crudity, but which has had a considerable reputation. In this work 518 nominal species of fishes were described, and referred to 61 genera, quite different from those of Artedi or Linnæus. From 1782 to 1795 a great work on fishes was published in two sections—one of three,\* and the other of nine† volumes—by Dr. Mark Elieser Bloch, a physician of Berlin, in which about 418 species of fishes were described and illustrated, in fine large oblong folio volumes of plates, but the drawings are very inaccurate, and the coloring still more erroneous. During the time the work of Bloch was being published, several compilations were issued from different European presses.

In 1787, René Just Haüy (better known as "the crystallographer") contributed, anonymously, a volume† to the natural history department of the *Encyclopédie Méthodique*, describing the fishes in an alphabetical sequence under their French names, and with tabular synopses, each on a special page, giving the classes, genera, and species under their French names, in connection with the descriptions.

In the following year (1788) the Abbé J. P. Bonnaterre‡ contributed also to the same series a volume under the title *Ichthyologie*, in which the species were arranged according to the Linnæan classification, and illustrated in 102 plates, representing about 400 species, which he had collected from all sources. Also in 1788, Johann Friedrich Gmelin issued an edition of the *Systema Naturæ* of Linnæus, in which he collected together from many sources descriptions of species, which were, however, referred to their places in the system with very little judgment; he raised the apparent number of species to 826, which he grouped in 65 genera, but many of these were identical with each other, and the number of real species was therefore much less. A few years later (in 1792) the work of Linnæus's friend (Artedi) also found an editor in Johann Julius Walbaum, who used the *Genera Piscium* as a nucleus around which he brought, in the form of foot-notes and appendices, all the species which he could collect from all sources, and which amounted to about 965, grouped under 228 genera; of these also a considerable proportion were synonymous with other species.

Between 1798 and 1803,|| Bernard Germain Étienne de la Ville-sur-Ilion, Comte de Lacépède, published an extensive work on fishes in the French language, entitled *Histoire Naturelle des Poissons*, in which he introduced, with very great modifications in the system, numerous generic divisions and many species based on figures made chiefly by French naturalists and travellers; very little wholesome criticism was exercised in this work. Fourteen hundred and sixty-three (1463) nominal species were described.

\* Bloch's (D. Marcus) *Oekonomische Naturgeschichte der Fische Deutschlands*, Berlin, 1782-83 (text, 3 vols. 4to; atlas, 3 vols., obl. fol.).

† Bloch's (D. Marcus) *Naturgeschichte der ausländischen Fische*, Berlin, 1782-95 (text, 9 vols. 4to; atlas, 9 vols. fol.).

‡ Haüy, René Just. *Encyclopédie Méthodique*.—*Histoire Naturelle*. Tome troisième. Contenant les Poissons.—A Liège, 1787, 4to.

§ Bonnaterre, J. P. *Tableau Encyclopédique et Méthodique des trois règnes de la Nature*.—*Ichthyologie*.—A Paris, 1788, 4to, with 102 pl.

|| Lacépède (Comte de). *Histoire Naturelle des Poissons*, Paris, 1798-1803 (4to, 5 vols.).



In 1801 the Greek scholar, Johann Gottlieb Schneider,\* who had paid considerable attention to natural history, and especially ichthyology, published a posthumous work of Bloch's, but which doubtless owed considerable to himself, under the title *Systema Ichthyologiae iconibus et illustratione*. In this work the species were primarily grouped in classes, distinguished nominally by the number of fins, although very often the species referred to the classes did not support the characters attributed to them. The classes were again divided into orders distinguished by the position of the ventral fins.

In 1803 and 1804, George Shaw published the fourth and fifth volumes (in four parts) of his *General Zoology, or Systematic Natural History*, which were exclusively devoted to the fishes. He adopted, with a few trifling modifications, the system of Linnaeus, as rectified by Gmelin, and described 1230 nominal species of fishes.

With Shaw the age of mere compilations of descriptions of species of fishes came to an end, and although the subsequent works devoted to such descriptions were few, they were far more valuable in every respect, and based chiefly on original materials and observation, and a comparison of the fishes themselves.

In 1828, Baron Georges Cuvier commenced the publication, in connection with M. Achille Valenciennes,† of a great work on fishes (*Histoire Naturelle des Poissons*), which was continued through many years (1828-49), and was only brought to a stop in 1842, when twenty-two volumes had been published; all of the apodal fishes, almost all of the ganoids, and all of the elasmobranchiates, marsipobranchiates, and leptocephalians being left undescribed. The first ten volumes were prepared by Cuvier and Valenciennes, each elaborating special groups, but on the death of Cuvier, and after the publication of the manuscript he left behind, the work was carried on by Valenciennes alone. Owing to the length of time during which the work was published, a great inequality in its proportions necessarily resulted, the last volumes describing a larger proportion of the now known species than the earlier ones; 4514 nominal species of fishes were described in the twenty-two volumes, almost all of which belong to the typical fishes or to the order of Teleostei.

In connection with the work of Cuvier and Valenciennes may be considered one by A. Duméril,‡ bearing, in part, the same title—i. e. *Histoire Naturelle des Poissons, ou Ichthyologie générale*. This work is complementary to the preceding, as it embraces the selachians, ganoids, and lophobranchiates, groups which had not been described by Cuvier and Valenciennes. Two large volumes were published between 1865 and 1870, when the death of its author arrested its further progress. 626 nominal species were described in the volumes issued.

Between 1859 and 1870, in the form of a *Catalogue of the Fishes in the British Museum*, by Albert Günther, M. D.,§ all the species recognized by the author, as well from autopsy as descriptions of species unknown to him, were described. This is the only work published since the early part of the century which contains a complete conspectus of the living fishes. It is in eight volumes, which were issued every one or two years. The author adopted 6343 species as established, while 1682 others are considered as doubtful, and referred to by name only in foot-notes to the genera to which they are supposed to belong. It is assumed that about 1000, however, of the doubtful species will be ultimately confirmed; and, allowing 1000 species to have been described during the course of publication of the series, it is estimated that we may put the total number of fishes known at present as about 9000.

II. *Progress of Classification*.—Nothing like a scientific classification of fishes was known to the ancient or mediæval authors, Aristotle in this respect being but little if any in advance of others, and none of his followers or successors are better. The first germ of a regular system based on anything like scientific principles was not published till near the end of the seventeenth century. In 1686, Ray published the *Historia Piscium* left by his friend Willoughby, in which the species were dichotomously divided, primarily, (a) into (I.) CARTILAGINEI, and (II.) OSSEI: (b) the former (I.) into *Lamii* (including sharks and *Raii* including rays); and the latter (II.) into *Placii* and *Non-Placii*: c. the *Placii* included only the flat fishes; the *Non-Placii* were distinguished according to the form of the

body, whether eel shaped (*Anguilliformes*), or more contracted (*Corporis contractiores*), and (d) those according to the absence of ventrals (*sine ventralibus*) or their presence (*cum ventralibus*): (e) those without ventrals were only differentiated into genera; those with, into *Malacopterygii*, or soft-rayed fishes, and *Acanthopterygii*, or spiny-rayed fishes. This scheme exhibits some idea of system, but in most respects, and in its details, it is quite defective.

Artedi classified the 45 genera known to him under 5 orders, accepting to a considerable extent the views announced in the work of Willoughby and Ray. These orders were (1) *Malacopterygii*, (2) *Acanthopterygii*, (3) *Branchiostegii*, (4) *Chondropterygii*, and (5) *Plagiuri*. It is only necessary to observe that among the *Malacopterygii* he included the genera *Syngnathus*, *Stomatopus*, and *Anarrhichas*, as well as the true *Malacopterygians* of later authors; and under the *Branchiostegii* he combined the genera *Balistes*, *Osteaster*, *Cyclopterus*, and *Lophius*.

In 1758, Linnæus published an original system of ichthyology, and (a) rejected (as Brisson had previously done) the cetaceans from the class of fishes; (b) applied the binomial system of nomenclature to the species; and (c) introduced a new system of classification, based chiefly upon the position of the ventral fins, and recognizing 5 orders, distinguished severally (1) by the supposed structure of the branchiæ (*Branchiostegi*), (2) the want of ventral fins (*Apodes*), or their presence (3) under the throat (*Jugulares*), or (4) at the thorax (*Thoracici*), or (5) behind the ventrals (*Abdominales*). Linnæus ran to an opposite extreme from his predecessors in limiting the class, and not only excluded the cetaceans, but committed a grave error in separating from the fishes and referring to the amphibians the *Chondropterygii* of Artedi. He was led into this, mistake by erroneous information respecting the air-bladder, communicated to him by Dr. Garden of Charleston, S. C.; and this error was still further aggravated in the succeeding edition (the twelfth, or the last published during his life).

The true fishes were again brought together by Gmelin in his edition of the *Systema Naturæ*, and the class, remaining purged of the cetaceans, was retained with the constituents generally accorded to it till within the last few years.

In 1801, Bloch and Schneider published their *Systema Ichthyologiae*, in which they distributed the genera under 11 classes, distinguished by the number of fins from eleven down to one—i. e. *Hendeapterygii*, *Decapterygii*, *Enneapterygii*, *Octapterygii*, *Heptapterygii*, *Hexapterygii*, *Pentapterygii*, *Tetapterygii*, *Tripterygii*, *Dipterygii*, and *Monopterygii*. Within the classes orders were recognized based upon the ventral fins—i. e. whether jugular, thoracic, abdominal, or wanting. This system had not even the merit of being based upon a correct appreciation or count of the fins; and independently of this, it was in the highest degree unnatural, bringing together forms that were in nowise related, and separating others that were very closely allied, or even congeneric. It must be remembered, in this connection, that a greater or less number of fins is often simply the expression of more or less abbreviated or shortened rays, and more or less deeply incised membrane—e. g. differences such as may be found between the species of black bass or species and genera of Serranidae, etc.

Nearly contemporaneously, from 1799 to 1804, appeared the work of Lacépède, in which the classification adopted is a procrustean system of (1) sub-classes, (2) divisions, and (3) orders. *First*.—*Sub-classes*, based on the supposed consistence of the skeleton (*Sous-classes*, (1) *Poissons cartilagineux*, (2) *Poissons osseux*). *Second*.—*Divisions*, under each sub-class, established on the supposed presence or absence and various combinations (4) of the opercula and branchiostegal membrane—that is, the presence of both, of one, or the other, or none. *Third*.—*Orders*, distinguished by the presence of ventrals (*Apodes*), or their presence at different regions (*Jugulaires*, *Thoraciques*, *Abdominaux*). Several of these categories are non-existent in nature, and the reference of species to them is due to erroneous observation or supposition. Numerous new genera were in this work for the first time instituted, but most of them were very badly defined and congeneric species were frequently combined with other types.

In 1806, M. Duméril, in his *Zoologie Analogue*, published a system of fishes which was to a considerable extent simply a modification of Lacépède, but he for the first time introduced the category of "familie" in the classification of fishes; his arrangement, however, was as artificial as that of Lacépède.

Several other authors published new arrangements or introduced modifications in the classification of the class; among them were Rafinesque in 1810, Pallas in 1811, Rafinesque anew in 1816, De Kay and Oken in 1816, Goldfuss in 1820, and Risso in 1827. Almost all of their modifications, however, were devoid of merit, and therefore need not detain us.

\* Blochii (M. F.), *Systema Ichthyologiae iconibus et illustratione*. Post obitum auctoris apud A. Schönerer ab auct. emendat. et postulat Jo. Gottlob Schneider. Berolini 1801. 8vo.

† Cuvier (Baron Georges) and Achille Valenciennes. *Histoire Naturelle des Poissons*. A Paris, 1828-49. 22 vols. 8vo.

‡ Duméril (Auguste). *Histoire Naturelle des Poissons, ou Ichthyologie générale*, ouvrage accompagné de planches. Paris, 1865-70. (text 2 vols. 8vo; atlas larger 8vo.)

§ Günther, Albert C. L. G. *Catalogue of the Fishes in the British Museum*.—London, 1859-70. 8 vols. 8vo.



In 1817, Cuvier, who had previously published numerous special memoirs on fishes, and rectified many details in their classification, introduced his complete system in the first edition of the *Règne Animal*. He primarily distinguished fishes into "Chondroptérygiens" and "Oseux." The chondropterygian fishes were disintegrated into those with attached branchiæ ("a branchies fixes") and those with free branchiæ ("a branchies libres"): the former were subdivided into "Suceurs" (Marsipobranchiates), and into "Sclaciens" (Elasmobranchiates); the latter included only the sturgeons and paddle-fish ("Sturioniens"). The osseous fishes were divided into the orders "Plectognathes," "Lophobranches," "Malacoptérygiens abdominaux," "Malacoptérygiens sub-branchiens," "Malacoptérygiens apodes," and "Acanthoptérygiens."

The natural groups Plectognaths and Lophobranches were thus for the first time recognized; as to the rest, the merit consisted chiefly in the criticism exercised in the elimination of doubtful forms and their proper identification, and in approximations of minor groups, rather than in the appreciation of the outlines of classification.

In 1846, Johann Müller, the most able anatomist of the century, who had long been engaged on very elaborate anatomical investigations of different groups of fishes, gave expression to the result of his studies in a remarkable memoir on the classification of fishes. He recognized in the class 6 distinct sub-classes—viz. (1) Lepto-cardii, (2) Marsipobranchii, (3) Elasmobranchii, (4) Ganoidea, (5) Teleostei, and (6) Dipnoi. These sub-classes were based upon weighty structural differences, and the combinations indicated by them were far superior to any that had been previously proposed. Perhaps his most valuable results were the recognition and characterization of the sub-class of Ganoidea. The members of this group had previously been either (*e. g.* by Cuvier and his followers) widely dispersed and their relations not at all appreciated, or (by Agassiz) very unlike forms had been combined with them in one group, on account of partial agreement in characters of very slight value. Müller was the first to recognize a natural group distinguished by definite characters; he also defined, in a much more scientific manner than had been previously done, the sub-classes which had already received names adopted by him. On the whole, his classification marks the most noteworthy epoch in the history of systematic ichthyology.

The great majority of the other natural classifications of fishes proposed within the last half century have been either slight modifications of Cuvier's or Müller's, or (*e. g.* Owen's) eclectic ones combining selections from each.

To this generalization, however, there are several marked exceptions, and notably the classifications of Prof. Agassiz and Dr. von Bleeker. The former has been so celebrated that some reference to it may be demanded. In 1833, Prof. Agassiz published his views respecting the ichthyological system, and, exclusively basing his arrangement on the character of the scales, segregated all the existing and fossil fishes into four orders: (1) Ganoidei, with enamel-covered scales; (2) Placoidi, with shagreen-like scales; (3) Ctenoidi, with ordinary scales pectinated at their free margins; and (4) Cycloidei, with ordinary scales entire at their free margins. The illustrious and learned author retained this classification till about 1857. It was not, however, received with favor by any other original investigator, and was justly objected to on account of (1) the characters themselves being insufficient, (2) the distinctions being very trivial and intergrading, as well as (3) on account of deficiency in diagnostic precision, large numbers of forms being left unprovided for, inasmuch as many fishes are entirely destitute of scales. Very many fishes, also, have two kinds of scales (cycloid and ctenoid) in different parts of the body.

In 1871, Dr. Albert Günther proposed a modification of the system which has been much noticed. The tendency among zoologists had always been towards a differentiation of the fishes into the teleost and ganoid forms on one hand, and on the other the selachian types, but Dr. Günther reversed this, combining the ganoids and selachians in one sub-class ("fourth sub-class, *Palæichthyes*"), contrasted with that of the Teleosts. The Palæichthyes were subdivided into two "orders"—order 1, Chondropterygii, with two "sub-orders" (Plagiostomata and Holocephali), and order 2, Ganoidei, with five "sub-orders" (Amioidei, Lepidosteroidei, Polypteroidi, Chondrostei, and Dipnoi).

Many other modifications have been proposed by various authors, but scarcely require notice here. Only one other system need detain us. In 1871, Prof. Edward D. Cope, after first recognizing three classes by most authors confounded under the old term "Fishes" (Lepto-cardii, Dermopteri, and Pisces), divided the fishes proper primarily into 5 sub-classes—viz. (1) Holocephali (= Elasmobranchii holocephali, Müller), (2) Selachii (= Elasmobranchii selachii, Müller), (3) Dipnoi (Müller), (4) Cro-

sospterygia (= Ganoidei crossospterygidae, Huxley), and (5) Actinopteri (new). The Holocephali, Selachii, and Dipnoi had the same limits as the homonymous sub-classes or orders of Müller. The Crossospterygia included those having the "hyomandibular articulated, opercular bones well developed, a single ceratohyal; no pelvic elements; limbs having derivative radii of the primary series on the extremity of the basal pieces, which are in the pectoral, metapterygium, mesopterygium, and prop-terygium." Three orders were recognized—viz. Haplistia, Cladistia, and Actinistia. The Actinistia embraced such forms as had "opercular bones well developed or separate and complex suspensorium; a double ceratohyal, no pelvic elements; primary radii of fore limb parallel with basilar elements, and entering the articulation with scapular arch; basilar elements reduced to metapterygium, and very rarely mesopterygium; primary radii of posterior generally reduced to one rudiment." This sub-class was primarily divided into three tribes: Chondrostei (Müller) with 2 orders; Physostomi (Müller), with 12; and Physoclysti (Müller), with 10.

*Classes.*—From this point more lucid ideas may be obtained by considering the primary subdivisions of the group known under the general name of "Fishes." Up to the close of the eighteenth century, under this name all the vertebrate inhabitants of the waters adapted for exclusive progression through the liquid medium were confounded; consequently, the true fishes and cetaceans had not been decidedly separated. In 1756, for the first time, Mathurin Brisson (*Règne animal, divis. en neuf classes*) removed the cetaceans entirely from the fishes, distinguished them as a class, and placed them immediately after the mammals; he therefore was the first naturalist who limited the class Pisces to the typical branchiferous vertebrates. As previously indicated, Linnaeus never recognized anything like the true limits of the class, at one time confounding with them the cetaceans, and later, when he excluded them, also excluding typical fishes which he referred to the class of amphibians. Gmelin, however, rectified this error, and thenceforth the fishes were recognized as a homogeneous class until a comparatively recent date. To this statement, however, several exceptions must be noted. E. Geoffroy St.-Hilaire and Latreille (1825) differentiated the fishes thus understood into two classes—viz. (1) Poissons (= Fishes proper) and (2) Ichthyoderes (= Elasmobranchiates and Marsipobranchiates), the Lepto-cardians being then unknown. I. Geoffroy St.-Hilaire, Bonaparte (1856), and Moquin Tandon also recognized two classes, but with different limits—viz. Poissons (= Fishes, Elasmobranchiates and Marsipobranchiates) and Myxozoa (= Lepto-cardians). Agassiz has distinguished four classes—viz. (1) Myzontes (= Marsipobranchiates and Lepto-cardians), (2) Fishes, (3) Ganoïds (2 and 3 = Fishes proper), and (4) Selachians (= Elasmobranchiates). Hæckel has likewise adopted four classes, but very different from those proposed by Agassiz—viz. (1) Pisces, (2) Dipneusta (= Dipnoi), (3) Cyclostoma, and (4) Lepto-cardii. Gegenbaur, Schmidt, Cope, and several other recent naturalists recognize three classes—viz. (1) Pisces, (2) Cyclostoma, Cyclostomata, Dermopteri, or Marsipobranchii, and (3) Lepto-cardii.

It will be thus seen that the present tendency and the weight of authority is decidedly in favor of the recognition of class-value for the differences of structure exhibited by several constituent groups of the old so-called class of "Fishes," and the more thoroughly we enter upon the comprehensive study of the anatomy of all the vertebrates, the more disposed we must be to the recognition of the naturalness of such associations.

In fine, on a review of the various steps in the progress of knowledge gained respecting these animals, it appears that the early Linnaean and post-Linnaean authors rather added to the confusion in which species were already involved than advanced the science; that Cuvier and his disciples did much to clear that confusion away, and introduce sound methods of study; that Müller made a great advance in the rigorous application of anatomical principles to the distinction of the several groups; and that subsequent progress has chiefly resulted from the more or less general recognition of the principle that the consideration of the entire structure must be the paramount guide to a correct appreciation of the true relations of the various types of organization, and that teleological modifications are quite unimportant in comparison with morphological.

*Classification.*—In conclusion, we append a synopsis of the primary and secondary groups, down to sub-orders, that may be most advantageously admitted among the fishes; they are arranged in an inverted ascending series:

Class Pisces, or Fishes (E. Geoffroy St.-Hilaire, Latreille, Agassiz & fraction, Cope, Gill).

Sub-class Teleostei.



- Order Plectognathi.
- Sub-order Gymnodontes,
- “ “ Ostracodermi.
- “ “ Sclerodermi.
- Order Lophobranchii.
- Sub-order Syngnathi.
- “ “ Solenostomi.
- Order Pediculati.
- Order Hemibranchii.
- Order Teleostei.
- Sub-order Heterosomata.
- “ “ Anacanthini, or Jugulares,
- “ “ Acanthopteri.
- “ “ Percussores.
- “ “ Syngnathini.
- “ “ Haplomi.
- “ “ Isopodnyli.
- “ “ Evertognathi.
- “ “ Gymnognathi.
- Order Scyphophori.
- Order Nematognathi.
- Order Apodes.
- Sub-order Ichthyoccephali,
- “ “ Holostomi.
- “ “ Enchelycephali.
- “ “ Colocephali.

Order Opisthomi.

Sub-class Ganoidei.

Super-order Hyoganoidei.

Order Cycloganoidei.

Order Rhomboganoidei.

Super-order Chondroganoidei.

Order Chondrostei.

Order Selachostomi.

Super-order Brachioanoidei.

Order Crossopterygia.

Order Actinistia (extinct).

Super-order Dipnoi.

Order Sirenoidei.

(?) Order Placoganoidei (extinct).

Super-order (?) Aspidoganoidei (extinct).

Order Cephalaspidoidea (extinct).

(?) Super-order Acanthoganoidei (extinct).

Order Acanthoidea (extinct).

Class Selachians or Elasmobranchiata.

Super-order Chimærae.

Order Holocephali.

Super-order Plagiostomi.

Order Raie.

Sub-order Masticura.

“ “ Pachyura.

Order Squali.

Sub-order Rhinæ.

“ “ Galei.

Class Marsipobranchii.

Order Hyperostia.

Order Hyperotreti.

Class Leptocephali.

Order Cirrostei.

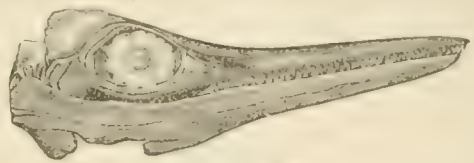
**Authorities.**—In addition to the general works whose titles have been subjoined in foot notes to this account, the following articles may be referred to:—viz.: “Ichthyology,” by Sir John Richardson, in the *Encyclopædia Britannica*; “Observations on the Systematic Relations of the Fishes,” by Edward D. Cope, in the *Proceedings of the American Association for the Advancement of Science for 1874* (1872), pp. 317–343; and “Arrangements of the Families of Fishes,” by Theodore Gill. Lists of all the fishes of North America have been given by DeKay, Storer, and Gill; those of British America have been described by Richardson, Fortin, Storer, Perley, and Knight; those of Maine by Holmes; of Massachusetts, by Storer and others; those of Connecticut, by Linsley; of New York, by Mitchell, DeKay, and Ayres; of New Jersey, by Baird and Abbott, and of South Carolina, by Holbrook. The most important of these for the general student are those of DeKay, Holbrook, and Storer. The latest list of the species has been given by Gill, and in that work references will be found to other authors. Numerous articles on American fishes will be found in the *Proceedings of the Academy of Natural Sciences of Philadelphia*; *Proceedings of the Boston Society of Natural History*; *Boston Journal of Natural History*; *Annals of the Lyceum of Natural History, New York*; and especially in the *Reports of the U. S. Commissioner of Fish and Fisheries*, Prof. S. F. Baird.

The fossil fishes have been chiefly studied by Agassiz, Pander, Egerton, Hugh Miller, Huxley, and Kner, and those of the U. S. have been well illustrated and received much attention from Dr. Newberry, whose article on Fossil Fishes in this volume will give further information.

THEODORE GILL.

**Ichthyornis** [Gr. *ichthos*, “fish,” and *ornis*, “bird”], an extinct genus of birds described by Prof. Marsh from the Cretaceous of Kansas. They possessed teeth and biconcave vertebræ, from which fish-like character the name is derived. (See ODONTORNITHES.)

**Ichthyosaurus** [Gr. *ichthos*, “fish,” and *sauros*, “lizard”], an extinct genus of marine reptiles having some fish-like characters, whence the name, meaning “fish-lizard.” In general form these reptiles were elongate, with the head set immediately upon the body, without any constriction at the neck. They had four fin-like paddles, and the tail was flattened, and probably expanded toward the end into a powerful vertical tail-fin, as in the fishes. The skull of the ichthyosaurus is elongated and tapering at the



Ichthyosaurus (head).

snout, which, in the upper jaw, is formed principally by the much-enlarged premaxillaries. The rami of the mandible are also united in an elongated symphysis, as in the modern gavia. The teeth are simple, conical, of nearly equal size, and in an uninterrupted series. Their surface is marked by longitudinal impressions and ridges, varying in the different species. They are inserted loosely in a long and deep continuous furrow, and were retained by slight ridges extending, between the teeth, along the sides and bottom of the furrow, and by the gum and the organized membranes continued into the groove and upon the base of the teeth. The nostrils are small and near the orbits, which are large and evidently enclosed highly developed eyes. There is often found in front of the orbit in fossil skulls a circular series of petrified thin bony plates ranged round a circular aperture. Such a series of sclerotic plates is now found only in the eyes of turtles, lizards, and birds, showing, writes Dr. Buckland, “that the enormous eye of which they formed the front was an optical instrument of varied and prodigious power, enabling the ichthyosaurus to descry its prey at great or little distances, in the obscurity of night or in the depths of the sea.” There are in the skull large supratemporal fossæ, and the infratemporal fossæ are closed over by plates of bone. The centra of the vertebræ are short flattened disks and deeply biconcave, resembling those of fishes. The only transverse processes they possess are tubercles developed from the sides of these centra. The neural arches are forked bones, connected only by cartilage, with two flat surfaces, one on each side of the middle line of the upper surfaces of the centra; and in the greater part of the body they are not articulated with one another. The cervical and dorsal series of vertebræ are not separated by any marked characters; and there is no sacrum, but the caudal vertebræ are distinguished by the chevron bones which are attached to their under surfaces. The anterior ribs have a capitular and tubercular articulation. The scapula is narrow. The coracoids are broad, and meet on the median line below. The clavicles are stout, curved, and united with a T-shaped interclavicle. The shoulder-girdle formed by the union of these bones resembled that of the aquatic mammal of Australia, the ornithorhynchus, and probably enabled the ichthyosaurus to visit the shore perhaps to deposit its eggs, when it would crawl with its body dragging on the ground. The humerus is short and prismatic, and distally support two bones, representing the radius and ulna. Six or seven bones in the two following series are reckoned as carpals, and the next series are metacarpals. They are followed by not more than three to five complete series of phalanges, representing as many digits, which, however, sometimes fork, and there are in addition marginal bones, four upon each side of the paddle. The centra of the tail, which is posterior to the ichthyosaurus, is repeated in the tail paddles, but they are much smaller. The pelvis consists of the ordinary three bones on each side, but was not connected with the verte-

\* DeKay (James E.), *Zoology of New York, or the New York Fauna*, part iv., Fishes, Albany, 1842, the first animal species are described and mostly figured as New York fishes.

† Holbrook (John Edwards), *Ichthyology of South Carolina* (Charleston, S. C., 1st ed. 1846, 2d ed. 1860), the naturalist.

‡ Storer (David Humphreys), *A History of the Fishes of Massachusetts* (Cambridge and Boston, 1847), reprinted from *Mem. Am. Acad. Arts and Sci.*, 1847, the description is based on a plate.

§ Gill (Theodore), *Catalogue of the Fishes of the First Century North America* (Washington, 1871), now published by the Smithsonian Institution, 351 species enumerated.



bral column. The ischium, as well as the pubis, met its fellow on the median line. The body seems to have been covered with a smooth or finely wrinkled skin, and destitute of scales. These animals sometimes attained a length of more than thirty feet, and were predaceous in their habits, as is witnessed by the scales and bones of contemporary fishes sometimes found under the ribs of these fossils. The composition of the singular spiral "coprolites" affords additional evidence of this fact, which might also be easily inferred from the construction of the jaws and teeth. Ichthyosaurus may have abounded in the Triassic seas, but their remains have not been certainly identified earlier than the Lias, and the latest species occur in the Chalk.

O. C. MARSH.

**Ichthyosis** [Gr. *ichthys*, a "fish;" *i. c.*, "fish-skin disease"], a disease of the human subject characterized by the presence of scaly growths in or upon the integument. Three distinct diseases have been called by this name: (1) Intra-uterine ichthyosis, in which the *vernix caseosa*, or glutinous secretion of the skin of the fetus, becomes hardened into a horny armor, crippling the development of the child and leading to its death. (2) True ichthyosis is a hypertrophy of the papillary layer of the skin and of the epidermis. The patient is covered, as to a great part of the body and limbs, with unsightly scales of forms varying in different patients. This disease is thus far quite incurable. It is generally hereditary, but is not always so. Ichthyosis has been known to cover the skin of the knee after recovery from severe destructive disease of the joint. Frequent bathing and anointing are useful, but never curative. (3) The so-called sebaceous ichthyosis depends on excessive functional activity of the sebaceous glands, the secretion of which rapidly hardens into scales. This disease is often caused by some reflex disturbance, and is curable as a rule.

REVISED BY WILLARD PARKER.

**Icica Resin**, a resin from Guiana, similar to elemi.

**Ico**, town of Brazil, in the province of Ceara, on the Salgado, is well built and thriving, carrying on a lively trade in the products of the province and in European manufactures. Pop. about 6000.

**Ico'nium** [now *Konieh*], in Asia Minor, on the high-road between Ephesus and Antioch of Syria, a place of considerable importance in the time of the apostles (Acts xiii. 51). An oasis in the desert, it was called the Damascus of Lycaonia. In 1099 A. D. the Seljukian Turks made it the capital of their kingdom of Roum. It was captured by Frederick Barbarossa in 1189, and recovered by the Turks in 1190. It has massive walls, between two and three miles in circumference, with suburbs almost as populous as the city itself. Its most remarkable building is the tomb of Hazret Mevlana, the founder of the Mevlevi Der-vishes. Pop. nearly 20,000.

R. D. HITCHCOCK.

**Iconoclast** [from Gr. *εἰκών*, "image," and *κλάω*, "I break"], a name given in the eighth century to the destroyers of images, distinguishing them from *iconolaters*, image-worshippers. The excessive and ever-increasing reverence paid to images in the Christian Church had already been reproved by some of its most enlightened members, but the great iconoclastic conflict was begun A. D. 726 by Leo the Isaurian, who had ascended the throne of Byzantium in 717. As the writings of his partisans were either destroyed by the iconolaters or lost through neglect, the emperor's motive for opposing image-worship is unknown to us. His opponents accused him of listening to Jewish and Mohammedan advisers, especially to the renegade Beser; and it may be that a contemplation of the simpler Mohammedan worship led him to condemn the semi-pagan Christianity of his subjects. His first edict (726) forbade the adoration of images, and ordered that such pictures as were movable should be hung higher, so as no longer to receive kisses and other marks of devotion. Authors disagree as to the chronology of these events, but according to Theophanes and later Byzantine historians, Pope Gregory II., upon Leo's publication of his edict, wrote to him demanding its revocation, and when the emperor refused compliance, forbade the Italians to pay their customary tribute. In 730, Leo held a council at Constantinople, at which he commanded the destruction of images in churches, imposing severe penalties on those persons who should persist in worshipping them; he also deposed the aged patriarch Germanus, who disapproved of his measures, and put Anastasius in his place. This second edict excited the iconolaters, among whom were nearly all the clergy, to open revolt. An officer who, by Leo's order, attempted to destroy a miracle-working image of Christ at Constantinople, was beaten to death by the populace. The islanders of the Archipelago proclaimed a new emperor, one Cosmas, and sailed against Constantinople; the rebels were discomfited by the Greek fire, and Cosmas was made prisoner and executed. In 731, Gregory II. was succeeded

by Gregory III., also an enemy to iconoclasm. This pope and Leo the Isaurian both died in 741. The emperor was succeeded by his son, Constantine Copronymus, who, having defeated the usurper Artavasdas, continued the opposition to images. In 754 he convoked a council at Constantinople, called by the Greeks the seventh general council, but never recognized by the Roman Church. It was composed of 338 Oriental bishops, who prohibited all images, and anathematized those persons who should set up any, either in a church or private house. They also cursed by name the principal champions of image-worship—Germanus (who had not long survived his deposition), George of Cyprus, and the learned John of Damascus. The monks now took refuge in their cloisters or in deserts, whence many of them were dragged to prison, torture, and even death. The patriarch Constantine, successor of Anastasius, being accused of disrespect to the emperor, was publicly degraded and beheaded. Constantine Copronymus died of fever in 775. His son and successor, Leo Chazarus, though in weak health and of a mild disposition, enforced the laws against iconolatriy. After Leo's death (A. D. 780) his wife, Irene, who was devoted to images, became guardian of her young son, Constantine VI., and immediately proclaimed liberty of conscience. She promoted her secretary, Tarasius, a layman, to the patriarchate, made friends with the pope, Adrian, and assembled a council, first in 786 at Constantinople, where it was dispersed by the iconoclasts, then in the following year at Nicæa. It was attended by 375 bishops, who set aside the decrees of the Council of Constantinople (754), anathematized the persons who had composed it, restored the worship of images, and solemnly cursed all iconoclasts. The churches of France, Germany, England, and Spain took a middle course between the destruction and the adoration of images, which they regarded simply as useful memorials of faith and history. A book of controversy was composed and published in the name of Charlemagne, who assembled a council of 300 bishops at Frankfort. This assembly, while blaming iconoclasts, pronounced a more severe censure against the Council of Nicæa. In the Eastern Church the decrees of the Nicene Council remained in force until 813, when Leo Armenus, an enemy to images, became emperor, and treated the iconolaters with great severity. Among those who suffered for their doctrines was the historian Theophanes. Leo was murdered in 820, and succeeded on the throne by Michael the Stammerer, who restored image-worship and recalled the monks banished by his predecessor. Michael's son, Theophilus, became emperor in 829, and opposed image-worship, which, after his death (in 842), was again established by his wife, Theodora, who governed the empire for her young son, Michael, afterwards called the Drunkard, and instituted a festival, still kept in the Greek Church, to celebrate this final triumph over iconoclasm.

The original motive for iconoclasm is, as already said, unknown to us; but whatever it may have been, and however much we may condemn the use of images, we must allow that their overthrow by Leo and his successors was a mistake, "a premature rationalism," as Dean Milman expresses it. It was a violent change, but not a reformation; a rooting up, unfollowed by any planting. Pictures and statues, sacred books for those who could read no others, were destroyed, and nothing better was given to replace them. The very fact that they frequently were not regarded simply as emblems, but adored for their own sakes, made the unwisdom of their destruction so much the greater. Ignorant and superstitious persons would probably have cared little to defend mere symbols, but they clung obstinately to carvings and paintings which were to them as present gods. The images worked miracles of healing, wept tears, and shed blood—in short, lived, so believed their worshippers, as truly as the invisible Christ and his saints in heaven. When Leo's edicts against images were followed by rebellion, the hatred of the iconoclasts was extended from pictures and statues to those who adored them. We may suppose that each party in this struggle was actively cruel towards the other, but the emperors had the army on their side, and consequently greater power of injury. The persecution of iconolaters became particularly violent under Constantine Copronymus, of whose barbarities the Byzantine historians give many terrible examples. This emperor was chiefly incensed against the monks. He destroyed or secularized the monasteries, and subjected their inmates to every possible insult, causing them to break their vows of celibacy under pain of exile or death. The governors of provinces were Constantine's willing agents, the most zealous being Michael Lachanodraco, prefect of Thrace, in which prefecture there was soon left hardly one man bold enough to wear the monkish dress. Andrew and Stephen were the two chief martyrs of this reign. The former, having reproached the emperor for his persecutions, was scourged to death. Stephen, an eloquent



preacher against iconoclasm, was killed after a long imprisonment. The cause of his violent death is curiously like that of Thomas à Becket's. Constantine, hearing that even in prison he spoke in defence of images, cried, "An Ior is this monk the emperor of the world?" Some soldiers having heard these words, took Stephen from his dungeon, fastened thongs to his feet, and so dragged him through the streets until he died; they then cast his body into the common grave of criminals. The patriarch Constantine, though an iconoclast, was accused of conspiracy and of using disrespectful words against the emperor. Having been deposed from the patriarchate and forced to acknowledge a eunuch as his successor, he was banished from Constantinople. But the emperor, not content with this much vengeance, had him brought back to be scourged, exposed to the derision of the populace, and finally beheaded.

The term iconoclast has in modern times been used to designate those reformers who, through excess of zeal, destroyed statues, painted windows, and other works of art in Roman Catholic churches.

JANET TUCKEY.

**ICTINUS**, a contemporary of Pericles, built, in connection with Callicrates, the Parthenon in the Acropolis of Athens, which was finished in 438 B. C.; also the temple of Apollo Epicurius, near Phigalia in Arcadia, and the building at Eleusis in which the mysteries were celebrated. All these were of the Doric order.

**Ida** [Gr. Ἰδῆ], a mountain in Asia Minor, is a spur or branch of the Taurus system, and traverses the ancient Phrygia and Mysia, itself throwing out many spurs. From it flow the Granicus, the Simois, the Scamander, and other streams whose names are historic. Its highest point is Mount Gargarus, 4650 feet high.—Another Ida [now called Psiloriti], equally famous in song and story, is in the island of Crete. It terminates in three peaks, and rises to the height of 7674 feet.

**Ida**, county in the W. of Iowa. Area, 432 square miles. It is intersected by the Maple River, and is very fertile. Cap. Ida. Pop. 226.

**Ida**, post-v., cap. of Ida co., Ia., on the line of the unfinished I. P. R. R.; has a court-house, weekly newspaper, graded schools, 2 churches, etc., and is in a very fertile region. Pop. 30, much increased since the census.

W. P. EVANS, Ed. "IDA COUNTY PIONEER."

**Ida**, post-tp. of Monroe co., Mich., on the Michigan Southern R. R. Pop. 1020.

**Ida**, tp. of Douglas co., Minn. Pop. 224.

**Ida'eius**, or **Itha'eius**, b. at Limicia, in Galicia, Spain, in the latter part of the fourth century, was appointed bishop of his native city about 427, but was deposed by the invading Suevi in 461, and d. after 469. He wrote a *Chronicon*, arranged according to the succession of emperors, and embracing the period from 379 A. D. (at which point Hieronymus breaks off) to 429. It gives a brief account of events besides the enumeration of names and dates, and is considered as a valuable repository of facts. It was first published complete in 1619 by Sirmond, and is incorporated in Rostker's *Chronica Mediae Aevi* (1798).

**Idaho**, a Territory of the Pacific slope of the U. S., lying almost wholly in the upper Columbia River basin. It is bounded on the N. by British Columbia, where its breadth is but one degree of longitude, about 48 miles in that latitude; on the E. it is bounded by Montana and Wyoming, contributing also for about 25 miles to form the western boundary of the National Yellowstone Park, a narrow strip of which was contributed by this Territory; the line of its separation from Montana is, in the N. E., the watershed or divide of the Bitter Root Mountains, and lower down the principal Rocky Mountain chain, which sweeps around the head-waters of the sources of the Missouri River. The Teton range, a spur of the Rocky Mountains which branches off almost due S., coincides nearly with the boundary-line between Idaho and Wyoming Territory; on the S. it is bounded by Utah and Nevada, the boundary line being the 42d parallel; on the W. by Oregon and Washington Territory for about two fifths of the distance from Fort Boise to the mouth of the Clearwater River, the Snake River forming the actual boundary. The Territory lies between the 42d and the 49th parallels of N. lat., and between the 111th and the 117th meridians of W. lon. from Greenwich. Its length from N. to S. is about 442 miles; its breadth varies from 48 miles at the northern boundary to 308 on the southern, the mean breadth at the parallel of 44° 30', about 257 miles. Its area is 86,294 square miles, or 55,228,160 square acres.

**Face of the Country.** Idaho is for the most part a mountainous country. The Bitter Root Mountains, which from their origin in British Columbia form the westernmost or outlying range of the Great Rocky Mountain chain, form at the north eastern line of Idaho the divide between it and

Montana, and from the northern bank of the Columbia River and its tributary, Clark's Fork, these mountains have covered the whole country to the Sierra Nevada with a succession of spurs or short ranges running nearly due W. Prominent among these, both from their height and breadth, are the Kootenai Mountains in the extreme N., the Cour d'Alène Mountains near the 47th parallel, and the Clearwater or Lapwai Mountains along the Clearwater River and its tributaries. As the Bitter Root Mountains near the 14th parallel draw closer to the main chain of the Rocky Mountains, a new range of outliers, forming almost a distinct mountain-system of its own under the name of the Salmon range, follows the course of the Salmon River and its affluents. The summits of this range are mostly lofty, rugged, and snow-capped. Many of them are above 12,000 feet in altitude, and several of the loftiest over 13,000 feet. The town of Florence, in Florence Basin, 2000 feet below the summit of Florence Mountain, is 11,100 feet above the sea, and is probably the highest town in the U. S. Spurs from this range along the Snake River and its tributaries have received the names of Weiser, Payette, Boise, Owyhee, and Sand Tooth mountains. Below these, and towards the S. E. along a part of the Snake River, is a somewhat elevated plateau or prairie with two or three terraces, as at the American and the Shoshone Falls, but constituting a broad and tolerably fertile tract of arable soil. S. of the Snake River Valley we find the Bear River Mountains, the Goose Creek Mountains, and other ranges which form a part of the rim of the Great Salt Lake Basin, while in the extreme S. E. of the Territory Bear River and Bear River Lake are within that basin.

**Rivers, Lakes, etc.**—Although some of the summits of the Salmon Mountains, and perhaps of the others, are higher than those of the Rocky Mountains proper in the same latitude, yet no portion of the waters of the Territory flows eastward. With the exception of Bear River in the extreme S. E., which discharges its waters into the Great Salt Lake, the entire drainage of the Territory is into the Columbia River, and the whole region is a part of the upper basin of the Columbia. The Clark's or North Fork of the Columbia and its affluents, including the Vermilion River, the Pend d'Oreille Lake and its tributary streams, and the outlet of the Hoo-doo or Tessentines Lake; the Spokane River, a smaller but considerable branch of the Columbia, with the beautiful Cour d'Alène Lake and its affluents, of which it is the outlet; and, as the principal river of the Territory, which has a course of about 850 miles within it, the Lewis Fork or Snake River, which, with its branches, the Clearwater and the Salmon, with their numerous affluents, Weiser Creek, Payette River, Boise River, Owyhee River, Bruneau Creek, Salmon Creek, Malade River, Goose Creek, Raft River, Bannack Creek, Pont Neuf River, Black-foot River, Teton or Pierre's River, and Henry's Fork, which has its source in Henry's Lake on the borders of Montana, only a few miles from the Yellowstone Park, drains nearly 70,000 square miles of the Territory. The only other river of any size in the Territory is Bear River, which drains the S. E. corner, and is, as we have said, tributary to Great Salt Lake. The principal lakes besides Pend d'Oreille, Cour d'Alène, Tessentines, Bear, and Henry's lakes, already mentioned, are the Payette lakes in Idaho co., and several unnamed lakes in Alturas and Boise cos. Many of these rivers have fertile valleys, some of them of considerable extent, which constitute the best arable lands of the Territory, and which yield even to a rude cultivation large crops. Prominent among these valleys are those of Wood River, North Malade, Raft River, Bear River, Owyhee River, the upper waters of Snake River as far down as Fort Hall, Long Valley around Payette lakes, Round Valley, the Upper Payette valleys, Indian Valley, Lower, Upper, and Weiser River valleys, Boise Valley, the Great and Little Camas Prairies, Goose Creek Valley, etc. The Snake River is navigable without difficulty for about 200 miles of its course in the Territory—viz. from the mouth of Powder River to the Salmon Falls, just above the mouth of Malade River. Below the mouth of Powder River for 150 miles to Lewiston, where it turns westward into Washington Territory, the Snake River navigation, though not impossible in a high stage of water, is difficult and dangerous from the numerous obstructions, rapids, etc. Above the mouth of the Malade, and between that and the junction of Bannack Creek, W. Lon. about 112° 40', there are three remarkable cataraacts—Shoshone Falls, in W. Lon. about 114° 45', Shoshone Falls, 114° 50', and American Falls, about 112° 50'. Of these, Snake River Falls are the most noted. The river is here 600 feet wide, the descent a little greater than that of Niagara, and at some seasons of the year the volume of water nearly as large, while the surrounding scenery is magnificent. There are numerous waterfalls in the Territory of great beauty and much greater height, though of smaller volume of water. In the E. S. E.



the Territory contributes a small portion to that wonder of the world, the Yellowstone National Park, and the region adjacent, about Henry's Lake and the whole course of Henry's Fork of the Snake River to its delta-like junction with that river near the Crater Buttes and the Lava Hills, is a region full of wonders and interest. In S. E. Idaho there are a number of sinks or tracts where the roofs of deep caves have broken through, and considerable streams suddenly sink below the surface and become subterranean in their subsequent course. The whole region is volcanic, and must have been at some period of the remote past in a condition of active eruption, though now the geysers, steam-springs, and soda springs and the natural hot baths, give but faint indications of its former activity.

**Geology.**—The geological system of Idaho is very simple. The Eozoic rocks cover nearly three-fourths of the Territory, but the Snake River Valley, the valleys of the Lower Salmon River, the Owyhee, Bruneau, Malade, McArthur, and Weiser rivers are evidently volcanic. The upper waters of Salmon River and its tributaries, the S. fork of the Clearwater, and Bear River, flow through valleys of considerable width, which are wholly of Tertiary formation, and there are also Tertiary plateaus of considerable extent in Southern Idaho. There are eight or nine small patches of Silurian rocks, none of them of any great extent, but lying among the foot-hills on either side of the Bitter Root Mountains. In the Bear River Valley, not far from the Yellowstone Park, there is a small outcrop of Cretaceous rocks.

**Minerology.**—Gold and silver ores are found abundantly in Idaho. Gold was first discovered in the Territory in 1852, on the Pend d'Oreille River, and near the lake of the same name, but there were no considerable mining operations commenced until 1860, when placer-mining was begun on the S. fork of Clearwater River. There are now mines of gold or silver at the sources of all the rivers and in every county of the Territory. In Kootenai co. there are extensive leads in the quartz veins, and many quartz-mills have been established. The placer mines of Shoshone, Nez Percés, Idaho, and Lemhi cos. yielded in 1872 about \$500,000 gold in each county. In Boise co. over \$1,000,000 worth of gold-dust was taken out in the summer of 1872, and several quartz gold-mines were opened and tunnelled which yielded largely. In Ada, Alturas, Owyhee, and Oneida cos. the mining is mostly for silver, the argentiferous galena and other silver ores of that region yielding bountiful returns, ranging from \$126 to \$280 the ton of ore. Placer gold is found also in considerable quantities in Alturas and Owyhee. New silver-mines of very rich ore have recently been opened near the Utah line. The yield of gold and silver in 1872 in the Territory was estimated at somewhat more than \$8,000,000. The placer-mines under the improved methods of washing will give out in a few years, but before that time there will be sufficient quartz-mines opened and a sufficient number of quartz-mills in operation to keep up and probably increase the gold production of the Territory. But Idaho is rich in other metals, ores, and minerals, as well as in gold and silver. The lead from the argentiferous galena is so pure as to be worth saving for its own sake. There are extensive deposits of coal and iron at various points in the Territory; quarries of valuable building-stone could be opened at small expense; and the volcanic region of S. E. Idaho yields sulphur, soda, magnesia, carbonates and sulphate of lime, very pure salt, and other valuable minerals and alkalies, and the mineral springs of that region bid fair to furnish healing to the nation.

**Vegetation.**—The mountains of the Territory are for the most part covered with forests up nearly to the snow-line, and the forests are largely evergreen, having numerous varieties and species of pine, spruce, hemlock, tamarack, and fir, of which there are many on the western slope of the Rocky Mountains and on the eastern slope of the Sierra Nevada, but aside from these there are large tracts of red cedar in Kootenai and Shoshone cos. on the foot-hills and mountain-slopes. This is supposed to be the largest single tract of red cedar in the U. S., and it is of excellent quality. In the more southern counties there are many deciduous trees, and in some districts vast sage-plains which were at first supposed to be worthless, but it has been ascertained that the white sage, which is the principal species, after ripening its seed is preferred by cattle to any of the grasses, and that they will fatten on it as a winter browse. The soil of sage-lands is mostly a decomposed granite, with a considerable quantity of vegetable humus, and when irrigated, for which the Territory offers extraordinary facilities, they yield very large crops—from 30 to 45 bushels of wheat and corresponding amounts of other cereals to the acre. There are said to be nearly 16,000,000 acres of these lands. The river-valleys are very fertile, and though some of them require occasional irrigation they yield large crops. Agriculturally, Idaho is, with the exception of these val-

leys, better adapted to grazing than to the culture of cereals. Indian corn is not a sure crop, owing to the late and early frosts. The greater part of the Territory is from 3000 to 5000 feet above the sea, yet even in the northern counties snow seldom lies to any considerable depth in the valleys, and cattle can browse, and even fatten, through the winter without being housed. The ordinary garden vegetables, as well as potatoes, do well in the valleys, and fruit trees generally yield fruit in great abundance and of fine flavor. The smaller wild fruits are found in great profusion in the fertile valleys and on the mountain-slopes. There are native wild grapes of the *Vitis labrusca* or fox-grape species which ripen in the valleys, but the cultivated species and varieties require a higher temperature and less liability to frosts during the summer and early autumn months than are found in most sections of the Territory. In the southern part, however, on the mountain-slopes having a southern aspect, and especially where there are considerable lakes with steeply sloping banks, the culture of the grape may be made very profitable.

**Zoology.**—The beasts of prey are those characteristic of the Columbia basin and of the Pacific slope. The grizzly bear (*Ursus horribilis* or *ferus*) is the largest and most formidable of them, and his congener, the black bear (*Ursus americanus*), is also found in the forests of the Territory. The raccoon, badger, wolverine (*Gulo luscus*), two species of skunk (the California and the little striped skunk), the fisher-marten, the American sable or marten, the mink, the panther, wild-cat or red lynx, and the banded lynx, raccoon-fox or mountain-cat, the gray wolf, the coyote or barking wolf, and four or five species of fox, are found. Among the rodents, there are beavers, moles, several species of ground-squirrels, and at least three of the tree-squirrels, the yellow-footed marmot, and at least three species of bat. There are ten or twelve species of the mouse family, muskrats, gophers, one species of porcupine, and several new species of rabbits and hares. Among the ruminants there are the bison or American buffalo, the moose (*Alce Americanus*), the elk, the black-tailed and mule deer, the Rocky Mountain or prong-horn antelope, and the big-horn or Rocky Mountain sheep (*Ovis montana*). The birds are very numerous, and many of them of beautiful plumage. Ninety-five species, including specimens of most of the orders and families found on this continent, were shot by the naturalists of the Hayden expedition either in or near this Territory. The species of reptiles are not very numerous, though some of the harmless snakes and batrachians abound in the marshy portions of the Territory. There are three, and possibly four, species of rattlesnake, fifteen or sixteen species of harmless snakes, two tortoises, at least fifteen species of lizard, ten or twelve of frogs, several toads, newts, etc. Fish of the usual fresh-water kinds are found in the lakes and rivers. There are also several fresh-water mollusks and testaceans. The various geological expeditions which have traversed this and the adjacent Territories have unearthed numerous and very interesting fossils. Among the larger mammals discovered are several of the mastodon, elephant, and tapir families; new fossils of the bear and monkey families, ten or eleven genera allied to the horse, marsupials, rodents, several genera of crocodiles, alligators, and other saurians, tortoises and turtles in great numbers, lizards, serpents, batrachians, and twenty-six species of fish, many of them of large size. Not all, perhaps not the greater part, of these were found within the geographical limits of Idaho, but they occurred in the geological formation and the deposits which are common to S. E. Idaho and the adjacent Territories of Montana, Wyoming, and Dakota.

**Climate.**—Statistical tables of the climate of the greater part of Idaho are wanting. We know, indeed, that W. of the Rocky Mountains, especially in the upper Columbia River basin, there is but a moderate amount of either snow or rainfall, and that the climate is much milder, even though the land is elevated, than E. of those mountains. The annual range of the thermometer in Northern Idaho, in the river and lake valleys, is said to be between 5° and 93° F., though in exceptional seasons it may surpass either boundary by two or three degrees. The most of the central portions of the Territory is very mountainous, though with valleys from ten to fifteen miles in width wherever there are streams of water. These valleys are from 3000 to 5000 feet above the sea, but the climate is very equable. Farther S. are extensive plains covered with sage-bushes and grease-wood, but these give way to fine crops when the land can be irrigated. The rainfall is small here, though greater than in Colorado, or perhaps than in Wyoming, but the facilities for irrigation are much better, and on all the higher summits there is perpetual snow. In S. E. Idaho, which belongs really to the Great Salt Lake Basin, there is a somewhat different climate, and perhaps a slightly greater rainfall. At Fort Hall, 4754 feet above the sea, in 1871 the



barometric range from June to October was but  $\frac{3}{16}$  of an inch; the mean temperature for June was 61.62° F.; of July, 70.44°; of August, 70.90°; of September, 57.79°; and of the first eighteen days of October, 57.28°. The average observations of the Hayden expedition the same summer for June and July, from the southern boundary of the Territory to the Montana line, corresponded very nearly with the temperature at Fort Hall.

**Agricultural Products.**—According to the census of 1870, there were in that year only 77,139 acres of land in farms in the Territory, of which only 26,603 were under tillage, 50,536 being woodland or other unimproved lands, being 65.5 per cent. of the entire land in farms. The average size of the farms was 186 acres, or a little more than a quarter section. The value of the farms in the Territory in 1870 was \$492,860, and of farming implements and machinery, \$59,295; the farm products of the same year were valued at \$637,797; animals slaughtered or sold for slaughter were valued at \$57,932; home manufactures, at \$34,730; the forest products, though of considerable amount, were not reported; market-garden products were estimated at \$24,577; orchard products, at \$725; wages paid to agricultural laborers, including board, \$153,907. In 1869, 75,650 bushels of wheat were harvested, almost all of it spring wheat; 1756 bushels of rye; 5750 bushels of Indian corn; 100,119 bushels of oats; 72,316 bushels of barley. There were 2775 horses reported; 59,996 neat cattle; 3415 pounds of wool; 6985 tons of hay; 21 pounds of hops; 64,534 bushels of potatoes; 610 bushels of peas and beans; 14 bushels of grass-seed; the value of all live-stock was \$520,580. Besides the horses enumerated above, there were 371 mules and asses; of the neat cattle, 4171 were milch cows, 522 working oxen; the remainder were probably for the most part cattle driven into the Territory for pasturage; the number of sheep was 1021; of swine, 2316. The dairy products were 111,480 pounds of butter, 4464 pounds of cheese, and 11,250 gallons of milk sold. The increase of population since 1870 has unquestionably more than doubled, perhaps quadrupled, all these amounts, but there are no available returns which give even approximately accurate figures of the actual production.

**Manufactures and Industrial Products.**—The industrial progress of Idaho since 1870 has been rapid, but there are not, we believe, any existing statistics to show its extent. In 1870 there were 101 manufacturing establishments of all kinds, in which 11 steam-engines of 311 aggregate horsepower, and 16 water-wheels of 295 horse-power, furnished the motive force; in these establishments 265 hands were employed, a capital of \$742,300 was invested, \$112,372 wages were paid, raw material to the value of \$691,785 was used, and the annual product was \$1,047,624. Of this amount, the greater part was the product of smelting furnaces for the extraction of silver and gold from the argentiferous galena and other ores, and Owyhee co. claimed \$164,116 of the product, Ada co., \$317,925, and Boise co., \$156,147, leaving only \$110,000 between the other six counties. The milling of quartz, a branch of this smelting industry, yielded alone a product of \$523,100.

**Railroads.**—As yet (May, 1875) there is not a mile of railroad in the Territory, though the Ogden and Franklin branch of the Union Pacific comes to its southern border. The Northern Pacific was intended to traverse by two distinct and widely separated lines the northern counties of the Territory—one line following the valley of the Clearwater through Shoshone co. and the northern border of Nez Percés co. to Lewiston, at the junction of the Clearwater and Snake rivers, while the other or more northern route, striking north-westward near Frenchtown, Mont., was to follow the valley of Clark's Fork of the Columbia, around the northerly shore of Lake Pend d'Oreille, and then turn south-westward till it reached the Spokane River in Washington Territory, its whole course in Idaho being in Kootenai co. Eventually this road will probably be built, but whether it will follow either or both these routes is uncertain. A road is projected, in continuation of the Ogden and Franklin branch already spoken of, to extend through S. E. Idaho to the Yellowstone National Park. It would probably follow the valleys of the Bear River, the upper Snake River, and Henry's Fork. Another road, projected, is from Monument Point or Terrace on the Central Pacific, up the valley of Salmon Creek to Silver Bar at the mouth of Malade River, from whence the Snake River is navigable for 200 miles to the mouth of Powder River, and could be rendered navigable at a moderate expense to Lewiston at the junction of the Clearwater. Eventually, probably, this road would follow the valley of Snake River, and thus connect the Central Pacific with the Oregon and Washington lines. All these projects, however, have been postponed almost indefinitely by the failure of the great banking-house which was engaged in promoting them.

**Finances, etc.**—The assessed valuation of Idaho Terri-

tory in 1870 was \$5,292,205, and the true valuation was estimated to be \$6,552,681; of this, three-fifths were in the two counties of Boise and Owyhee, and nearly four-fifths in the three counties of Boise, Owyhee, and Ada. The entire taxes, not national, of the Territory were \$174,711, of which \$40,594 were territorial and \$132,171 county taxes. In 1873 the internal revenue tax of the Territory was \$19,275.80. The public debt of the counties in 1870 was \$218,522, and Boise City had besides a debt of \$4099. The Territory has an assay-office at Boise City which assays several hundred thousand dollars of gold and casts it into bars for transportation. The principal exports of Idaho are gold and cattle. Of the former, about \$7,500,000 is sent from the Territory yearly; of the latter, probably about 20,000 head go to market. The imports are mostly of manufactured products, which, owing to the great expense of transportation, bear a high price. There is one national bank at Boise City, with a capital of \$100,000 and liberty to increase to \$500,000; no savings banks, and 4 private banking-houses—2 at Boise City and 2 at Idaho City. There are no life or fire insurance companies in the Territory.

**Population.**—The true population of Idaho Territory in 1870, including Indians, nomadic and on reservations, was 20,583, of whom 5631 were Indians, 3284 were on the various Indian reservations of the Territory, 4274 were Chinese, 10,618 whites, and 60 colored. As the Territory was not organized until 1863, and there was only a mere handful of settlers within its limits in 1860, there is no record of population earlier than 1870. The density of the population in the Territory in 1870, exclusive of tribal Indians, was 0.17 to the square mile. Of the constitutional population (14,999), 12,184 were males, 2815 females; 7114 were natives, of whom 5054 were males and 2060 females; 7885 were of foreign birth, of whom 7130 were males and 755 females; 10,618 were whites, of whom 7973 were males and 2645 females. Of these 10,618 white persons, 7018 were natives (5002 males and 2016 females); 3600 were of foreign birth (2971 males and 629 females). Of the 60 of African descent, 42 were males and 18 females; of these, 47 were natives of the U. S. and 13 of foreign birth. Of the 4274 Chinese, 4148 were males and 126 females; there were 47 civilized Indians, 21 males and 26 females. Of the total population, 1695 (897 males and 798 females) were of school age, 9430 males were of military age (18 to 45), 10,313 males were 21 years old and upwards (citizen's age), and 5557 males were actually citizens.

**Education.**—In 1870 there were 25 schools of all classes in Idaho, having 23 male and 10 female teachers, and 602 male and 606 female pupils; the income of these schools for the year ending June 1, 1870, was \$19,938, of which \$16,178 was from taxation and public funds and \$3760 from other sources, including tuition. Of these schools, 21 were public, having 20 male and 6 female teachers, and 1048 pupils and \$16,178 income; there were 4 private schools, having 7 teachers (3 male and 4 female) and 160 scholars (75 male and 85 female), and \$3760 income, mostly from tuition. There was no college, scientific, professional, or technical school. At the beginning of 1873 there were 37 school districts, 32 public schools, 60 teachers (26 male, 34 female); 26 school-houses; the average monthly pay of teachers was \$162.50; there were 1898 children of school age, of whom 1416 were enrolled in school, with an average attendance of nearly 1000. The sum of \$22,496.81 was received for school purposes from all sources, and \$17,219.56 expended. There is a school law and school board, with a superintendent, in each of the nine counties.

**Literatures, Newspapers, etc.**—In 1870 there were 11 public libraries, with 2860 volumes, and 32 private libraries, with 7765 volumes, making in all 43 libraries, with 10,625 volumes. There were 6 newspapers in the Territory—1 tri-weekly, 1 semi-weekly, and 4 weekly—with an aggregate circulation of 2750, and an aggregate annual issue of 200,200 copies. In the same year there were 15 churches of all denominations, 12 church edifices, 2150 sittings, and \$18,200 estimated value of church property. Of these, 2 were Baptist, having 2 church edifices, 175 sittings, and church property valued at \$2000; 6 Protestant Episcopal churches, with 4 edifices, 600 sittings, and \$1000 of church property; 1 Presbyterian church; and 4 Roman Catholic congregations, with 1 church edifice, 575 sittings, and \$14,000 of church property. In 1873 the number of congregations had increased to 19, of which, however, 6 were missions. There were also 6 missions of the Jesuit Fathers among the Indians. Of the 2 regular priests, 6 were missionaries among the Indians, and one was the vicar apostolic of the vicariate of Idaho.

**Constitution, Courts, etc.**—The governor and secretary of state are appointed by the President for a term of four years; the treasurer, comptroller, and superintendent of public instruction are elected by



the people. The legislature comprises a council of 13 members, chosen for two years, and a house of representatives of 25 members, chosen for one year. The constitution of the Territory is similar to other territorial constitutions, and will be abrogated when the Territory becomes sufficiently populous for admission as a State. The supreme court consists of a chief justice and two associate justices, appointed by the President for four years. It holds at least one session annually at the territorial capital. The Territory is divided into three judicial districts, in each of which one of the supreme court justices holds a district court session. The Territory has a delegate in Congress, who is entitled to speak on any question, but not to vote.

**Counties.**—The Territory is divided into ten counties, as follows:

Counties.	Pop. in 1870.	Counties.	Pop. in 1870.
Ada .....	2,175	Idaho .....	985
Alfalfa .....	689	Nez Percés .....	1,607
Bonanza .....	3,834	Owyhee .....	1,322
Idaho .....	849	Owyhee .....	1,711
Kootenai, new county taken from Shoshone).		Shoshone .....	722

**Principal Towns.**—Boisé City, the capital both of the Territory and of Ada county, has a population of 1,500 to 2,000. Idaho City, county-seat of Boise county, is of about the same population; Lewiston, capital of Nez Percés county, Silver City, Malade City, and Florence are the other towns of note.

**History.**—The history of Idaho Territory is very brief. With the exception of the bold explorers, Lewis and Clark, who early in the present century followed up nearly to their sources the two forks of the Columbia, Clark's and Lewis's Forks, which traverse this Territory, the only white men who had trodden its soil previous to 1850 were some of the trappers and hunters who had penetrated its mountains and valleys in pursuit of their game. In 1852 gold was discovered in the extreme northern part of the Territory, but it attracted few miners or settlers. It formed a portion of the Territory of Oregon up to 1863. Its first paying gold-mine was opened at Oro Fino in 1860, and others in Owyhee county in 1862. When first organized it included portions of the previous Territories of Oregon, Washington, Utah, and Nebraska. In 1864 its boundaries were changed, and a part set off to Montana. While it possesses as much arable land, as large a proportion of forest and grazing lands, and as valuable mineral wealth as most of the Territories, its settlement has been much impeded by its inaccessibility. It has no railroads, and no good wagon-roads traversing any great extent. Yet it is steadily and healthily growing, and from its fine climate, its valuable mines, and its large extent of grazing lands it must become an important Territory and State.

**Governors.**—

William H. Wallace .....	1833-34	David W. Ballard .....	1868-70
Calvin Lyon .....	1834-35	Carlman M. Weston .....	1870-71
David W. Ballard .....	1835-37	Thomas W. Bennett .....	1871-73
Isaac L. Gibbs .....	1837-38		

L. P. BROCKETT.

**Idaho**, county of Idaho, extending E. and W. from Oregon to Montana. It is generally mountainous, and is very deficient in roads. The river-valleys are generally deep, fertile, and so well sheltered from winds that cattle need no protection in winter. The Payette Valley is a splendid prairie, producing grass, grain, cattle, and some timber. It abounds in game and fish. Cap. Mount Idaho. P. 849.

**Idaho**, post-v., county-seat of Clear Creek co., Cal., in Clear Creek Valley, among the Rocky Mountains, 34 miles W. of Denver and 5 miles from Concord, on the Colorado Central R. R. It is in a most romantic region, and is well known for its hot and cold mineral springs, which are useful in a very wide range of diseases. Idaho has ample hotel accommodation, and is visited every summer by great numbers for the purpose of regaining health by means of the baths and the charming climate.

**Idaho City**, post-v., cap. of Boise co., Id., in a valley of a spur of the Salmon River Mountains; lat. 43° 45' N., lon. 115° 30' W. It is in the centre of a very important mining region; has a national bank, a weekly newspaper, public and private schools, 2 churches, a court-house, jail, and various manufacturing and business firms.

T. J. SUTTON, Ed. "IDAHU WORLD."

**Ida'ium** (now *Dali*), a promontory of the E. coast of Cyprus, on which was situated a celebrated temple of Aphrodite; hence her surname, *Idalia*.

**Idaville**, post-v. of Jackson tp., White co., Ind., on the Columbus-Chicago and Indiana Central R. R. P. 197.

**Ide**, a fish of the carp family (Cyprinidae), the *Lenciscus Idus*, found in rocky lakes of Northern Europe. It is a good table-fish.

**Ide** (GEORGE BARTON), D. D., b. at Coventry, Vt., in

1806; graduated at Middlebury College in 1820; entered the ministry; became pastor of a Baptist church in Albany, N. Y., in 1834, of the Old Federal street church in Boston in 1835, of the First Baptist church in Philadelphia in 1838, and of a church in Springfield, Mass., in 1852. Dr. Ide was distinguished for scholarship, eloquence, and logical power; he was averse to writing for publication, but in the course of a ministry of forty-two years quite a number of his sermons appeared separately or in volumes. D. at Springfield, Mass., Apr. 16, 1872.

**Ide'a**, one of the most important terms in mental philosophy from the Greek *idea* or *éidos*, as employed by Plato to signify what is objectively permanent under changing phenomena, used in modern times, especially since Descartes, to designate subjective notions and representations with or without objective validity. Plato discovered, as a result of his "dialectic," that under the constant change which goes on with individual things there is a permanent form or type of the process, which abides—somewhat after the manner of the "persistent force" or "law of nature" described in modern science. These archetypal forms or "ideas" he represented as existing prior to, and independent of, things manifest to the senses. Aristotle held to the doctrine of a pure, self-active form (*πρῶτον εἶδος*), which transcends material existence, but he opposed Plato's doctrine of independent ideas. The doctrine of the existence of ideas as logical conditions of reality, and as conditions of the possibility of all the general conceptions which the mind forms, was held by Spinoza, Malebranche, and Leibnitz, in a modified form. Descartes was so strongly impressed with this doctrine that he attempted to prove the existence of God from the subjective idea of a most perfect being. The ancient philosophers investigated the question, What is true in and for itself? The moderns propose the problem of certitude, How to proceed from thought to being? Since the time of Locke it has been common usage to designate by the term "ideas" all thoughts, notions, conceptions, images, perceptions, and intuitions, whether necessary or arbitrary. According to the sensational school of Locke and Hume, all ideas take their rise in sensation, and immediate sensuous impressions give the most adequate knowledge, while ideas, and especially complex ideas, are fainter and less valid copies of reality. Kant pointed out the objective validity of universal and necessary ideas; they were to be regarded as expressing logical conditions of reality in time and space. But ideas proper were with him the product of the reason in its regulative activity. Hegel gave the name of idea (*Idee*) to the highest actuality—the universal form of existence considered as a totality, self-related activity, or thinking reason. This was a return to Plato's insight, or rather to that of Aristotle. Taking "idea" in the modern acceptance as the common term for all representations, it may signify I. Sensuous ideas = images of sense formed in the lowest stage of thinking; II. Abstract ideas = general concepts formed by abstraction and generalization from experience; III. Concrete ideas = synthetical conceptions or notions formed by tracing out necessary relations and correlations dialectically; IV. Absolute idea = the comprehension of the totality in its self-determination (what the Platonists speak of as "knowing by wholes"). Ideas are spoken of as simple or complex, necessary or contingent, absolute or relative, universal or particular, innate or adventitious, clear or obscure, adequate or inadequate, etc. W. T. HARRIS.

**Ide'alism**, a philosophical doctrine defined (a) as holding that in external perception the objects immediately known are ideas, or (b) as holding that the external world is a mere phenomenon manifesting a supersensuous essence which is (1) spirit, reason, or thinking intelligence and will, or (2) force, law, or some unconscious principle of evolution. According to the former definition, nearly all philosophers, excepting those belonging to the Scottish school, would fall in the class of idealists, thus numbering such different systems as those of Locke, Hume, Kant, Plato, Aristotle, Descartes, etc. all in one school. According to the latter definition, the theistic or spiritualistic thinkers would be classed in one division of the idealistic school, while the pantheistic thinkers (including even the modern "positivists") would belong to the other division; and opposed to these would be the nominalistic branch of materialists and the self-styled "common-sense" thinkers. It has been contended, in fact, that all philosophy must be impliedly idealistic in that it undertakes to explain immediate things—or at least the knowledge of them—and thereby presupposes a unity or ground for them upon which they depend. All dependent things are in a certain sense ideal or potential, and underlying the external multiplicity of such things there is a unity. Were there no interdependence or correlation among things, it is held that



there could be no philosophy. Although Parmenides, Anaxagoras, and especially Pythagoras, are to be regarded as idealists, yet Plato is the idealist *par excellence*, and the father of that school of thinkers. His "ideas" or archetypal forms—*ἰδέαι*—are immaterial and eternal essences which are shadowed forth or manifested by finite realities. Finite things are "copies" of ideas, and by reason of their inadequateness as copies they are in a state of perpetual flux or transition from one phase to another, each imperfection giving place to a more correct copy, which, again, is defective in some other respect. Thus, the process of finite things arises from their mutual imperfection, and from the consequent struggle to attain adequateness. Substantially identical with this is the doctrine of Aristotle, who opposes the doctrine of "ideas" as separate archetypes, and lays stress on an intelligent First Cause as the supreme principle of explanation. The Neo-Platonists were Aristotelian in the scientific form of their systems, but they betray a strong Oriental influence upon their modes of thinking. Oriental idealism is unable to reconcile the infinite with the finite, holding the former to be the unconditioned and indeterminate, consequently as impersonal. The Neo-Platonists endeavor to seize a first principle higher than intelligence or than consciousness; they seek, after the manner of Oriental idealism, an impersonal absolute unity. The idealism of Plotinus and Proclus, and especially that of Iamblichus and Synesius, strives to reach a primordial essence as the secret ineffable cause and final goal of all things. The visible world of time and space is a creation of the soul in its "lapse" or descent from the divine world of ideas or eternal verities. Valentinian Gnosticism undertook to furnish a Neo-Platonic basis for Christianity, adding, however, a more explicit principle of mediation or means of return from the "lapse" to the highest principle. Alexander of Aphrodisias, and more especially the Arabian commentators of Aristotle, set up a pantheistic idealism; which indeed is the outcome of Oriental monotheism as contrasted with the Christian Trinitarianism. The ideal principle to which all individual existences in the world are subordinated, and before which they perish, is a world-soul conscious in individuals not endowed with immortality, and not possessing, of itself, personality. Christian philosophy, as such, is essentially idealistic, inasmuch as it has to provide a speculative basis for the doctrine of a personal Creator and for an immortal creature. Thomas Aquinas says that God "eternally knows all things as present, and through this knowledge these things themselves are caused." But with the disputes of Nominalism and Realism arose the distinction which separates later philosophy into idealism and materialism. The "realism" of Anselm, Albertus Magnus, and Aquinas, is idealism in the proper sense of the term, holding to the origin of the world from the thought of God, through his eternal ideas which make possible our cognition of things by means of general ideas, these being the subjective correlates to the eternal ideas manifested in individual things. Realism thus holds the universe to exist *ante rem* in the mind of God, *in rem* in the phenomena of the world, and *post rem* in the human mind recognizing it by the act of cognition. Nominalism, as developed by Roscellinus, Abelard, and Occam, looked upon general terms as arbitrary creations (*status vocis*) without objective reality corresponding to them. Each individual thing exists in its isolated independence, and there is no species or genus or class in nature, but only individual beings. Hence, sensuous certitude is the nearest approach to truth, and abstract or general ideas are the farthest removed from it.—But when the mind perceives the existence of essential relations in nature, such as it names *force, law, life*, etc., indicating dependence and interdependence among the things in the world, it finds itself obliged to recognize, perforce, the objective validity of its complex or general ideas expressing "substances, modes, and relations." Powers and forces give rise to individuals, and cause them to vanish again. While the particular individuals begin and cease, the power or force persists, and is manifested in the evanescence of things as much as in their origination, and thus proves itself to possess greater reality than the particular things which Nominalism supposes to be the only reality. The existence of processes which are generic in their nature and correspond to our general ideas, comes to consciousness in modern natural science as the doctrine of the "persistence of force." In the first stage of idealism, accordingly, all individuality is looked upon as transitory, and an abstract unity of force is regarded as the ultimate reality which swallows up all special existences, spiritual or material. From this pantheistic idealism to spiritual idealism the transition lies in the perception that all force or essential relation is necessarily, in the last analysis, a phase of self-determination, and hence of personal being. This insight is the key to the idealism of Aristotle, Leib-

nitz, Aquinas, Eckhart, Hegel, and of most thinkers who have founded systems that explain human institutions. Idealism, according to Sir William Hamilton, deduces the object from the subject, while materialism deduces the subject from the object. This would exclude the numerous forms of idealism wherein both subject and object are deduced from a spiritual principle. Among distinguished modern philosophers, called idealists in accordance with one or the other of the above definitions, are to be named Berkeley and Malebranche as theological idealists; Descartes, as problematical idealist; Hume, as skeptical idealist; Kant, as transcendental idealist; Fichte, as subjective idealist; Schelling, as objective idealist; Hegel, as absolute idealist; Schopenhauer, as theoretical idealist; Jacobi and Schleiermacher, as sentimental idealists; Spinoza, as substantial idealist. These and similar designations are liable to convey a false impression unless supplemented by reference to the full systems of those thinkers. (See KRAUTH'S *Berkeley*, Philadelphia, 1874; also the several articles in this work on the philosophers above named, on SCHOOLMEN, and on PHILOSOPHY.) W. T. HARRIS.

**I'deler** (CHRISTIAN LUDWIG), b. at Gross-Brese, in the Prussian province of Brandenburg, Sept. 21, 1766, and appointed professor of astronomy and chronology at the University of Berlin in 1821. His principal works are—*Handbuch der mathematischen und technischen Chronologie* (1831) and *Die Zeitrechnung der Chinesen* (1839); but his earlier writings, *Historische Untersuchungen über die astronomische Beobachtungen der Alten* (1806), *Handbuch der Französischen Sprache und Literatur* (1852), etc., were also well received. D. in Berlin Aug. 10, 1846.

**Iden'tity**, a philosophical term used to indicate unity with persistence and continuity. By it is not meant abstract unity, but unity in plurality, in multiplicity, succession, diversity, or change. Hence it is predicable of substance, and of the quantity of force, matter, and other essential relations in nature. It is more especially predicable of life and of personality. Personal identity is attested through consciousness and memory. In consciousness there is the antithesis of subject and object, and the self is certain of the identity of itself as subject with itself as object. This identity is a mystery, perhaps identical with the mystery of the Trinity, or of the participation of the particular thing in the generic or universal. Identity may be regarded as existing in various degrees: I. As the identity of the inorganic substances in nature—of the mineral, for example. Here there is supposed to be an identity in material or substance—an identity of composition, but scarcely any identity that might be called individual identity, although in the crystal this begins to be suggested. II. In the plant, according to Aristotle, dwells the *nourishing* soul, so that there is identity of life, and even of propagation of species—identity of individual and identity of genus. There is a preservation of identity under diverse conditions and transmutations. III. In the animal there is a still more remarkable preservation of identity, inasmuch as to the *vegetative* soul is added the *feeling* soul, and the individual animal feels his identity even in his extremities. IV. Man *thinks* his identity, and consciousness is the result. In his entire history man may be regarded as coming into identity with himself—i. e. as realizing, by education, in himself, his faculties and possibilities as mind, and as making these actual in the world in the shape of institutions and social organizations. Man's identity is personal identity, and essentially different from the identity of the plant, which grows and repeats its species in new individuals, or from the animal, which also *feels*, but cannot generalize. In man the species, or the generic process, enters entire in each individual as consciousness, the universal and particular being identical with the individual—constituting subject, object, and union of the two. The doctrine of identity, as taught by Schelling (see SHEL-LING), holds the absolute to be the identity of the ideal and real, or of the subjective and objective—matter and mind being the two poles of one infinite substance. The Principle of Identity in logic states in another form what the Principle of Contradiction lays down as the fundamental law of thought—namely, that a thing cannot be and not be at the same time. (See LOGIC, and IMMORTALITY.) W. T. HARRIS.

**Ides.** See CALENDERS.

**Id'ioey** [from the Gr. *ἰδιώτης*, a "private person," hence an unlettered man, and finally an idiot, or person without mental capacity], the want of a natural and harmonious development of the mental, active, and moral powers and faculties of a human being, dependent upon some defect or infirmity of the nervous organization. It varies in degree, contingent upon the extent of nervous degeneracy, from a slight impairment of the mental faculties or imbecility, by insensible gradations and shades, down to complete idiocy.



This maximum of imperfection and incapacity stops short only at a condition of nerve degeneracy inconsistent with the continuance of human life. Idiocy may exist with an apparent condition of bodily health, but is more commonly associated with obviously diseased physical states or some impairment of general physiological functions. There is a notable form of idiocy that is known as cretinism, which is a marked want of mental development, associated with extreme scrofulous degeneracy and great bodily deformity. This is more commonly prevalent in mountainous districts. Idiocy is sometimes confounded with dementia, which is a loss of mental powers and faculties once possessed. This occurs at a period of life later than childhood.

Various methods of classification of idiocy have been suggested, but these are either arbitrary or based upon pathological distinctions that are valueless for any practical purposes of classification. Of the first class, those based upon differences in mental capacity, it may be said that they have a certain convenience when it is fully understood that they are proposed only to define general degrees of mental deficiency that nevertheless run into each other by insensible gradations. Of the latter, where idiocy is classified by known or probable pathological conditions underlying it, such distinctions are of little practical value in devising modes of obviating the resulting mental states or in predicting the results of such methods. A pathological classification may, however, be used to indicate the ordinary and immediate causes which produce idiocy. From such a study it would be seen to occur, first, as a form of human degeneracy, the result of congenital or post-natal influences; or, secondly, as a consequence of accidental causes that have interrupted or checked the laws of normal human growth. Of the former, a majority may be classed as the result of hereditary neuroses in one or both families. The intermarriage of near relatives is a not infrequent cause of idiocy, because it intensifies the family defects and vices in the offspring. Again, ill-health, any serious constitutional affection, or the intemperance of one or both parents at the time of conception, insufficient food, continued ill-health, depressing influences, or any sudden shock to the mother during gestation. Of the latter, all injuries to the brain in infancy, whether the result of primary or secondary disease or from accidental causes. Thus, on the one hand there may be the ill effects of convulsions, epilepsy, hydrocephalus, or any primary brain disease, or the translation of eruptive diseases to the brain. On the other hand, there may be injuries to the brain in parturition from instrumental interference or otherwise, from blows on the head or concussion in infancy, and in rare instances from fright. Premature ossification of the skull may prevent mental development by checking or stopping cerebral growth. In many cases, however, the search for causation is a blind one.

Idiocy has existed in all ages and in every country. The relative number of idiots in any community will depend upon the physical and social influences that lead towards nerve-degeneracy, but the ratio to the general population seems to be an increasing one. With the present imperfect civilization of the *civilized* world, it is safe to estimate the number as at least one to every thousand in the population. The statistics of the subject would support this estimate, after excluding all cases of dementia, and not including those unrecognized as idiots on account of infancy. Their status as subjects of law and objects of pity and charity had been recognized from time immemorial, but any known attempts to ameliorate their condition were reserved for quite recent times. In fact, systematic efforts for the improvement of their condition date back only some forty years. There was a prior period of incubation, in which circumstances combined to direct attention to this class, to their peculiarities and their needs. Efforts to improve the condition of the insane, to educate deaf-mutes and the blind, had been attended with great success. In individual instances, where idiocy had been studied and some degree of improvement had been attained, the facts had found their way to the public ear. Scientific curiosity had been awakened as to the nature of idiocy and the extent to which remedial means might be rationally applied. Civilized communities were thus made ripe for an extension of experimental measures of relief to the class of idiots. By general consent the name of Dr. Edward Seguin of Paris stands at the head of European specialists in the management and training of idiots. He organized a school for the purpose in 1838. His intelligence, skill, and zeal, together with a happy faculty of presenting his principles and methods of instruction and the results, attracted public attention. The public authorities of France and scientific bodies acknowledged the merits of his system. Visitors from many nations went to see the wonderful results. Thus were sown the seeds that have ripened into extended labors in the same direction in many lands. His work on

the management, training, and education of idiots, published in Paris in 1846, has been almost the only textbook on the subject till the issue of a second treatise in English published in 1866 in New York, where he now resides.

Institutions have been established in many of the continental states of Europe. In Great Britain the growth and spread of institutions for idiots has been almost unexampled. Beginning with a small school founded by some benevolent ladies in Bath but a little more than twenty-five years ago, there are now eight institutions, public and private, in England, three in Scotland, and one in Ireland. More than 1000 idiots and imbeciles are now gathered in institutions designed for their management and instruction, supported by their friends or by the liberality of wealthy and benevolent individuals. Besides these, several large custodial establishments exist where indigent and pauper cases of idiocy are properly cared for at the public expense. In Great Britain, therefore, the cause of the amelioration of the condition of idiots may be regarded as having been fairly adopted and placed upon a firm foundation, both as a charity and a measure of public policy. In the U. S. efforts at instruction in individual cases of idiocy or imbecility were undertaken as early as 1818. The first school, however, was opened at Barre, Mass., in 1848. Only a few months later, an experimental school, under the patronage of the State of Massachusetts, was begun at Boston. To this enterprise Dr. S. G. Howe, long identified with the education of the blind and other works of philanthropy, gave the prestige of his name. Thence followed the establishment of similar institutions in other States, a list of which is here given:

Name and location of Institution	When founded.	Superintendent.	No. of pupils.
Priv. ins. Barre, Mass. ....	1848	Dr. George Brown.....	77
State " S. Boston, Mass. ....	1848	Dr. S. G. Howe.....	120
State " Syracuse, N. Y. ....	1851	Dr. H. B. Wilbur.....	198
State " Media, Pa. ....	1853	Dr. I. N. Kerlin.....	223
State " Columbus, O. ....	1857	Dr. G. A. Doren.....	357
State " Lakeville, Conn. ....	1858	Dr. H. M. Knight.....	57
State " Frankfort, Ky. ....	1859	Dr. E. H. Black.....	99
State " Jacksonville, Ill. ....	1865	Dr. C. T. Wilbur.....	100
City " New York City. ....	1865	Com. of Charities.....	200
Priv. " Fayville, Mass. ....	1870	Mrs. Knight & Green ..	30
State " Glenwood, Ia. ....	1876		30
Total number under instruction.....			1468

The underlying or associated physical causes of idiocy have been referred to. From the nature of the case, they are, the most of them, not directly remediable; but in an indirect way much may be done to obviate their consequences, if no more. These physical causes may be classed either as defects or infirmities. As a defect, there may be want of size or want of brain-capacity, from whatever cause arising; a want of proper anatomical relation or connection in the elementary parts of the brain, or various abnormal modifications of its more intimate structure or organization. As an infirmity, there may be a general default of normal functional activity. This statement includes a variety of subtle conditions or influences that may be suggested or inferred, rather than demonstrated, originating in the brain itself or derived from impairment of function of remote but correlated organs. Of these physical causes of the first category, it will be seen that they cannot absolutely be removed by any treatment. They are congenital, organic defects or abnormal organic conditions induced by disease in a region and in tissues not susceptible of much modification by remedial measures. In other words, absorption and regeneration cannot be rendered active and operative. Of the second class of physical states or influences, some degree of reformation under favoring circumstances may be predicated. Thus, to establish a healthy functional activity of the nervous system and other bodily organs, hygienic and remedial measures may be undertaken with a reasonable hope of success. To bring the brain and the nerves of relation into exercise, increasing their forces, actual and potential, is the work of education. And inasmuch as all physiological growth is the result of reciprocal action between organ and function, while size or capacity and perfection of organism controls and determines the amount of functional activity, so imperfection of organic structure and want of size may be the result of the absence of proper functional exercise in the brain, as in any other organ. Education, then, may have an indirect effect in obviating even the profounder causes of idiocy. Rational efforts for the amelioration of the condition of idiots resolve themselves, first, into measures of management, training, and education. In institutions for this purpose the same general features are everywhere seen: a gymnasium, to develop muscular power, attention, dexterity and a proper carriage; a nursery, where the younger and lower grades of pupils are trained to habits of cleanliness, decency, order, and self-care; a school-room,



with a complete scale of mental exercises, from those applicable to the first dawnings of sense-power and sense-perception up to the ordinary studies of an elementary school. The same principles of education are here as in any other system of instruction. But the special adaptations of these principles to meet the peculiar needs of this class of pupils may be quite varied. The will of the teacher may be needed to supplement an absence of spontaneousness on the part of the pupil. The beginnings of instruction will be at such a point in the series of exercises as the exigencies of each case may demand. The progress will be by such gradual steps as are within the reach of each pupil's intelligence. The acquisitions of each day, in the way of greater nerve-force, awakened intelligence, and increased self-control, are applied to the practical matters of every-day life in the household or elsewhere. The ultimate end of all these efforts is to establish good habits, to impart a capacity and a willingness for some form of useful occupation, to develop greater power of self-control, and, if possible, to bring idiots under the sway of moral obligation. The experience of institutions now for many years in operation has established the fact that the majority of idiots of a school-attending age and condition are susceptible of marked improvement, and may attain the end proposed by their education in the manner and by the means thus briefly indicated. Ordinarily, the precise extent of improbability can be determined only by experiment, as the actual physiological limitations of the mental growth can only thus be ascertained. Of some, unimprovability may be predicted at the very outset; thus, where the degeneracy is of a kind to be self-developing with the progress of age; where there is an obviously underlying pathological condition progressive in its nature; where there is such a degree of deformity as to prevent the use of the various means of training, etc.; and, finally, where there is an extreme nervous excitability, the natural termination of which is in some form of insanity,—for all such unimprovable cases there is needed another class of institutions—namely, of a custodial character. As a question of social science two practical principles may be laid down as to the disposition of idiots. First, it involves less trouble and no more actual expense to care for them by themselves in the hands of competent persons, and with proper surroundings and appliances, than in the public almshouse with other socially dependent classes, or even in the homes of indigence. Secondly, whenever practicable it is a wise public economy that provides for them appropriate means of management, training, and education.

H. B. WILBUR.

**Idiosyncrasy** [Gr. *ιδιοσυγκρασία*, a "peculiar admixture"), a marked individual trait of any function of body or of mind which is possessed by only one or by very few persons. Certain bodily idiosyncrasies appear to be compatible with perfect health. Others arise from diseased conditions, and cease upon the cure of the disease. Mental idiosyncrasies may not amount to marks of insanity, and yet it is impossible to draw a line between the two.

**Idlewild Cave**, a large cave at White Pine, Nev. It was discovered by miners who ran a shaft into it. It has been but imperfectly explored.

**Idocrase** [Gr. *είδος*, "form," and *κρᾶσις*, "mixture," from its resemblances to other minerals], a mineral crystallizing in the dimetric system, and essentially a silicate of alumina and lime, with a smaller proportion of iron, and in some cases also containing magnesia, etc.; hardness, 6.5; specific gravity, 3.4. It occurs chiefly in lavas, but is also met with in gneiss, serpentine, and granular limestone.

**Idolatry** [from the Gr. *είδος*, an "image," and *λατρεύειν*, to "serve"] is distinguished from IMAGE-WORSHIP (which see) or iconolatry in this, that the former is applied to literally worshipping the images themselves, whereas iconolatry is restricted to signifying simply the use of images to direct the mind in worship to the deity or saint represented. The ignorant find it difficult to distinguish between the two, and end by believing that there are sanctity and miraculous or magical virtue in the image itself. Idolatry appears to be of great antiquity. The Turanian races (i. e. the Finnic, Turkish, Tartar, and Ural-Altaic, Dravidian, and cognate tribes, including perhaps the Basque and Etruscan) worshipped the spirits of their ancestors, and represented these by little images, as did the Romans, who derived the custom from the Etruscans. As soon as the belief was established that the departed were immortal, it would occur to the survivors that their spirits might benefit them, and that this might be made sure by worship. The beginning of this *cultus* was before all history, since Boucher de Perthes found that the earliest races buried their dead in urns with offerings. The more civilized branch of humanity divided into the Indo-European and Semitic. The former

appear to have been inspired with a deeply poetical and pantheistic spirit, from which came the tendency to deify not only the principal forces in nature, but all their subdivisions, so that eventually there was a god or goddess for every separate river or kind of plant—all represented more or less by images, which were worshipped. The Semitic races limited their idols, expressed in gods, to the first principles of reproductiveness and death, especially the former, whence resulted a sex-worship and obscene rites. But they found in Moses and Mohammed reformers who vigorously repressed all nature-worship and its resultant idolatry to such an extent as to very strictly forbid the making of graven images; Mohammed, with great practical shrewdness, going so far as to forbid the making of any image whatever. It is a curious fact that the literal worship of images in themselves appears to be in proportion to their monstrosity and ugliness. The Greeks made statues of their gods, but seem to have merely admired the former while they adored the latter. In the Roman Catholic Church the Virgins of Raphael and of the great artists generally serve merely for iconolatry, but where idolatry is developed it is common to some barbarously adorned rural image or to one absolutely hideous—e. g. the jet-black Virgin of Altötting. The tendency of humanity to invest material objects with magical virtues is universal. A savage who has by chance always killed his enemies or his game with a certain weapon soon believes that it possesses a peculiar virtue, and this belief readily extends to ornaments and amulets, which are supposed to bring luck. From amulets—pebbles or beads—the faith readily extends to human images, whether of ancestors or representing powers of nature. Idolaters of every country endeavor to please their divinity by sacrifices, and many punish it when their prayers are not answered. It is not many years, as the writer can vouch, since the inhabitants of Segni, in Italy, having prayed in vain to St. Bruno for rain, took his image down, punished it with stripes, and stuck it into the mud of a river head downward. A great shower happening to fall immediately after, the people came in solemn procession, took the image up, washed it, and reinstated it in its shrine. It is needless to say that the Catholic Church does not sanction such idolatry, though it encourages iconolatry. A curious form of idolatry is the totem-worship by which a certain sacred animal is regarded as originating and protecting families and tribes of a common descent. This was to be found, e. g., among the Teutonic Wolfings—whose names survive in Rudolf, Wolfgang, etc.—as also among North American Indians. Sir John Lubbock briefly explains this as follows: "In endeavoring to account for the worship of animals we must remember that names are very frequently taken from them. The children and followers of a man called the Bear or the Lion would make that a tribal name. Hence the animal itself would be first respected, then worshipped." Mr. Herbert Spencer regards this as the origin of fetichism, or the lowest forms of all idolatry. "He whose family tradition is that his ancestor was the crab, will conceive the crab as having a disguised inner power like his own. Hence . . . multitudinous things around will acquire imaginary personalities." Idols representing forms half human, half brutal, also originate, in all probability, from this source. There is more than one royal or noble family in Europe and the East which has a tradition that it sprang from the amours of a woman with an animal, the animal having been simply a man named after one. According to Max Müller, races so rude as to have simply one word for every one idea, cannot represent active powers, natural or supernatural, in any but a personal and more or less human form. This would also account for the origin of much rude idolatry. Iconolatry becomes idolatry when the image is believed to wink, bow, or display signs of life, owing to the actual presence in it of the spirit which it represents, or when it is believed to possess healing or magical power. The most extensively disseminated idols are those of Boodha and of the Chinese queen of heaven, which bears a striking resemblance to Isis.

CHARLES G. LELAND.

**Id'ria**, town of Austria, in Carniola, on the Idriza. It is situated in a kettle-shaped valley, and is famous for its quicksilver-mines, which are said to be the richest in Europe, producing annually 2000 cwts. Pop. 4200.

**Id'stedt**, a v. of Sleswick, noteworthy on account of the battle July 24 and 25, 1864, by which the Danes crushed the Sleswick-Holstein rebellion.

**Idumea**, territory of Western Asia, was bounded N. by Judaea, W. by the Mediterranean. At one time it comprised parts of Judaea as far N. as Hebron, and in Arabia the peninsula of Petra. It was inhabited by the descendants of Esau, and was annexed to Judaea by David, and later by the Macedonians. The relations between the Jews and the Idumeans (Edomites) were always hostile and full of hatred, even after the Jews had received an Idumean



dynasty in the son of Herod the Great, in whose time the Idumæans were, however, Jews in religion.

**Ie'si**, town of Italy, in the province of Ancona. It is said to be of Pelasgian origin, and through the Umbrians and Gauls it passed to the Romans, traces of whose civilization are everywhere seen. The city walls are flanked by towers, and the place is well supplied with good water. The public buildings are very respectable, and contain some fine pictures, as well as some curious antiquities. The trade and manufactures of this town are very considerable. Pop. in 1874, 18,912.

**Iffland** (AUGUST WILHELM), b. at Hanover Apr. 19, 1759; took to the stage at Gotha in 1777; acted in Mannheim 1779, and became in 1796 director of the National Theatre of Berlin, where he d. Sept. 22, 1814. His dramas, of which he wrote a great number, and which in their time were performed on all the stages of Germany and Scandinavia, are narrow, sentimental, and affected pictures of the trivialities of every-day life; but they are not altogether without psychological interest and theatrical effect. As an actor he was the perfection of that which his dramas intended to represent—the natural, the noble, the true; but he was great only in the representation of that which in reality is small. CLEMENS PETERSEN.

**Ignasuric Acid** [Malay, *igasura*, "vomiting-nut"], an acid found in *Nux vomica* and St. Ignatius' beans, and in the root of *Strychnos colubrina*.

**Ignasurine** [Malay, *igasura*, "vomiting-nut"], an alkaloid which occurs in *Nux vomica* in company with strychnine and brucine. It is intensely poisonous. (See Desnoix, *J. Pharm.* [3], xiv. 202, and Schützenberger, *Compt. rend.*, xlv. 1234; *Ann. Ch. Pharm.*, cviii. 348.)

**Iglau**, town of Austria, in the province of Moravia, on the Iglawa. It is an old but well-built town, with extensive manufactures of cloth, tobacco, and machinery, and rich silver-mines in the vicinity. Pop. 20,112.

**Iglesias**, town of Sardinia, in the province of Cagliari. It is a walled city, with crenelated towers and a castle, and is situated in one of the most fertile portions of the island. Silver and other mines are found in the vicinity, and so prosperous are the mining operations that this town is known in Sardinia as the "city of the mines." There is, however, little general industry except among the women, who make quantities of linen and woollen stuffs. P. 9816.

**Iglesias** (JOSÉ MARIA). See APPENDIX.

**Ig'lo**, town of Hungary, in the county of Zips, on the Hernad, has copper and iron works, and a considerable trade. Pop. 5900.

**Ignatius**, SAINT, bishop and martyr. It is not known whether he was of Syrian or of Greek descent, nor whose disciple he was. Eusebius (*Hist.*, iii. 22) makes him the second bishop of Antioch, Evodius having been the first. The *Apostolic Constitutions* (vii. 46) make Evodius and Ignatius bishops together—Evodius appointed by Peter, and Ignatius by Paul. Baronius and Natalis Alexander think they were bishops together—Evodius of the Jews, Ignatius of the Gentiles. That he was a martyr, having been condemned at Antioch, and taken to Rome to be thrown to the lions, is hardly to be doubted. The date of his martyrdom is, however, a mooted question. The earliest date is that recently given by Dressel on the authority of a new codex of the *Martyrium*, first edited by him in 1857 (2d ed. 1863), which begins: "In the fifth year of the reign of the emperor Trajan," i. e. 102 A. D. The old *Martyrium*, which has the appearance of having been tampered with, names Dec. 20, 107. But as it is now generally admitted that Trajan did not go to the East till 114, wintering at Antioch 114–15, critical opinion is now gravitating towards 115. Perhaps we may say Dec. 20, 115. Bearing the name of Ignatius there are fifteen *Epistles*, eight of which (three in a Latin and five in a Greek recension) are now generally considered spurious. The remaining seven (*Ephesians*, *Magnesians*, *Trallians*, *Romans*, written at Smyrna; *Philadelphians*, *Smyrneans*, *Polycarp*, written at Troas) are in two Greek recensions: (1) the longer, first published by Paeus in 1557; (2) the shorter, first published by Archbishop Usher in 1644. Three of the seven (*Ephesians*, *Romans*, *Polycarp*) were published, with a translation, in a still shorter Syriac recension, by Cureton in 1845. Since then the Ignatian controversy has been renewed with great sharpness. The several opinions are as follows: (1) Killen thinks them all spurious, but imagines that the Syriac three were the first to be forged, in the time of Origen (185–254), soon after which they were translated into Greek, expanded, and others added, before the time of Eusebius, who had the seven. (2) Baur and Hilgenfeld think them all spurious, but are of the opinion that the seven shorter Greek epistles were the first to be forged, after 150. The Syriac three, it is contended, read

like extracts. (3) Cureton, Bunsen, Ritschl, and Lipsius advocate the genuineness of the Syriac three. (4) A strong array of the ablest critics, both Protestant and Roman Catholic, such as Gieseler, Uhlhorn, Möhler, and Hefele, may still be reckoned on the side of the shorter Greek recension. The longer Greek differ from the shorter in the greater emphasis which is put—(1) upon episcopacy; (2) the divinity of Christ. R. D. HITCHCOCK.

**Ignatius, Loyola**. See LOYOLA.

**Ignatius' Bean**, or **Bean of St. Ignatius**, the bean-like seed of *Strychnos Ignatii*, a rather large shrub with curious vine-like branches growing in the Philippines, and belonging to the order Loganiaceæ. The seed is an inch long, half an inch thick, and has the properties of *nux vomica*, but more actively, for it contains a much larger percentage of strychnia. The commercial supply is irregular. The seed was named by the Jesuits in honor of Ignatius Loyola, their founder.

**Igneous Rocks** are those which have been formed by the cooling of melted materials, as distinguished from *sedimentary* rocks, which are formed of material deposited from water, and *metamorphic* rocks, sedimentary in their origin, but much changed in character by the action of heat and pressure. Igneous rocks are formed by the cooling of lavas from volcanoes or of the fused matters cast up through fissures in the earth's crust, constituting dykes of non-stratified rock. Igneous rocks are either *feldspathic* (white trap, porphyry, trachyte, phonolite, pitchstone, obsidian, pumice, etc.) or *augitic* (diorite, basalt, dolerite, etc.). Granite, greenstone, etc. are sometimes reckoned as igneous rocks, but in many cases they appear to be truly metamorphic.

**Ig'nis Fatuus** [Lat. "vain or foolish light;" Fr. *feu follet*; Ger. *Irlicht* or *Irrwisch*], a luminous meteor, appearing during summer and autumn nights on marshy land, near stagnant water, in graveyards and other places where decomposition is going on. It is an unsteady bluish light, usually seen a few inches above the surface of the ground, sometimes stationary, but commonly moving with great rapidity. It appears brightest at a distance, and recedes from the observer as he tries to approach it; thus travellers have frequently lost their lives through being deluded by it into dangerous bogs. From its resemblance to a lighted wisp of straw or torch borne quickly along, it has received a number of names, such as Will-o'-the-Wisp, Jack- (or Peg-) o'-Lantern, Friar's Lantern, Kit-with-the-Canstick (i. e. candlestick), and has given rise to many popular legends. It was formerly attributed by the country-people to evil spirits, who found pleasure in luring human beings to destruction, but was sometimes supposed to be souls escaped from purgatory, all in flames, with the hope of inducing men to pray for their deliverance. When appearing in churchyards, the ignis fatuus is still in some places called "corpse-candle," and regarded as a presage of speedy death, generally to the person by whom it is seen. The English gypsies, to whom, owing to their out-of-door life, the ignis fatuus is a familiar spectacle, call it *mullos momelis*, or ghost-light. A light of this species, called in Buckinghamshire "the Wat," is said to haunt prisons, and when seen by a prisoner before his trial is considered an unfavorable omen. The cause of the ignis fatuus is not fully decided. Some meteorologists refer it to electricity; others to an issue of marsh-gas (light carburetted hydrogen), caused by the decomposition of vegetable matter and inflamed by an electric spark. It is most generally supposed to be phosphuretted hydrogen arising from decomposing animal matter; this gas takes fire spontaneously upon coming into contact with atmospheric air. Before the introduction of an improved agricultural system, and the almost universal drainage of marsh-lands, the ignis fatuus was a very ordinary phenomenon. At present it is more rarely seen, and is often vainly sought for by students of meteorology. Sir Isaac Newton defined it as "a vapor shining without heat," but other observers have described it as producing a slight degree of warmth, and have even succeeded in igniting flax at its flame. JANET TUCKER.

**Ignoramus**. See GRAND JURY.

**Ignorantia Facti**. See IGNORANTIA JURIS.

**Ignorantia Juris** [Lat. "ignorance of the law"]. It is a cardinal legal principle that ignorance of the law affords no excuse for a violation of, or failure to observe, its requirements. It is conclusively presumed that every one is acquainted with the established rules of law, and understands that his conduct should be regulated in accordance with them, without regard to his lack of opportunity to acquire such knowledge. This presumption, though it may work great hardship in particular cases, is based upon the necessity of securing the practical and uniform enforcement of the law, and is therefore demanded by considerations of



public policy. If a different rule were adopted, the desire to avoid legal accountability would lead to a general disregard of the law, and it might therefore be transgressed with impunity, and would become wholly ineffective. In regard to *ignorance of fact*, however, there is not the same reason for a similar presumption, and a different rule is established. Acts done or transactions entered into in consequence of ignorance of material facts, when the lack of knowledge is not attributable to unreasonable remissness in inquiry or a disregard of readily available sources of information, will not, therefore, as a general rule, be held to impose any legal liability, or at least the same degree of liability as would otherwise have been incurred. These rules as to ignorance of law and of fact are at present recognized in the common-law tribunals, as well as in courts of equity. For example, in civil cases it is held that if money is paid in any transaction with full knowledge of the facts, but in ignorance of the doctrines of law applying to the case, it cannot be recovered back if there be nothing unconscientious on other grounds in the retention of it; but, on the other hand, if money be paid through ignorance of the facts merely, and without laches, it will in general be recoverable. In like manner, in criminal law, if an offence be committed which is in fact a crime, though not known to be such by the wrongdoer, the plea of ignorance that the law forbade such an act will not be accepted in justification; but if a house-owner should, in the exercise of a reasonable degree of caution, and in the belief that it was necessary for self-protection, kill a person by night in his house whom he innocently but mistakenly believed to be a burglar, his ignorance would be upon a point of fact, and would free him from responsibility. Ignorance of the laws of a foreign state is deemed to be ignorance of fact, and the States of the Union are for this purpose deemed to be foreign to one another.

But these rules in regard to the effect of ignorance are modified at times by other principles of law, so that their application is not invariable. Thus, if a point of law be doubtful, and certainty of knowledge thereon cannot be attained, a compromise of claims affected by it will generally be sustained as establishing the rights of the parties, since it is desirable that litigation be diminished. Moreover, if a person's ignorance of law has afforded another opportunity to practice fraud or imposition upon him, his ignorance will not preclude him from obtaining relief, since, if such were the case, the other party would be permitted to profit by his own wrong. Again, it is a salutary rule of law that when one of two innocent parties must suffer the loss resulting from any act, the consequences should fall upon the one who has caused or enabled the act to be committed, rather than upon the other. Hence, if a person assume to act as agent for another in conducting any transaction, believing that he has authority so to act, while he has no authority in reality, the interests of the third person with whom he deals upon such a basis will generally be protected, and the pretended agent will have no claim to relief on the ground of ignorance of material facts. The generally prevalent doctrine is, that he would be liable to the third person in such a case upon an implied warranty of authority. In like manner, special considerations may at times lead the courts to modify the application of the rules concerning the effect of ignorance, and courts of equity particularly may, in peculiar cases of hardship, occasionally grant special indulgence to one innocently violating the law. (See MISTAKE.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Ignorantines.** See BRETHERN OF THE CHRISTIAN SCHOOLS.

**Iguala'da**, town of Spain, in the province of Barcelona, on the Noya. It is an old and gloomy town, with a bright and handsome suburb, a brisk trade in wine, oil, and fruits, and extensive manufactures of weapons and cotton and woollen goods, with several paper-mills in the vicinity. Pop. 14,000.

**Iguana** [Sp.], a genus of lizards inhabiting Central and South America and the West Indies. These animals are of large size, often four or five feet in length to the end of the tail, which is long, slender, compressed, and covered with small, equal, imbricated, and orinated scales. The body is also scaly, and provided with a prominent median fold of integument under the throat, forming a conspicuous dewlap, which is serrated in front, with large scales. Another fold along the back is similarly raised into a deeply and acutely serrated crest, highest on the dorsal region and extending upon the tail. There is a single row of femoral pores. The tongue is short, contractile, and notched at the tip. There is a double row of small teeth upon the pterygoid bones of the palate, and larger teeth upon the usual maxillary bones. These teeth have the crown compressed, acute, and with a serrated margin. The external surface

of the crown is coated with enamel and traversed by a median longitudinal ridge. The bases of the teeth are elongated, subcylindrical, and soldered to excavations on the inner surface of the outer wall of a shallow, oblique alveolar groove, thus exhibiting the pleurodont type of dentition. The vertebrae, besides the ordinary articulation by the zygapophyses or oblique processes from the arches, are further united by a process (zygosphene) from the front part of each arch, which fits into a cavity (zygantrum) upon the posterior face of the preceding arch; and in this respect they resemble the vertebrae of serpents. There are five well-developed toes on each foot, all provided with claws. They are active animals, living mostly upon trees, and are herbivorous. Their flesh is considered a delicacy. The best known species is *Iguana tuberculata*, so named from the tubercular scales upon the sides of the neck.

O. C. MARSH.

**Iguanodon** [from Sp. *iguana*, a species of lizard, and Gr. *δόνος*, "tooth"], a genus of extinct reptiles belonging to the order Dinosauria, and found in the Wealden and Cretaceous of Europe. These reptiles were first discovered by Dr. Mantell in the Wealden of Tilgate Forest, and the remains first found consisted of teeth. The name of the animal was intended to express the resemblance of these teeth to those of the iguana. As in that animal, the base of the tooth is elongated, the crown expanded and notched on the margin; at first it is acuminate and compressed, its sloping sides serrated, and one surface, external in the upper jaw, internal in the lower, is traversed by a median longitudinal ridge and covered with a layer of enamel. On each side of this ridge are one or two lower ridges, separated from each other and from the serrated margin by wide smooth grooves. The marginal serrations are seen under a low magnifying power to be transversely notched. These teeth were set in sockets giving a firm support for mastication, by which they seem to have been worn until nearly the whole crown was gone. In the earlier stages of use a sharp, irregular edge was maintained by the layer of enamel; later, the ossified pulp, harder than the dentine, formed a transverse ridge, fitting the tooth for its work as a molar for grinding and bruising the coarse vegetables that formed the food of these animals. The vertebrae of the neck were moderately convex in front, concave behind, becoming concave on both faces in the dorsals, resembling those of some mammals, while other points of structure allied these animals with the birds. The ribs were bifurcate. The shoulder-girdle resembled that of lizards, and the fore legs were comparatively small. The pelvis had the ilium extending far in front of the acetabulum, and furnishing only a widely arched roof to that cavity. The ischium was much elongated, had an obturator process as in birds, and probably united with its fellow in a median ventral symphysis. The unusually large bones of the hind limbs were excavated by a large medullary cavity, and fitted for terrestrial locomotion. The femur had a strong inner trochanter, and its distal end was bird-like in the development of a strong ridge, which played between the tibia and fibula. The metatarsals were elongated, and so fitted together as to hardly if at all move on one another. The inner and outer digits were short or rudimentary, leaving only three well-developed toes, of which the middle was the largest and strongest. Large three-toed tracks in the Wealden are such as might have been made by these animals. *Iguanodon Mantelli* (so named by Prof. Owen for its discoverer) was thirty feet in length, with a bulky body, and was perhaps the largest of terrestrial animals. This genus has not yet been identified from America. (See HADROSAUROUS.)

O. C. MARSH.

**Ih'lang-Ih'lang** [Tagel, for "flower of flowers"], the rich and powerful perfume of *Uncaria odoratissima*, a noble forest tree of the Philippines and Malay Islands. The volatile oil of the flowers of the tree is largely employed in making the rich handkerchief-perfume of this name. This oil is distilled in the East, and is worth about \$250 a pound.

**I'chester**, small town of England, in Somersetshire, on the Exe, is noteworthy as the birthplace of Roger Bacon, and there are in the neighborhood many Roman remains. Pop. 781.

**Ile-de-France**, an old province of France, with Paris for its capital, is now divided into the departments of Seine, Oise, Aisne, Seine-et-Marne, and Seine-et-Oise.

**Ilesboro**, a village of Washington tp., Hocking co., O. Pop. 62.

**I'leum** [Gr. *ἔλκος*, to "twist," from its convoluted appearance], the lowest portion of the small intestine, extending from the jejunum to the head of the colon. In man it is about twelve feet long, thus including some three fifths of the length of the small intestine. It is one and a quarter inches in calibre, is thinner and narrower than the je-



junum, has less marked *valvulae conniventes*, and is ordinarily the only part of the intestine which has Peyer's patches (agminated glands) upon its inner surface.

**Ileus** [Gr. *εἶλος*, a "twisting;" Lat. *volvulus* or *miserere mei*], a very painful disease of the intestine, produced by mechanical obstruction, as by twisting, intussusception, or knotting of the entrail. Intense pain, persistent vomiting (sometimes stercoraceous), hiccough, etc. are characteristic symptoms. Intussusception, or the passage of a part of the intestine into the cavity of another part, is one of the most common conditions, as when the lower part of the small intestine is slipped down into the large intestine. The disease is very often fatal. Spontaneous reduction of the displacement may occur; the intussuscepted part may slough away and an inflammatory process occur, resulting in recovery; dilatation of the bowels by the bellows may effect a cure. As a last resort, gastrostomy may be tried with possible success.

**Ilex.** See HOLM OAK and HOLLY.

**Iha'vo**, town of Portugal, in the province of Beira, is well built and thriving. In its neighborhood is the celebrated glass and porcelain manufactory of Vista Alegre. Pop. 2,215.

**Ilicic Acid** [Lat. *ilicis*, "holly"], an acid contained in the leaves of the holly, *Ilex aquifolium*.

**Ilic'in** [Lat. *ilicis*, "holly"], the bitter principle of holly, *Ilex aquifolium*.

**Ilijats', or Iliyats'**, the name of the nomadic tribes of Persia. They are of various descent, Turkish, Arabic, etc., and most of them are Mohammedans of the Sunni sect. Each tribe has a district or grazing-ground appointed to it, for which it pays a tribute in lambs, oxen, etc., money being unknown among them; but on account of the somewhat unsettled social state, it happens every now and then that a tribe falls into habits of robbery and plunder.

**Ilini'za, or Ilinis'sa**, a volcano of the Cordilleras of Ecuador, South America, 10 miles S. of Quito. Its two peaks, from which smoke and flames have been seen to issue, rise 17,380 feet high.

**Ilion**, post-v. of German Flats tp., Herkimer co., N. Y., on the S. bank of the Mohawk River and on the Erie Canal. Ilion Station, on the New York Central R. R., 70 miles from Albany, is on the opposite side of the river, in Herkimer tp. Horse railroads connect Ilion with Mohawk and Herkimer. It has 4 churches, a national bank, 2 weekly newspapers, and extensive manufactures of firearms, sewing-machines, agricultural implements, and other goods. P. 2876.

**Ilion, or Ilium.** See Troy.

**Ilis'sus**, a river of Attica, rises near Hymettus and flows to the Phaleric Bay. In ancient times it was celebrated for its beautiful scenery, but its waters have now greatly decreased, and near Athens it is dry in summer.

**Ilixan'thin** [Lat. *ilicis*, "holly," and Gr. *ξανθός*, "yellow"],  $C_{17}H_{22}O_{11}$ , a yellow dye contained in the leaves of holly, *Ilex aquifolium*.

**Ilkeston**, town of England, in Derbyshire, 8 miles N. E. of Derby. It has large manufactures of hosiery, lace, and silk, and rich coal and iron mines in the vicinity. P. 9662.

**Ilwaco'ra**, post-v. of Carroll parish, La.

**Ile-et-Vilaine'**, department of North-western France, in Brittany, bordering on the English Channel. Area, 2,554 square miles. Pop. 589,532. The ground is mostly low, occupied along the sea by dunes and marshes, but much of the soil is fertile, producing, besides good crops of grain, large quantities of hemp and flax, which are manufactured into thread, cordage, and woven goods. The oyster fisheries are considerable. Cap. Rennes.

**Iler**, a river of Southern Germany, rises in the Tyrol, flows N. through Bavaria, and empties into the Danube.

**Iliman'i**, the highest peak of the Bolivian Andes, situated in lat. 16° 37' S. and lon. 67° 49' W. It is 21,149 feet high, and covered with glaciers to the height of 16,350 feet.

**Ilini**, tp. of Macon co., Ill. Pop. 821.

**Illinois'**, one of the central States of the Union, lying in the upper Mississippi Valley, extending from the parallel of 36° 59' N. lat. to that of 42° 30', and from 87° 35' to 91° 40' W. lon. It is bounded N. by Wisconsin, E. by Lake Michigan, Indiana (from which it is in part separated by the Wabash River), and by Kentucky, from which it is separated on the S. E. and S. by the Ohio River. It is also separated from Missouri for a short distance on the S. by the Mississippi River, which forms its entire western boundary, severing it from the States of Missouri and Iowa. Its territory extends both on the Ohio and Mississippi rivers to the middle of those rivers. Its area is 55,410 square miles, or 35,462,400 acres.

**Face of the Country.**—Illinois may be described in general terms as a gently inclined plain sloping from Lake

Michigan toward the Mississippi and Ohio. A somewhat elevated plateau extends from Wisconsin into the N. W. section of the State, and is there manifest in some bluffs



Seal of Illinois.

and hills, and another moderate elevation includes Ford and the adjacent counties; but neither of these sections rises to a greater height than 800 feet above the sea, while the Grand Prairie is not more than 500 feet above the sea, and the lowest portion of the State, at the junction of the Ohio and Mississippi, is 340 feet above the Gulf of Mexico. The State is therefore very nearly level. The N. W. corner is the most uneven portion of the State, though the rivers have in some instances cut such deep channels into the clay and alluvial soil as to give a broken appearance to the surface. In the extreme S. there is a range of remarkable hills crossing the State from Grand Tower to Shawneetown.

**Rivers, Lakes, etc.**—The State is drained almost exclusively by the Mississippi and its tributaries, the Ohio and its affluent the Wabash, the Kaskaskia, the Illinois, and Rock rivers, and the smaller affluents and tributary streams of these. A few short and inconsiderable streams flow into Lake Michigan, but the largest of these, the Chicago River, now flows by an artificially deepened channel through the Illinois Canal into one of the branches of the Illinois River. The Illinois, formed by the junction of the Des Plaines River from Wisconsin and the Kankakee from Indiana, is the largest river wholly within the State. Its course is nearly 500 miles in length, of which 245 are navigable, and its principal affluents are Fox, Spoon, and La Main rivers and Crooked Creek from the N. and W., and Vermilion, Mackinaw, and Sangamon rivers and Macoupin Creek from the S. and E. In Woodford and Peoria cos. its bed expands and forms Peoria Lake. It enters the Mississippi River 15 miles above Alton. The Kaskaskia River rises in Champaign co., and runs in a nearly parallel course with the Illinois for 250 miles, joining the Mississippi near Chester in Randolph co. Rock River enters the State from Wisconsin, and finds its way to the Mississippi at Rock Island. The Big Vermilion, Embarras, and Little Wabash are tributaries of the Wabash; the Saline and Cash of the Ohio. The Big Muddy is a smaller but considerable affluent of the Mississippi. Lake Pishtaka in the N. E. is the only considerable lake, besides the expansion of Illinois River already mentioned, in the State.

**Geology.**—The greater part of the surface of Illinois belongs to the Carboniferous era, the great coal-field of the State extending 375 miles in length from N. W. to S. E., and in breadth from St. Louis to the N. E. about 200 miles. The thickness of these coal-measures is much less than those of the same formation in Ohio and Pennsylvania; and as the strata are thrown into waves, traversing the State from N. W. to S. E., the limestones and sandstones of the formations below are frequently brought to the surface. The workable beds of coal are comparatively small for the large area occupied by the coal-measures. The N. E. portion of the State for a considerable distance from Lake Michigan belongs to the Post-tertiary formation. The valley of the Illinois River (which has cut for itself a deep channel) consists of successive terraces of limestone, indicating that at a period not geologically remote the waters of the great lakes found an outlet through this channel to the Gulf of Mexico. In the S. E. strata belonging to the Permian group have been discovered overlying the coal-measures conformably. In the N. W. corner of the State, in Jo Daviess co., there is a small district forming the terminal portion of the great Western lead-bearing belt. The



argentiferous galena is found in the lower Silurian limestones, and the mines are so productive as to form an important item in the products of the State. The soils of the State are of diluvial origin, and seem to indicate that at an early period the greater part of the surface of the State was a portion of the bed of an immense lake. The prairie soils are very deep and fertile; in some of the bottom lands the loam and mould are reported to be from 25 to 100 feet in depth. Whatever the depth, the loam is underlain by a dense, almost entirely impervious, clay, which keeps the moisture from leaching away.

**Mineralogy.** First among the minerals of the State is the coal. We have already spoken of the extent of the great coal field. Its area is estimated at 15,000 square miles, but much of it is not workable. The coal is bituminous, containing from 3 to 20 per cent. of incombustible materials; and in some of the mines the cannel coal predominates; in others excellent smelting coals are found. In 1870 there were over 400 mines worked, and the product amounted in round numbers to 2,500,000 tons. It has since increased to a little more than 3,000,000 tons. The position of these coal-mines, readily accessible by railroads and convenient to the Ohio, Mississippi, and Wabash, and furnishing to the vast manufacturing establishments of St. Louis and Chicago, as well as to the countless steamers on the Mississippi, abundant fuel for steam purposes, greatly enhances their value. The iron ores of the State are not very valuable, though they answer a good purpose when mixed with the valuable specular, spathic, and hematitic ores so readily and cheaply brought into the State from Missouri and from the Lake Superior iron-region. Lead ore containing a considerable percentage of silver (argentiferous galena) is mined in large quantities in Jo Daviess co., and the flourishing city of Galena derives its name from it. There are fine and productive veins of copper ore in the northern part of the State, on the Peckatonica River and Plum Creek. Zinc is also mined in the northern part of the State. Limestone of excellent quality, both for burning and for building, a drab freestone of great beauty, gypsum, and a fine variegated marble, are among the other mineral treasures of economic value; there are salt-springs in Jackson, Vermilion, and Gallatin cos.; sulphur and chalybeate springs in Jefferson co., and other medicinal springs between Ottawa and Peru. A cave in the rock in Hardin co., on the Ohio, presents, as the place is approached, a vast mass of rocks of a castellated appearance, resembling the ruins of some fortress of the Middle Ages. The entrance to the cave, which is from the river, and is but a little above high water, introduces the visitor to a chamber 80 feet square and 25 feet high, with a farther chamber of smaller size beyond. It was in the early years of this century the resort and hiding-place of bands of robbers, counterfeiters, and river-pirates. Starved Rock, the Lover's Leap, and Buffalo Rock are well-known points on the Illinois River near Ottawa.

**Vegetation.**—Though not by any means a densely wooded State, Illinois has a sufficiency of woodland for its present home requirements, but imports much timber from the States farther N. Most of its prairies have islands of oak and other forest trees, and where the limestones and sandstones have been broken through the overlying coal-measures there are wooded belts of considerable extent. But for her extensive coal production, however, the State would have been long ere this completely denuded of its forests. As it is, a little more than one-sixth (16.9 per cent.) of its surface is woodland. The forest trees most abundant are oak, black walnut, sugar maple, ash, elm, locust, linden, hickory, persimmon, pecan, and in the bottom lands cottonwood, sycamore, buckeye, tulip tree, poplar, beech, and black birch

prevail, and in the vicinity of the Ohio River yellow pine, cypress, and cedar. The prairies in the spring and early summer, where not under cultivation, are carpeted with a profusion of flowers, those of the same or allied species forming large masses of bloom, and then giving way to those of an entirely different family. Later in the season the intense heat of the sun renders these broad lands much less attractive. The grasses in the rich and fertile soil attain great height, and their stems are stiff and almost woody. The State abounds in fruit trees, and much of its fruit is of excellent quality. The apple, peach, pear, plum, cherry, apricot, etc. are successfully cultivated; grapes of all varieties do well, and the smaller fruits, as strawberries, raspberries, blackberries, etc., are raised in great quantities.

**Zoology.**—There are a few deer left in the State, though most of the larger game has disappeared. Bears, wild-cats, and panthers are very rare. The coyote or prairie wolf is occasionally found in the sparsely settled districts; there are some foxes, mainly the fuscous or red fox, and of the rodents, the gopher, several species of squirrel, and numerous field and dormice. There are at least two species of hares. The wild-turkey, stateliest of game-birds, the prairie-hen, a species of grouse, and an abundance of other feathered game, are still found in great numbers on the prairies and in the woodlands. The rivers and lakes abound in fish of good quality—the white-fish, the great lake-trout, black bass, catfish, and other species. The insect tribe are in their usual variety, about 20,000 species having been enumerated in the State, though less troublesome than farther S., except the small number of species injurious to vegetation. These in some years appear in countless numbers.

**Climate.**—Stretching as Illinois does over five and a half degrees of latitude, there is of course considerable variety in its climate. In the northern portion the annual range of the thermometer is very great, the summer heat being at times intense, and the cold of winter very severe. At Chicago, and in the N. of the State generally, the prevalent winds throughout the year are those from the S. W. and S., though in the spring and summer N. and W. winds are moderately frequent. The wind blows almost constantly in some direction, only 44 out of 1100 observations noting a calm condition of the atmosphere. At Cairo, in the southern extremity of the State, the most prevalent wind was that from the S., though closely followed by that from the N. E., while those from the N. and the S. E. were less frequent. About one-eleventh of the observations represented the absence of wind. At Rock Island the S. W. wind was the prevalent one, though N. W. and N. E. winds were also common. The annual range of the thermometer in Peoria in 1859 and 1860 was 117° F. (the maximum being 104° in July and the minimum -13° in December); in Riley, McHenry co., near the N. line of the State, 123° F. In 40 N. lat. the mean temperature of the year is about 54°; of the summer 77°, and of the winter 33° 30'. At Beloit on the N. line of the State the mean annual temperature is 47° 30'; at Cairo 58° 30'. About 215 days of the year are clear and 120 cloudy or rainy. The climate is generally healthy, the paludal fevers which prevailed in the early settlement of the State having mostly disappeared or become greatly mitigated with more thorough cultivation and drainage. In the low and swampy bottom lands, especially in the southern part of the State, bilious and intermittent fevers and diseases of the bowels are prevalent. The following table, compiled from the signal service report of 1873, gives the mean temperature, and range and barometer mean, together with the rainfall of each month, and the annual rainfall and the annual means of barometer and thermometer in 1872-73 for Chicago, Rock Island, and Cairo:

CITIES.	BAROMETER, MONTHLY MEAN (NORMAL MEAN PRESSURE)												THERMOMETER, MONTHLY MEAN (NORMAL MEAN TEMPERATURE)											
	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883
Chicago, 1872-73, lat. 41 52', lon. 87 45' W. above sea.	30.003	30.080	30.234	30.451	30.676	30.868	31.061	31.256	31.434	31.600	31.761	31.908	30.008	30.022	30.110	30.210	30.310	30.410	30.510	30.610	30.710	30.810	30.910	31.010
Rock Island, 1872-73, lat. 41 0', lon. 90 36' W. above sea.	30.110	30.118	30.295	30.450	30.610	30.780	30.950	31.120	31.290	31.460	31.630	31.800	30.110	30.118	30.295	30.450	30.610	30.780	30.950	31.120	31.290	31.460	31.630	31.800
Cairo, 1872-73, lat. 36 56' 10" W. above sea.	30.110	30.118	30.295	30.450	30.610	30.780	30.950	31.120	31.290	31.460	31.630	31.800	30.110	30.118	30.295	30.450	30.610	30.780	30.950	31.120	31.290	31.460	31.630	31.800
Latitude, 54° 10' N. Longitude, 90° 15' W.	30.110	30.118	30.295	30.450	30.610	30.780	30.950	31.120	31.290	31.460	31.630	31.800	30.110	30.118	30.295	30.450	30.610	30.780	30.950	31.120	31.290	31.460	31.630	31.800

CITIES.	FALL, CLOUDY, MONTHLY PERCENTS												REINSTATE, MONTHLY MEAN (NORMAL MEAN TEMPERATURE)											
	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883	1872	1873	1874	1875	1876	1877	1878	1879	1880	1881	1882	1883
Chicago, 1872-73, lat. 41 52', lon. 87 45' W. above sea.	54	61	69	73	78	85	90	93	94	95	96	97	54	61	69	73	78	85	90	93	94	95	96	97
Rock Island, 1872-73, lat. 41 0', lon. 90 36' W. above sea.	54	61	69	73	78	85	90	93	94	95	96	97	54	61	69	73	78	85	90	93	94	95	96	97
Cairo, 1872-73, lat. 36 56' 10" W. above sea.	54	61	69	73	78	85	90	93	94	95	96	97	54	61	69	73	78	85	90	93	94	95	96	97

\* Annual range of thermometer, 10° (from 32° down to 22° above).

Latitude range of the thermometer, 10° (from 36° to 46° above).

\* Annual range of thermometer, 116°, from 31° below to 147° above.

† Annual range of thermometer, 103°, from 76° below to 179° above.



The report of the State department of agriculture, presented to the Illinois legislature in 1874, throws additional light on the climate of different parts of Central Illinois. At Sandwich, De Kalb co. (lat.  $41^{\circ} 31'$ , lon.  $88^{\circ} 30'$ , elevation above sea-level, 674 feet), the highest degree of heat in 1873 (June 24) was  $98^{\circ}$ ; the lowest (Jan. 29) was  $-25^{\circ}$ ; the range  $123^{\circ}$ ; the mean temperature of the year  $48.7^{\circ}$ ; mean temperature of summer months,  $71.5^{\circ}$ ; of winter months,  $22.9^{\circ}$ ; the prevailing wind was W. for 10 months of the 12; E. and N. W. for the other two. There were 127 fair and 238 cloudy days, 143 days without frost; the last frost of spring was April 24, and the first of autumn Sept. 14. The total rainfall was 45.4 inches, April, July, Dec., and Aug. being the months of greatest precipitation. This town seems to be the centre of greatest precipitation in the State, its average rainfall for sixteen years being 50.17 inches. Havana, in Mason co. (lat.  $41^{\circ} 14'$ , lon.  $90^{\circ} W.$ , elevation 465 feet above the sea), had for its maximum temperature in 1872,  $102^{\circ}$  (in Aug.), for its minimum  $-23^{\circ}$  in Dec.—giving an annual range of  $125^{\circ}$ . The mean temperature of the year was  $49.3^{\circ}$ ; of the winter months  $22.7^{\circ}$ ; of the summer months,  $74.3^{\circ}$ . The annual rainfall of the same year, 33.10 inches, of which 9.83 inches fell in the month of June. In 1871 the rainfall was 33.90 inches, and in the first nine months of 1873 it was 33.42 inches. Evanston, near Chicago, elevated 644 feet above the sea, from observations taken for several successive years, has the least rainfall of any town in the State, the average being 24.78 inches.

**Agricultural Productions.**—In 1870, according to the census, the value of the farms in Illinois was \$920,606,346; of farming implements, \$34,576,546; of forest products, \$1,087,144; of home manufactures, \$1,408,015; of animals slaughtered or sold for slaughter, \$56,718,944; of all live-stock, \$149,756,698; of farm products, \$210,860,585; of orchard products, \$3,571,789; of market-gardens, \$765,992; making a grand total of farming lands and productions of \$1,379,252,100. Vast as this aggregate is for a State which sixty years ago had not 20,000 inhabitants, the four years which have since passed have greatly increased it. In 1873 the assessed value of cultivated farm-lands (stated by the State auditor to be less than 40 per cent. of their real value) was \$642,912,908, representing a real value of not less than \$1,600,000,000; the assessed value of town and city lots was \$243,961,152; and these were similarly underrated. The valuation of railroad property (70 per cent. of actual valuation), the vast property of the Illinois Central R. R. being excluded, that road paying a specific tax, was \$98,400,545.53, representing an actual value of \$128,000,000; while the assessment of personal property, which was of course greatly underrated, was \$302,778,499. The actual property of the State, real and personal, was not less than \$2,800,000,000. The live-stock of the State was reported as follows by the State board of equalization in the summer of 1873: horses, 930,947 (the *Agricultural Report* of Jan., 1873, estimates them at 1,049,400, at the average price of \$66.31), averaging a value of \$52.41, and giving an aggregate value of \$48,790,933 (the *Agricultural Report* above named gives their value as \$69,585,714); cattle, board of equalization, 2,014,801, valued at \$17.74 per head = \$35,742,563 (the *Report* makes the number 1,971,800, but the value \$51,769,806); mules and asses, 93,316, average value, \$59.09, aggregate \$5,500,104 (the *Agricultural Report* makes the number about the same (98,800), but the valuation \$72.58, giving an aggregate of \$7,778,524). The State board gives the number of sheep as 1,092,080, and the aggregate value, \$2,140,474, while the *Agricultural Report* makes the number 1,394,300, and their value \$4,461,460. The State board reports 3,560,083 hogs, averaging \$3.17, and worth in the aggregate \$11,285,464, while the *Agricultural Report* makes the number 3,706,300, averaging \$1.20, and having an aggregate value of \$15,937,090. The aggregate value of the live-stock was probably somewhat greater than the very large sum stated in the census report. We have not the full crop-returns of 1873, but those of 1872 give 283,481,600 bushels of corn, worth \$68,035,584; 25,329,027 bushels of wheat, worth at a low estimate \$31,154,703; 66,519,146 bushels of oats, worth \$13,303,829; 3,267,356 tons of hay, worth \$31,039,877; rye, barley, buckwheat, etc., worth \$4,240,790; tobacco, valued at \$1,276,000; hemp, flax, etc., \$1,316,000; dairy products, \$13,798,630; pasture, valued at \$24,361,563, and other farm products, not specially enumerated in the returns for 1872, were valued at over \$25,000,000. The year 1873 showed a very considerable increase on these large sums.

**Manufacturing Industry.**—The State has made great strides in manufacturing since the census of 1870 was taken, especially in Chicago and the other cities; and there is good reason for believing that the manufacturing statistics of the State, always ascertained with great dif-

culty, and often only by crude estimates, are very inadequately represented in the ninth census: still, these returns are later and more complete than any other. In 1870 there were reported in Illinois 12,597 manufacturing establishments, employing for motive-power 2330 steam-engines having an aggregate of 73,091 horse-power, and 528 water-wheels with an aggregate of 12,953 horse-power. These establishments employed 82,979 hands, of whom 73,045 were men, 6717 women, and 3217 children; the capital used was reported as \$94,368,057; the wages paid amounted to \$31,100,244; the raw material purchased to \$127,600,077; the annual product to \$205,620,672. The first rank in these manufactures belongs to flouring-mill products, for which there were 681 establishments, employing 3581 hands and a capital of \$12,931,600, paying wages to the amount of \$1,704,778, using raw material valued at \$32,090,825, and producing flour and meal valued at \$39,413,618. Next in importance was the packing of pork and other cut meats, in which 33 establishments were reported as engaged, employing 2236 hands and a capital of \$6,921,000, paying \$448,560 wages; using \$16,836,541 of raw material, and producing \$19,818,851 of packed meats annually. In Jan., 1873, the product of this branch of industry in the city of Chicago alone for the previous year was \$19,153,851. As many of the smaller cities of the State are engaged in this business, it is evident that it had largely increased, or that the census report was much below the facts. Malt and distilled liquors, in which 193 establishments were engaged, employing 1955 hands and \$7,397,900, paying \$1,031,142 wages, using \$6,898,377 of raw material, and producing liquors valued at \$12,042,975, came next; and lumber, planed and sawed, is not far behind, 410 establishments producing \$11,382,649. Agricultural implements came next, 294 establishments producing these to the value of \$8,880,390. The various manufactures of iron produced in 130 establishments wares valued at \$7,738,443; 458 establishments produced clothing valued at \$8,407,005; 1165 manufactures produced carriages and wagons valued at \$6,019,291. Machinery of all descriptions was produced in 131 establishments to the value of \$6,398,794; the manufacture of tobacco in its various forms, in 274 factories, produced goods of the value of \$4,319,716; leather, tanned and curried, in 97 establishments, was produced to the value of \$4,148,163; woollen goods, in 85 factories, were produced to the value of \$2,725,690; printing and publishing, in 129 offices, to the amount of \$2,727,549; furniture, 371 factories, to the amount of \$2,982,522; 391 cooper-shops produced goods valued at \$2,501,531; boots and shoes, in 88 factories, were made to the amount of \$2,298,136; oils, animal and vegetable, in 17 establishments, were produced to the value of \$2,642,733; saddlery and harness, in 687 establishments, to the amount of \$2,581,416; sash, doors, and blinds, in 94 factories, to the value of \$2,316,320; tin, copper, and sheet-iron wares, in 478 shops, to the amount of \$2,194,812; 24 confectionery establishments produced goods to the value of \$1,948,710; 128 bakeries produced goods valued at \$1,732,885; 240 brick-kilns made bricks to the value of \$1,638,764; marble and stone work, including monuments and tombstones, were produced in 122 establishments to the value of \$2,098,209; soap and candles, in 24 factories, to the amount of \$1,250,930; grease and tallow, in 5 rendering-factories, to the amount of \$1,412,900; paper was made in 16 mills to the amount of \$1,188,400; railroad cars, in 5 car-shops, to the amount of \$1,010,007. The other branches of manufacture, though of large aggregate amount, did not individually produce goods to the value of \$1,000,000.

**Railroads.**—The railroad system of Illinois has acquired a remarkable development, scarcely any county being untraversed by one or more lines. The number of miles of railroad now existing in Illinois exceeds that of any other State of the Union, the increase having been especially rapid since the close of the war, during which time the mileage has more than doubled. In 1850 there were only 111 miles of track, while in 1855 there were 887; in 1860, 2790; in 1865, 8157; in 1870, 4823; in 1871, 5904; and in 1872, 6361. This statement shows the remarkable fact that more than 1000 miles of railroad track were constructed in Illinois in a single year. The most important railroad, the Illinois Central, traverses the length of the State from Chicago to Cairo, 705 miles; it was commenced in 1851, and by the aid of an immense grant of public lands was completed within about five years. The railway interests of Illinois form so vast and complicated a portion of its material wealth as to have become the subject of much special legislation. By the constitutional convention of 1870, State control over the railroads was organized in considerable detail, and general supplementary laws for their government were enacted in 1871 and 1873. The following table gives the condition of all the railroads of the State to Jan. 1, 1874:



NAMES OF COMPANIES.	RIGHT OF WAY AND IMPROVEMENTS			LENGTH OF LINES IN FEET OR			ESTIMATES.			PAVING AND FENCING			Total cost of right of way and improvements.	Total cost of paving and fencing.	Total cost of right of way, paving and fencing.
	Acres.	Value.	Improvements on right of way.	Main line.	Branch.	Total.	Cost of road and right of way.	Preferred.	Common.	Shoulder.	Flanking.	Total right of way.	Gross right of way.	Net right of way.	Net right of way.
Chicago and Western Illinois Railroad Co.	9,465.76	219,924.86	8,469,673.01	307.	566.	783.	38,991,125.28	2,125,000.00	8,929,000.00	4,472,000.00	None.	36,442,125.28	4,072,125.28	2,200,000.00	1,872,125.28
Chicago and Western Illinois Railroad Co.	1,212.00	22,951.00	400,432.72	108.	108.	108.	2,000,000.00	None.	2,000,000.00	2,000,000.00	None.	4,000,000.00	6,000,000.00	4,000,000.00	2,000,000.00
Chicago and Western Illinois Railroad Co.	914.41	19,207.61	269,212.12	80.	80.	80.	None.	None.	1,250,000.00	1,250,000.00	None.	1,250,000.00	1,250,000.00	1,250,000.00	1,250,000.00
Chicago and Western Illinois Railroad Co.	3,841.81	107,618.78	4,957,690.00	433.	433.	433.	15,692,462.88	1,319,128.31	5,732,285.10	6,281,603.10	None.	12,033,431.41	1,319,128.31	3,399,013.41	2,115,000.00
Chicago and Western Illinois Railroad Co.	3,085.42	86,110.88	2,480,240.00	181.50	181.50	181.50	8,687,103.25	None.	7,293,700.72	2,603,802.28	None.	9,897,503.00	3,399,013.41	2,115,000.00	2,115,000.00
Chicago and Western Illinois Railroad Co.	311.72	21,819.00	161,472.00	22.20	22.20	22.20	1,401,351.10	None.	528,670.12	961,721.84	4,345.30	1,412,727.24	1,412,727.24	1,412,727.24	1,412,727.24
Chicago and Western Illinois Railroad Co.	1,212.00	22,951.00	400,432.72	108.	108.	108.	2,000,000.00	None.	2,000,000.00	2,000,000.00	None.	4,000,000.00	6,000,000.00	4,000,000.00	2,000,000.00
Chicago and Western Illinois Railroad Co.	460.00	6,624.00	112,852.67	1.3	1.3	1.3	None.	None.	1,000,000.00	600,000.00	200,000.00	1,800,000.00	2,000,000.00	1,800,000.00	2,000,000.00
Chicago and Western Illinois Railroad Co.	23.00	12,637.78	42,000.00	47.630	47.630	47.630	None.	None.	1,120,000.00	1,400,000.00	108,412.00	2,628,412.00	2,628,412.00	2,628,412.00	2,628,412.00
Chicago and Western Illinois Railroad Co.	388.61	8,160.81	88,704.00	32.300	32.300	32.300	1,111,840.15	710,100.00	29,371.46	482,300.00	91,601.80	1,404,000.62	1,404,000.62	1,404,000.62	1,404,000.62
Chicago and Western Illinois Railroad Co.	1,208.98	25,888.98	306,871.91	111.	111.	111.	4,486,797.43	2,000,000.00	2,000,000.00	3,000,000.00	93,672.90	5,000,000.00	2,000,000.00	2,000,000.00	2,000,000.00
Chicago and Western Illinois Railroad Co.	300.70	4,337.70	21,405.00	21.120	21.120	21.120	1,000,000.00	None.	477,660.00	1,000,000.00	None.	1,477,660.00	1,477,660.00	1,477,660.00	1,477,660.00
Chicago and Western Illinois Railroad Co.	217.00	9,112.20	211,675.00	308.300	308.300	308.300	31,120,410.00	None.	25,481,070.00	8,800,000.00	None.	34,281,070.00	34,281,070.00	34,281,070.00	34,281,070.00
Chicago and Western Illinois Railroad Co.	142.16	6,373.60	111,300.00	11.500	11.500	11.500	1,540,112.00	710,100.00	618,000.00	4,000,000.00	108,412.00	1,500,000.00	1,500,000.00	1,500,000.00	1,500,000.00
Chicago and Western Illinois Railroad Co.	1,384.96	29,101.96	2,406,717.72	121.300	121.300	121.300	8,467,673.05	None.	3,463,871.00	4,000,000.00	42,628.24	7,908,470.24	7,908,470.24	7,908,470.24	7,908,470.24
Chicago and Western Illinois Railroad Co.	2,308.45	45,825.42	1,457,860.00	181.	181.	181.	1,011,570.00	None.	629,473.42	3,800,000.00	36,124.42	1,097,673.01	1,097,673.01	1,097,673.01	1,097,673.01
Chicago and Western Illinois Railroad Co.	138.69	9,720.30	155,680.00	11.	11.	11.	2,300,000.00	None.	1,000,000.00	1,300,000.00	21.47	2,300,000.00	2,300,000.00	2,300,000.00	2,300,000.00
Chicago and Western Illinois Railroad Co.	611.16	19,176.16	306,207.05	80.	80.	80.	2,300,000.00	None.	1,000,000.00	1,300,000.00	21.47	2,300,000.00	2,300,000.00	2,300,000.00	2,300,000.00
Chicago and Western Illinois Railroad Co.	21.16	21.16	21.16	11.	11.	11.	1,811,075.25	None.	478,822.50	1,300,000.00	130,000.00	2,300,000.00	2,300,000.00	2,300,000.00	2,300,000.00
Chicago and Western Illinois Railroad Co.	2,010.00	42,600.00	1,397,800.00	115.400	115.400	115.400	10,262,010.00	None.	7,260,581.25	3,000,000.00	100,000.00	10,560,581.25	10,560,581.25	10,560,581.25	10,560,581.25
Chicago and Western Illinois Railroad Co.	907.72	19,062.12	316,000.00	83.	83.	83.	408,673.25	229,700.00	1,000,000.00	2,000,000.00	411,417.62	3,621,117.62	3,621,117.62	3,621,117.62	3,621,117.62
Chicago and Western Illinois Railroad Co.	622.55	13,613.55	315,530.00	67.200	67.200	67.200	2,300,000.00	None.	1,000,000.00	1,300,000.00	21.47	2,300,000.00	2,300,000.00	2,300,000.00	2,300,000.00
Chicago and Western Illinois Railroad Co.	112.71	7,889.70	174,886.13	11.500	11.500	11.500	811,180.80	None.	660,732.60	403,261.02	21.47	1,073,866.09	1,073,866.09	1,073,866.09	1,073,866.09
Chicago and Western Illinois Railroad Co.	768.10	19,176.10	272,175.00	72.	72.	72.	2,800,000.00	None.	1,000,000.00	1,300,000.00	21.47	2,300,000.00	2,300,000.00	2,300,000.00	2,300,000.00
Chicago and Western Illinois Railroad Co.	572.71	9,720.30	60,534.00	31.	31.	31.	417,952.89	None.	100,000.00	1,300,000.00	100,000.00	1,500,000.00	1,500,000.00	1,500,000.00	1,500,000.00
Chicago and Western Illinois Railroad Co.	910.78	19,117.88	271,005.65	91.	91.	91.	3,712,727.23	None.	1,258,560.00	1,600,000.00	49,620.27	5,000,000.00	5,000,000.00	5,000,000.00	5,000,000.00
Chicago and Western Illinois Railroad Co.	118.64	3,221.92	212,071.02	42.	42.	42.	1,300,000.00	None.	750,100.00	1,000,000.00	520,000.00	1,820,100.00	1,820,100.00	1,820,100.00	1,820,100.00
Chicago and Western Illinois Railroad Co.	3,458.37	72,861.37	618,714.90	29.000	29.000	29.000	15,996,316.71	2,400,400.00	2,400,000.00	2,400,000.00	319,930.10	18,396,316.71	947,620.25	219,000.00	18,177,316.71
Chicago and Western Illinois Railroad Co.	759.90	21,623.50	301,000.00	75.	75.	75.	8,898,400.00	2,571,000.00	2,571,000.00	2,571,000.00	None.	11,469,400.00	947,620.25	219,000.00	11,249,400.00
Chicago and Western Illinois Railroad Co.	2,112.96	37,007.42	712,103.83	132.	132.	132.	7,910,639.90	2,571,000.00	2,571,000.00	2,571,000.00	None.	11,469,400.00	947,620.25	219,000.00	11,249,400.00
Chicago and Western Illinois Railroad Co.	2,001.37	37,218.66	699,907.41	221.000	221.000	221.000	7,910,639.90	2,571,000.00	2,571,000.00	2,571,000.00	None.	11,469,400.00	947,620.25	219,000.00	11,249,400.00
Chicago and Western Illinois Railroad Co.	2,079.89	39,067.33	733,309.88	138.400	138.400	138.400	5,800,000.00	2,571,000.00	2,571,000.00	2,571,000.00	None.	11,469,400.00	947,620.25	219,000.00	11,249,400.00
Chicago and Western Illinois Railroad Co.	2,705.82	56,622.22	1,651,634.73	220.250	220.250	220.250	12,565,351.50	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	15,065,351.50	1,072,733.80	219,000.00	14,792,617.70
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,077.25	232.	232.	232.	21,671,513.74	2,500,000.00	2,500,000.00	2,500,000.00	446,733.80	24,171,513.74	1,072,733.80	219,000.00	23,898,779.94
Chicago and Western Illinois Railroad Co.	3,217.05	67,535.05	1,900,07												



**Finances.**—The assessed valuation of property in 1873 was: real estate, \$642,912,908; railroad property (not including the Illinois Central, which pays annually into the State treasury a certain percentage of its gross receipts), \$98,400,545.33. This was stated to be 70 per cent. of the true valuation, while that of real estate was only about 40 per cent. Personal property, certain specified kinds of property, including, besides stocks and bonds, live stock, fireproof safes, carriages and wagons, musical instruments, plate and jewelry, diamonds, agricultural and manufacturing tools and machinery, watches and clocks, sewing-machines, etc., \$302,803,262; making the entire assessed valuation \$1,044,116,715.33. The increased assessment of railroad property and stocks, and of stock of telegraph and other corporations, ordered by the State board of equalization, brought the whole assessment of the year up to \$1,339,570,950, which is probably not quite one-half the actual value of real and personal estate of the State. The State tax on this valuation is three mills, and there are also school fund and canal debt fund taxes, aside from the county, town, and city taxes, which are of varying amount. The other items of revenue to the State are—7 per cent. of the gross earnings of the Illinois Central R. R., paid semi-annually, and which now amounts to nearly \$500,000 per annum; insurance fees and fines collected from agents, and other fines and forfeitures; tolls and rents from the State canal and slack-water navigation; and occasionally other sources. The annual State expenditure for the fiscal years 1871 and 1872 was \$6,600,639.57, but this included the payment of \$3,408,470 of the State debt. In Jan., 1873, the entire State debt was \$1,732,467.18, the treasury reserve having been used for this reduction. In Jan., 1874, it had been still further reduced, and then stood at \$1,706,750.39. The amount of railroad bonds outstanding Jan. 1, 1874, which had been issued by counties, townships, cities, and incorporated towns in the State, was \$13,501,051.58; this was apportioned as follows: 45 counties had bonds outstanding to the amount of \$9,380,994; 212 townships, bonds to the amount of \$6,603,147.58; 17 cities, bonds amounting to \$1,019,500; 27 incorporated towns, bonds amounting to \$467,500. But the counties, towns, and cities had other debts besides these. In 1870 the amount of these was for the counties \$12,817,922, and of the towns and cities, \$24,483,010. It has been considerably reduced since that date, but more than one-half of the last item is the debt of the city of Chicago.

**Commerce.**—The grand system of railroads which cross the State in all directions and connect it with the great lakes, with all the ports on the Ohio, the Mississippi, and the Missouri, as well as with the opulent cities of the Atlantic and the Pacific coasts; the Illinois Canal, 100 miles in length, which connects Lake Michigan with the Missis-

sippi; the Mississippi River, navigable for the largest steamers along the whole western boundary of the State; and the Ohio and Wabash, which are navigable for one-half the eastern and the whole southern boundary, together with the other navigable rivers in the State,—give to Illinois unsurpassed facilities for commerce which are most industriously improved. The entire amount of its internal traffic cannot well be ascertained, for its surplus agricultural and mechanical products are shipped from ports without as well as from those within the State. Some idea of their magnitude can be formed when we state that the receipts and shipments of grain, flour, and other articles of commerce in the port of Chicago alone in 1872 were over \$370,000,000. A very considerable portion of the commerce of St. Louis is in the productions of Illinois, and considerable quantities of its products find their way to market through Indianapolis, Louisville, Cincinnati, and Toledo, while no small amount is shipped directly and without breaking bulk to Boston, New York, Philadelphia, Baltimore, and New Orleans. The direct foreign commerce of the State is mostly carried on through the port of Chicago by the way of the great lakes, the Welland Canal, and the St. Lawrence River. This is large and constantly increasing.

**Banks.**—There were in Nov., 1874, 152 national banks in the State, of which 10 were closing, leaving 142 in operation. The capital paid into these banks was \$20,338,670; the amount of bonds on deposit, \$16,742,400; the circulation issued, \$23,296,405; the amount of actual circulation, \$16,635,201; their assets, Sept. 12, 1873, \$41,489,877.57; their surplus and undivided profits, \$3,790,083.84; and their liabilities, \$37,699,793.73. There were at the same time 12 State banks and savings banks doing a discount and deposit business; these had an aggregate capital of \$3,300,000. There were also 217 private banking-houses doing business in the State.

**Insurance Companies.**—After the great fire in Chicago in 1871, many of the fire insurance companies of the State went into liquidation, but in June, 1873, there were 8 in operation, having an aggregate capital of \$1,708,400 and assets to the amount of \$2,568,000. There were in July, 1873, 6 life insurance companies, all in Chicago, having an aggregate capital of \$1,800,000, and assets to the amount of \$3,355,000.

**Population.**—The following table shows the population at each census, beginning with 1800, when the population of what was then the North-west Territory was first distinguished by districts, so that the inhabitants of what is now the State of Illinois could be distinguished from the other inhabitants of that vast Territory; it also includes the distinctions of color and nativity, and the density of population, so far as obtainable:

Census year.	Density of population per square mile.	Total population.	Whites.	Colored.	Natives.	Foreign-born.	Remarks.
1800	0.044	2,458	2,275	183			
1810	.22	12,282	4,501	781			168 slaves.
1820	1.00	55,162	53,788	1,374			917 slaves.
1830	2.84	157,445	155,061	2,384			747 slaves.
1840	8.39	476,183	472,234	3,929			351 slaves.
1850	15.37	851,470	846,034	5,436	738,149	111,892	3,429 of unknown nativity.
1860	30.20	1,711,951	1,704,291	7,628	1,387,308	324,643	
1870	45.84	2,141,510	2,124,170	17,340	2,024,693	515,198	986,025 of foreign parentage.
1870	45.84	2,539,891	2,511,095	28,762			

Of those of foreign birth in 1870, 203,758 were born in Germany; 192,960 in Great Britain and Ireland; 32,550 in British America; 29,979 in Sweden; 11,880 in Norway; 10,911 in France; 8980 in Switzerland; 7350 in Bohemia; 4180 in Holland; 3711 in Denmark; 2099 in Austria; 1696 in Poland; 1071 in Belgium; and 2633 in all other foreign countries. In the enumeration of sexes, there were in 1850 448,321 males and 403,149 females; of these, 445,544 were white males and 400,490 white females, 2777 colored males and 2659 colored females. In 1860 there were 902,761 males and 809,190 females; of these 898,941 were white males and 805,350 white females, 3809 colored males and 3819 colored females. In 1865 there were 1,102,223 males and 1,041,287 females, of whom 1,093,111 were white males, 1,033,059 white females, 9112 colored males, and 8228 colored females. In 1870 there were of all races and colors 1,316,537 males and 1,223,354 females in the State; of these, 1,033,161 were native males, and 991,532 native females; 283,376 males of foreign birth and 231,822 females; 1,301,583 white males, and 1,209,513 white females; 14,934 colored males and 13,828 colored females; 19 Indian males and 13 females. Of the total male population (1,316,537 males), 525,873 were between the ages of 18 and 45, or of military age; of these, 346,564 were natives and 179,309 foreigners; 518,924

white and 6941 colored; 623,139 males were 21 years old and upward, or of the voting age; of these, 390,735 were natives and 234,404 of foreign birth, and 542,833 were citizens. Of school age—i. e., between 6 and 21 years—there were 414,517 males and 404,219 females.

**Education.**—In 1870 there were in the State 86,268 persons of ten years old and over who could not read, and 133,584 who could not write; of these, 90,595 were of native and 42,989 of foreign birth; 97,653 whites (40,801 males and 56,857 females) were over 21 years of age, while 8051 colored (3969 males and 4082 females) over 21 were equally illiterate. Of the persons attending school in 1870 (548,225 in number), 522,939 were natives and 25,286 of foreign birth; 285,283 were males (284,084 whites and 1169 colored) and 262,968 females (261,813 whites and 1155 colored). According to the census of 1870, there were in the State 11,835 schools of all classes, with 24,056 teachers (10,411 males, 13,645 females) and 767,775 pupils or students (389,955 males and 377,820 females). The annual income of these schools was \$9,970,009, of which \$252,569 was derived from endowments, \$6,027,510 from taxation and public funds, and \$3,689,930 from other sources, including tuition. Of these schools, 11,050 were classed as public schools, having 20,097 teachers (8791 males and



11,396 females) and 677,623 scholars (343,115 males and 334,178 females). The income of these schools was \$7,810,265, of which \$6,858,219 was from taxation and public funds, and \$1,952,046 from other sources, including tuition; 80 schools were classical, professional, and technical, having 571 teachers (351 males and 217 females) and 11,755 students (7255 males, 4500 females), and \$896,372 of income, of which \$222,374 was from endowment, \$161,318 from taxation and public funds, and \$512,680 from other sources, including tuition; 705 were private schools of lower grade, having 3388 teachers (1266 males and 2122 females) and 78,297 pupils (39,255 males and 39,142 females), and an annual income of \$1,263,372, of which \$30,195 was from endowment, \$7943 from public funds, and \$1,225,234 from other sources, including tuition. The sessions of the Illinois legislature being only biennial, there is no report from the superintendent of public instruction of later date than Jan., 1873, and the statistics are only to the autumn of 1872. This report gives the number of persons of school age (6 to 21 years) in the State in Sept., 1872, as 882,693; the number of school districts, 11,231, of which 10,767 had schools in session six months or more of the year, and 275 for less than six months, while 189 had no schools. There were 11,396 public free schools, of which 91 were public high schools, 654 graded schools, and 10,141 ungraded schools. In these schools there were 20,924 teachers, of whom 9094 were male teachers and 11,459 females; and 662,049 scholars attended them, of whom 345,623 were males and 316,426 females. The schools were maintained an average period of 6.9 months. The number of private schools reported in 1872 was 436, having 34,784 pupils. The total number of public school-houses in the autumn of 1872 was 11,289, of which 470 were built during the year at an average cost of \$1517.65 each. The estimated value of school-houses in the State in the autumn of 1872 was \$12,477,639; of the school lots, grounds, and appurtenances, \$2,603,938; of other lands and property belonging to districts, \$2,537,917; of furniture, apparatus, and libraries, \$1,373,950; of repairs and improvements, \$883,264; making a total approximate value of \$19,876,708. The number of district school libraries was 830, and of volumes in them 54,286. The aggregate principal of township school funds was \$1,868,555.01, and the interest received \$328,811.47. The highest monthly wages paid to teachers was, to males, \$250; to females, \$120; the lowest was, to males, \$12; to females, \$9.50. The average monthly salaries were, to males, \$50; to females, \$39. In 75 of the 102 counties of the State the salaries of the best male teachers range from \$100 to \$250, and in 80 counties the salaries of the best female teachers range from \$50 to \$120. The total annual cost per scholar, including tuition, incidental expenses, and 6 per cent. interest on the estimated valuation of school property, is, upon the number enrolled, \$9.25; upon the average daily attendance, \$18.58. In 1872, 160 teachers' institutes were held and attended by 7771 teachers, and instructed by 532 lecturers and instructors. They continued an average of 5.4 days, or, in effect, a week. The amount received from all sources for school purposes in 1872 was \$7,500,122.76, and the expenditures for the same year \$7,480,889.24. The whole amount of principal of the common school funds of the State, Oct. 1, 1872, was \$6,382,248.08. For the instruction of the teachers of these schools, besides the teachers' institutes, there is the Illinois State Teachers' Institute, which holds an annual session of fourteen days, generally devoted to natural science; two normal universities—viz., the Illinois State Normal University at Normal, founded in 1857, a most admirable institution, with every facility for thorough instruction in the art of teaching, expending about \$31,500 annually, and having an average of 266 normal pupils annually, besides the large attendance on its model school; and the Southern Normal University, at Carbondale, which, founded in 1862, commenced actual instruction in Dec., 1873. There are also other very efficient normal training schools—the Cook County Normal School, at Englewood, 7 miles S. of Chicago court-house, established in 1867, which in 1872 had 207 pupils; the Peoria County Normal School, in Peoria, established in 1868, and having about 85 pupils; and the German-English Normal School, at Galena, etc.

The State has also provided liberally, in connection with the national agricultural college grant, for the scientific and practical education of those desiring to obtain such education. The Illinois Industrial University, located at Urbana and Champaign, is now in its seventh year of instruction, and is in most respects a model institution of its kind. In Jan., 1874, it had lands valued at \$86,000, buildings and improvements valued at \$175,000, furniture, library, cabinets, and apparatus valued at \$75,000, and funds and investments to the amount of \$424,000, making its total assets \$760,000. Its annual current expenditure is about \$68,000, but of this about \$27,000, belonging to the expenses of the

farm, gardens, and mechanical shops, is repaid from their products. It has eleven distinct courses of study, agricultural, mechanical, civil engineering, military, chemical, mathematical, natural history, classical, etc., a faculty of 24 professors and other instructors, and in 1873 had 326 male and 74 female students, of whom 360 were from Illinois, 33 from other States and Territories, and 7 from foreign countries. There is also an efficient and well-conducted soldiers' college at Fulton, Ill. Of the other institutions of higher education in Illinois, there are 6 so-called universities, 4 of them, as well as 3 of the colleges, being universities in fact, in the sense of having professional or scientific schools connected with them; 19 colleges, several of them with professional or scientific schools attached to them, and nearly all under the care and patronage of some religious denomination. These institutions have about 220 professors and over 4000 students. There are also 10 female colleges and seminaries of the highest grade, having 98 professors and teachers and over 2300 pupils; and 40 seminaries and academies of high grade for both sexes, having about 300 professors and teachers and nearly 4200 pupils. There are also, aside from the Illinois Industrial University, 3 scientific schools—the scientific departments of Chicago and Blackburn universities, at Chicago and Carlinville, and the Illinois Agricultural College at Irvington; 10 theological schools or seminaries, 4 of them at Chicago, having 35 professors and about 280 students; 2 law schools, one at Chicago and the other at Lebanon; 3 medical schools of the regular practice, 1 eclectic, and 1 homœopathic, and 1 college of pharmacy. These have 75 professors and over 500 students.

The institutions of special education for the unfortunate, orphans, diseased, and endangered classes are—(1) the Illinois Institution for the Education of the Deaf and Dumb, at Jacksonville, founded in 1840, and having 25 teachers and other officers, and 294 pupils. Its current annual expenditure is about \$68,750 per annum, all of it appropriated by the State; (2) the Illinois Institution for the Education of the Blind, also at Jacksonville, founded in 1848, and having 9 teachers and other officers, and 66 pupils, and expending annually about \$17,000, all of it appropriated by the State; (3) the Illinois Charitable Eye and Ear Infirmary, at Chicago, expending about \$15,000 per annum, of which \$10,000 is derived from the State; (4) the Illinois Institution for the Education of Feeble-Minded Children, at Jacksonville, founded in 1865, and incorporated in 1871; it has 7 teachers and other officers, and 107 pupils; it is now in rented premises, but is to have a new building completed in the winter of 1875; its expenses are about \$24,000, all furnished by the State; (5) the Illinois Soldiers' Orphans' Home, at Normal, founded in 1865, has 6 teachers and 326 pupils, and expends annually about \$52,000, all furnished by the State, besides the products of the farm and house, which are applied to materially reduce the expense *per capita*; (6) the Illinois State Reform School, at Pontiac, founded in 1870, which has 3 officers, 166 inmates, and expends about \$33,000 per year, of which \$25,000 is derived from the State. There are other reform and industrial schools in the State, but they are established by cities or counties, and not by the State. That in Chicago is a great success. It had 212 inmates in 1872, most of whom were reported reformed.

In this connection it is as well perhaps to speak of the charitable institutions of the State, which, though not directly educational in their character, have yet some connection with education. The Hospital for the Insane, at Jacksonville, founded 1847, has an average of 450 patients, and its current expenses are about \$110,000 per annum; the Northern Hospital and Asylum for the Insane, at Elgin, founded in 1868, in 1873 had 7 officers and an average of about 200 patients, and its expenditure is in round numbers \$50,000 per annum; the Southern Hospital for the Insane, at Anna, is a new institution, intended for 250 patients, and has nearly that number now. Its annual expenses are about \$250 per patient, and when it is full will require \$62,500 per annum. The two latter, when their buildings are completed, will accommodate 950 patients. There is also an insane asylum for Cook county, really a part of Cook county almshouse, which has 260 patients, and 2 small private asylums. The number of insane persons in the State exceeds 3000.

*Paupers and Crime.*—Of the 2363 paupers returned in the census of 1870, 1243 were native whites, 11 native colored, 1109 foreigners. Of 1799 persons in prison June 1, 1870, 1229 were native whites, 143 native colored, and 423 foreigners; 1552 persons were convicted during the year. The State penitentiary, at Joliet, was for many years managed at a heavy loss, but since June, 1872, it has earned a considerable sum over its expenses, while its general condition has been greatly improved. There were in Jan., 1873, 1321 convicts in the penitentiary, 15 of them females. The



prison has a large library, and provision is made for the instruction of the prisoners in elementary studies, as well as for their religious welfare.

*Libraries.*—There were in the State in 1870, 13,570 libraries of all classes, public and private, containing 3,323,914 volumes; of these, 3705, containing 924,545 volumes, were public libraries; these included one State library, with 10,000 vols.; 53 town and city libraries, with 35,010 vols.; 135 court and law libraries, with 23,832 vols.; 1122 school and college libraries, with 110,759 vols.; 2308 Sunday school and church libraries, with 486,100 vols.; 7 literary and benevolent associations, with 133,492 vols.; 79 circulating libraries, with 75,352 vols.; and 9865 private libraries, with 2,399,369 volumes.

*Newspapers and Periodicals.*—There were in Illinois in 1870, 505 newspapers, having an aggregate circulation of 1,722,511, and an aggregate annual issue of 113,140,492 copies. Of these, 39 were dailies, with a circulation of 166,400; 10 were tri-weekly, with 40,570 circulation; 4 were semi-weekly, with 2950 circulation; 364 were weekly, with 890,913 circulation; 11 were semi-monthly, with 107,900 circulation; 72 were monthly, with 490,808 circulation; 2 were bi-monthly, with 11,000 circulation; and 3 were quarterly, with 12,000 circulation.

*Churches.*—There were in 1870 in the State 4298 churches, of all denominations, 3459 church edifices, 1,201,403 sittings, and \$22,664,283 of church property. Of the churches at that date, 722 were Baptist, with 571 church edifices, 181,454 sittings, and \$2,601,612 of church property. According to the *Baptist Year Book* for 1875, the number of associations in 1874 was 44; of churches, 1056; of ordained ministers, 732; of communicants, 68,313; of additions, 7333; of Sunday schools, 540; of teachers and scholars, 59,700; of volumes in libraries, 61,088; of contributions for benevolent and church purposes, \$924,179. The Christian Connection and the Disciples, in 1870 had 350 churches, 251 church edifices, 85,175 sittings, and \$621,450 of church property. They have increased somewhat in four years, but their statistics are so incomplete that it is difficult to say how much. The Congregationalists in 1870 had 212 churches, 188 church edifices, 66,137 sittings, and \$1,867,800 of church property. At the close of 1874 they had 239 churches, 221 ordained ministers, 20,557 communicants, and 25,766 scholars in the Sabbath schools. The Protestant Episcopal Church had in the State in 1870, 105 parishes, 85 church edifices, 30,395 sittings, and \$1,426,300 of church property. In 1874 there were 101 parishes, 91 clergymen, 6785 communicants, 953 confirmations, 6838 Sunday school teachers and scholars, and the contributions to benevolent and church purposes were \$149,812.97. The Evangelical Association had in 1870, 58 churches, 55 church edifices, 20,176 sittings, \$329,650 of church property. In 1873 they had 73 itinerant and 72 local preachers, 94 churches, 8171 members, and about \$500,000 of church property. The Friends had in 1870, 5 meetings, 4 meeting-houses, with 1000 sittings, and \$13,400 meeting-house property. They have increased considerably within the last four years. The Lutherans in 1870 had 230 churches, 207 church edifices, 74,301 sittings, \$1,043,476 church property. The Lutheran church has so many different councils, ministeriums, and synods in the U. S. that it is difficult to isolate the churches of any one State; but as nearly as can be ascertained they had about 266 churches and 25,500 members in Illinois in 1873. The Methodists of all the Methodist bodies in 1870 had 1426 churches, 1124 church edifices, 357,073 sittings, and \$5,203,620 of church property. In 1874 the Methodist Episcopal Church alone had in the State about 1900 ministers, of whom 998 were itinerants, 1321 churches, 108,120 members, \$5,760,731 of church property, 1646 Sabbath schools, 145,861 teachers and scholars; while the other Methodist bodies had perhaps one-third of that number. The Presbyterians, including all branches, in 1870 had 595 churches, 523 church edifices, 184,849 sittings, \$3,637,625 of church property. In 1873 the Presbyterian General Assembly (Northern) had 435 ordained ministers, 482 churches, and 38,557 members; the United Presbyterians had 74 ministers, 87 churches, and 6836 communicants. There were also considerable numbers belonging to the Presbyterian Church, South, to the Cumberland Presbyterians, and to the Reformed and other independent synods. The Reformed Church in America (late Dutch) in 1870 had 14 churches, 14 church edifices, 4880 sittings, and \$150,200 of church property. In 1873 the same Church had 20 ministers, 19 churches, and 1782 communicants. The Reformed Church in the U. S. (late German) in 1870 had 32 churches, 30 church edifices, 7170 sittings, \$93,600 of church property. It has since increased, but the arrangement of their statistics is such that we cannot separate those of Illinois. The Roman Catholic Church had 290 congregations, 249 church edifices, 136,900 sittings, \$4,010,650 of church

property. In 1874 there were in the State 313 priests, 459 congregations, and an adherent population of probably 225,000. The Second Adventists in 1870 had 8 churches, 5 church edifices, 1300 sittings, \$7100 of church property. The Unitarians had 23 congregations, 17 church edifices, 5960 sittings, and \$492,900 of church property. The United Brethren in Christ (German Methodists) had 125 churches, 58 church edifices, 17,995 sittings, and \$126,800 of church property. In 1873 there were 324 churches, 210 ministers, and 11,351 members. The Universalists in 1870 had 52 congregations, 44 church edifices, 15,225 sittings, and \$543,300 of church property. In 1873 they reported 79 parishes, 52 congregations, 2776 members, and about 15,000 adherent population. There were also perhaps 200 congregations of the minor denominations, with 150 church edifices, 35,000 sittings, and \$125,000 of church property.

*Constitution, Courts, etc.*—The present constitution of Illinois was adopted by a constitutional convention held in 1870, and ratified by the people of the State the same year. It contains a bill of rights based on the principles of English constitutional law, defines the qualifications for legislators, prescribes that the senate shall consist of 51 senators, elected for four years, but in two classes, those in the odd-numbered districts being elected in 1874, and every four years thereafter, and those in the even-numbered districts in 1872, and every four years thereafter; the house of representatives to consist of 153 members, elected for two years. The legislative sessions are biennial. They are prohibited from special legislation; the house of representatives has the sole power of impeachment, but the senate must be the trial court for the impeachment. Minority representation is provided for. The pay of senators and representatives is \$5 per day, 10 cents a mile for actual mileage, and \$50 per session for postage, stationery, etc. The executive department consists of a governor, lieutenant-governor, secretary of state, auditor of public accounts, treasurer, superintendent of public instruction, and attorney-general, all elected by the people, and all, except the treasurer (whose term is two years), for four years. The treasurer is ineligible for re-election for two years after the expiration of his term. The governor has the veto power, which can only be overridden by a vote of two-thirds of all the members elected. The judicial powers of the government of the State are vested in one supreme court (which is also a court of appeals), circuit courts (which may have appellate jurisdiction to a certain extent), county courts, justices of the peace, police magistrates, and such courts as may be created by law in and for cities and incorporated towns. The supreme court consists of seven judges, one of whom shall be the chief-justice, and four shall constitute a quorum. The judges of the supreme court are elected by the people of their respective districts for a term of nine years, and provision is made so that their terms of office shall expire at different times. The chief-justice is chosen by his associates, and holds his office till the expiration of his term. The circuit courts are held in judicial circuits of 100,000 inhabitants, except in Cook county or other counties having more than 100,000 inhabitants (which form a single judicial circuit whatever their population), and the circuit judges hold office for six years. Judges of county courts hold office for four years. Probate judges are elected for four years, and, except as above, 1 to every 50,000 inhabitants. The minor judicial officers are to be elected in such districts as the legislature shall provide. Every person having resided in the State one year, in the county 90 days, and in the election district 30 days next preceding any election therein, who was an elector in the State on Apr. 1, 1848, or obtained a certificate of naturalization before any court of record in the State prior to Jan. 1, 1870, or who is a male citizen of the U. S. above the age of twenty-one years, shall be entitled to vote at such election. All votes are by ballot. No elector loses his residence by reason of absence on business of the U. S. or of the State of Illinois, or in the military and naval service of the U. S., and no soldier, seaman, or marine in the army or navy of the U. S. is deemed a resident of the State in consequence of being stationed therein. The general assembly has power to pass laws excluding from the right of suffrage persons convicted of infamous crimes. An efficient system of free-school education is provided for, and the legislature and counties, cities, towns, etc. are forever prohibited from making any appropriation or paying from any public fund whatever anything in aid of any college, seminary, literary or scientific institution which is controlled by any Church or sectarian denomination whatever. No teacher or school officer is allowed to be interested in the sale, proceeds, or profits of any book, apparatus, or furniture used in any school. There are also provisions in relation to counties, to railroads, warehouses, State revenues, etc. The State under the new apportionment has 19 members of the House of Representatives in Congress.



*Counties.*—The State is divided into 102 counties, whose names and population in 1870, 1860, and 1850 were as follows:

COUNTIES.	Total pop. 1870.	Male, 1870.	Female, 1870.	Total pop. 1860.	Total pop. 1850.
Adams	56,362	28,527	27,835	41,323	26,508
Alexander	14,514	5,256	5,258	4,707	2,184
Bond	13,152	6,765	6,387	9,815	6,144
Boone	12,912	6,565	6,377	11,678	7,624
Brown	12,205	6,259	5,946	9,938	7,138
Bureau	32,415	16,898	15,517	26,226	8,841
Calhoun	6,562	3,562	3,000	5,114	3,231
Carroll	16,705	8,790	8,003	11,735	4,586
Cass	11,580	6,089	5,491	7,233	2,619
Champaign	32,757	17,423	15,314	14,629	3,203
Christian	20,363	10,881	9,482	14,987	9,712
Clark	18,719	9,650	9,069	14,987	4,289
Clay	15,875	8,131	7,744	10,941	5,129
Clinton	16,245	8,614	7,631	14,203	9,335
Coles	25,235	12,984	12,251	14,954	43,385
Cook	349,966	180,007	169,959	141,951	7,135
Crawford	13,889	7,018	6,871	11,551	3,718
Cumberland	12,223	6,274	5,949	8,311	3,718
De Kalb	23,255	12,002	11,253	19,086	7,510
De Witt	14,768	7,845	6,923	10,820	5,002
Douglas	13,484	7,118	6,366	7,140	
Du Page	16,685	8,784	7,901	14,701	9,290
Elar	21,450	11,077	10,373	16,925	10,692
Edwards	7,565	3,840	3,725	5,454	3,521
Effingham	15,633	8,256	7,377	7,816	3,799
Fayette	19,638	10,170	9,468	11,189	8,075
Ford	9,103	5,039	4,064	9,799	5,681
Franklin	12,632	6,484	6,148	9,393	22,508
Fulton	38,291	19,739	18,552	33,338	5,448
Gallatin	11,124	5,716	5,408	10,093	12,429
Greene	20,277	10,677	9,600	16,379	3,023
Grundy	14,938	7,741	7,197	9,955	6,362
Hamilton	13,014	6,532	6,482	29,665	14,652
Hancock	35,935	18,509	17,426	3,759	2,887
Hardin	5,113	2,670	2,443	9,601	4,612
Henderson	12,582	6,801	5,781	20,600	3,807
Henry	35,506	18,487	17,019	12,325	4,149
Iroquois	25,782	13,481	12,301	9,589	5,832
Jackson	19,634	10,361	9,273	8,594	3,220
Jasper	11,234	5,738	5,496	12,935	8,109
Jefferson	17,864	9,010	8,854	12,031	7,354
Jerry	15,054	7,932	7,092	27,325	18,094
Jo Daviess	27,820	14,196	13,624	9,342	4,114
Johnson	11,248	5,713	5,535	30,032	16,703
Kane	39,091	19,836	19,255	15,412	7,720
Kankakee	24,552	12,708	11,844	13,074	13,279
Kendall	12,399	6,455	5,944	18,237	14,226
Knox	39,522	20,014	19,508	28,633	17,515
Lake	21,011	10,696	10,315	9,214	6,121
La Salle	60,792	31,223	29,564	17,651	5,292
Lawrence	12,633	6,383	6,150	11,637	1,552
Lee	27,171	14,220	12,951	14,272	5,128
Livingston	31,471	16,672	14,809	13,758	3,388
Logan	23,053	12,445	10,608	24,602	12,355
Macoupin	26,141	13,890	12,251	31,251	20,441
Madison	34,726	16,965	15,761	12,739	6,720
Marietta	44,131	22,888	21,243	13,437	5,180
Martin	20,622	10,501	10,121	10,931	5,921
McDonald	16,936	8,854	8,102	6,213	4,092
Mason	16,181	8,683	7,501	22,069	7,616
Massac	9,581	4,996	4,685	22,089	14,978
McDonough	21,000	13,546	12,363	28,772	10,163
McHenry	24,762	12,174	11,588	9,584	6,949
McLean	53,988	28,310	25,678	15,942	5,216
McNair	11,775	6,237	5,498	12,832	7,679
McRobert	18,709	9,789	8,980	13,979	6,277
Monroe	12,002	6,815	6,167	22,112	16,034
Montgomery	25,314	13,255	12,059	3,685	3,234
Morgan	28,143	14,579	13,564	16,034	10,020
Moultrie	10,385	5,481	4,904	36,001	17,547
Ogle	27,182	14,355	13,137	9,552	5,278
Oregon	47,540	24,214	23,296	6,127	1,696
Perry	11,723	7,139	6,588	27,249	18,819
Piatt	10,953	5,852	5,101	6,742	8,975
Pike	30,768	15,811	14,957	3,943	2,245
Poplar	11,457	5,791	5,666	5,687	3,924
Pulaski	8,752	4,751	4,191	17,205	11,029
Putnam	6,200	3,223	3,077	9,711	4,912
Randolph	20,830	10,889	9,940	21,005	6,937
Richland	12,803	6,129	6,674	9,331	5,000
Rock Island	29,783	15,369	14,411	32,274	19,228
Saline	12,714	6,378	6,336	11,684	10,774
Sangamon	43,342	24,010	22,332	9,909	7,914
Schuyler	17,419	9,459	7,960	11,613	7,897
Scott	10,511	5,567	4,973	9,934	3,710
Shelby	25,176	13,241	12,212	20,190	11,545
Stark	10,751	5,365	5,386	21,470	12,062
St. Clair	51,058	27,325	23,743	11,191	7,645
Stephenson	31,608	15,588	14,000	19,800	11,492
Tazewell	27,903	14,145	13,358	7,313	4,090
Union	16,518	8,367	8,151	18,356	8,173
Vermilion	30,111	15,762	14,349	13,731	6,933
Washington	8,411	4,427	4,114	12,203	8,925
Warren	23,174	12,100	11,074	18,575	5,391
Wayne	17,599	9,157	8,442	20,321	16,703
White	19,758	10,201	9,557	12,205	7,745
White-Ills	13,436	8,167	8,269	24,991	11,774
White-Oak	27,593	14,371	14,122	11,282	4,415
Will	47,013	23,221	19,792		
Williamson	17,329	9,062	8,267		
Winnebago	29,301	11,774	11,000		
Woodford	18,956	9,996	8,960		
Total	1,539,891	1,316,567	1,223,354	1,111,960	584,470

*Principal Towns.*—Chicago is the largest city, not only of Illinois, but of the region formerly comprised in the North-west Territory. Its population in 1870 was 298,977 and has since increased with great rapidity, notwithstanding the terribly destructive fire of Oct., 1871. Quincy, Peoria, and Springfield are cities of between 20,000 and 30,000 inhabitants; Bloomington, Aurora, Rockford, Galesburg, Jacksonville, and probably Alton, have more than 10,000 and less than 20,000; Belleville, Freeport, Galena, Rock Island, Ottawa, Decatur, and Joliet, from 8000 to 10,000; Cairo, East St. Louis, Elgin, Pekin, and La Salle, from 6000 to 8000; Champaign, Danville, Dixon, Wankegan, Monmouth, Moline, Litchfield, Mendota, Peru, Sterling, Warsaw, Princeton, Morris, Belvidere, Canton, Geneseo, and Paris have about 5000 inhabitants each.

*History.*—The first white settlements in this State were made by the French from Canada, and were the result of the enterprise of the great explorer, the Sieur de la Salle. He set out from Canada in 1679, crossed the lakes, and descended a river, on the banks of which he found an Indian tribe whom he names in his journal the Illini, and from whom he gave the river the name Illinois. Gaining their good-will, he established a small fort at the mouth of the river, and left the Chevalier de Tonty there with a few men, naming his little fort Crève Cœur. After descending the Mississippi for some distance, he returned to Canada, but in 1682 came again to the Illinois River with a colony of Canadians, and made a beginning of settlements at Kaskaskia, Cahokia, and some other towns. These settlements increased, and the Jesuit missionaries who visited the region early in the eighteenth century were so delighted with it that they described it as a new paradise. The colonists, like most of the French emigrants of that period, maintained the most friendly relations with the Indians, and eventually so far degenerated as to become very little above the Indians among whom they dwelt. The vagabond and reckless life of the half-breed Canadian voyageur is well known, and the greater part of the colonists were of this class. In 1763 the English government, by the conquest of Canada, succeeded to the dominion over all this region, to which the French had previously laid claim, but in the twenty years that followed they seem to have paid very little attention to this portion of their domain. At the close of the Revolutionary war this region was ceded to the U. S., and in 1787 the whole country N. of the Ohio River to the Canadian line was erected into the North-west Territory. In 1800, Ohio was made a separate Territory; in 1805, Michigan was set off as a distinct Territory; and in 1809, Indiana Territory was organized. This left for Illinois Territory, as it was soon after organized, the present States of Illinois and Wisconsin and part of Minnesota. The census of 1810 reported 12,282 inhabitants in this Territory. The Indians had for several years been very troublesome, and the settlement of the Territory had been hindered by their hostilities. In Aug., 1812, they attacked the fort at the mouth of Chicago River, and murdered most of the garrison and the settlers in the vicinity. They were severely punished for these outrages, and the hostile tribes being finally driven away, the northern section began to attract a large body of immigrants. In 1818 it was found that there were 35,220 inhabitants in the Territory, and all but a very few within the present limits of the State. In that year Illinois was admitted with the present limits into the Union as a State. Two years later it had 55,211 inhabitants, and in 1830, 157,445, a gain of 185.2 per cent. In 1832 the troubles with the Sac and Fox and other tribes of Indians, which had existed for a year or two, culminated in the Black Hawk war and the final removal of all the Indians from the State. During the continuance of hostilities there was much excitement and alarm in the State, but the result was eminently beneficial in making more widely known the great advantages the State offered to immigrants. Congress granted an appropriation in 1834 for the improvement of the harbor at Chicago, and in 1835 the Illinois and Lake Michigan Canal, connecting the great lakes with the Mississippi River, was projected and the State bank organized. In July, 1836, the canal was commenced and several railroad enterprises undertaken. But the financial panic of 1837 fell with crushing effect upon Illinois, and led to the abandonment of every work of internal improvement. The growth of the State in population continued, however, through all this period of depression, and in 1840 it had 176,181 inhabitants, a gain of 202.4 per cent. from 1830. In 1840 the Mormons removed from Missouri to Nauvoo in Illinois, and, by increasing in numbers, commenced erecting their temple there. From the first their lawlessness and their irregular and profligate lives had prejudiced the people against them, and as their offences became more numerous there was manifested a very general determination to drive them out of the State. In June, 1844, the brothers Joseph and Hyrum Smith, the



leaders of the Mormons, having been arrested and confined in Carthage jail, the jail was surrounded by a mob on the 27th of that month, and the Smiths were both murdered. In the following autumn the Mormons, to the number of about 20,000, left the State under the leadership of Brigham Young, and commenced their migration to Utah. In 1845 the population, according to the State census, was 613,182. In 1847 a new State constitution was adopted. In 1849, the tide of emigration having set very strongly toward Iowa and Wisconsin, the percentage of increase of population had fallen off considerably, the census reporting only 851,470 inhabitants, an increase of only 80.7 per cent. on the previous decade. In 1850, Congress granted a vast quantity of land to the Illinois Central Railroad Co. for the construction of their railway through the whole length of the State. Thus, and the other railroad enterprises which followed it, gave a new impulse to the growth of the State, and have made its development more rapid than that of any State which had preceded it. A great city was rapidly growing up on the shores of the lake, and river and lake, canal and railroads, were all contributing to its swift and irresistible progress. In 1860 the population of the State was 1,711,951, a little more than double that of 1850, and it had but very little government land remaining unsold. The civil war taxed the resources of the State very severely, but her citizens responded most nobly, and by the aid of improved agricultural machinery she was able to send a very large force, more than her full quota, into the field, and yet retain her pre-eminence as the granary of the nation. Owing to the losses of the war the

increase of her population was proportionally less in 1870 than in 1860, though the actual increase was nearly the same as in the previous decade. The census report gives her in 1870, 2,559,891, an addition of 827,940. Since 1870 she has enjoyed (except the great calamity of the Chicago fire) uninterrupted prosperity, and her growth has been as rapid as at any former period of her history. The conflict in regard to policy which in 1873 and 1874 had occurred between the farming population and the railway companies, though it may cause some bitterness of feeling for a time, is destined to be settled on terms which will be fair and just to both parties, and in the end will result in an increased business and a more satisfactory development of the vast resources of the State. In 1870 the State again revised its constitution very thoroughly, and in the interests of an economical and wise government.

#### Governors of Illinois.

Territory.	Term.	Thomas Ford.....	Term.
Ninian Edwards.....	1809-18	Augustus C. French.....	1842-46
SHADRAK BOND.....	1818-22	Joel A. Matteson.....	1856-57
Edward Coles.....	1822-26	William H. Lissell.....	1857-61
Ninian Edwards.....	1826-30	Richard Yates.....	1861-65
John Reynolds.....	1830-34	Richard J. Oglesby.....	1865-69
Joseph Duncan.....	1834-38	John M. Palmer.....	1869-73
Thomas Carlin.....	1838-42	Richard J. Oglesby.....	1873-77
		John L. Beveridge.....	1877-81

*Vote at Presidential Elections.*—Illinois not having been admitted into the Union as a State until 1818, her first vote for President was cast in 1820.

Year.	Candidate.	Popular vote.	Candidate.	Popular vote.	Candidate.	Popular vote.
1820	James Monroe P.....	3	Not rec.	J. Q. Adams P.....	Not rec.	
	D. D. Tompkins V-P.....			R. Rush V-P.....		
1824	Andrew Jackson P.....	2	1,901			
	John Quincy Adams P.....	1	1,542	John Quincy Adams P.....	1,542	{ Crawford P..... 219
	John C. Calhoun V-P.....	3				{ H. Clay P..... 1,047
1828	Andrew Jackson P.....	3	6,764	J. Q. Adams P.....	1,581	
	John C. Calhoun V-P.....			R. Rush V-P.....		
1832	Andrew Jackson P.....	5	14,147	H. Clay P.....	5,429	{ John Floyd and Wilkins.....
	M. Van Buren V-P.....			John Sergeant V-P.....		{ William Wirt and Henry Lee.....
1836	Martin Van Buren P.....	5	17,275	W. H. Harrison P.....	14,292	{ Hugh White and John Tyler.....
	R. M. Johnson V-P.....			F. Granger V-P.....		{ Daniel Webster.....
1840	Martin Van Buren P.....	5	47,476	W. H. Harrison P.....	45,537	{ W. P. Mangum and Smith.....
	R. M. Johnson V-P.....			J. Tyler V-P.....		{ J. G. Birney P..... 119
1844	James K. Polk P.....	9	57,920	H. Clay P.....	45,528	J. G. Birney P..... 3,570
	G. M. Dallas V-P.....			T. Frelinghuysen V-P.....		
1848	Lewis Cass P.....	9	56,300	Zach Taylor P.....	53,047	M. Van Buren P..... 15,773
	W. O. Butler V-P.....			M. Fillmore V-P.....		
1852	Franklin Pierce P.....	11	80,597	Winfield Scott P.....	64,934	J. P. Hale P., and Julian V-P..... 9,966
	William R. King V-P.....			W. A. Graham V-P.....		
1856	James Buchanan P.....	11	105,348	John C. Fremont P.....	96,189	Fillmore P., and Donaldson V-P..... 37,444
	J. C. Breckenridge V-P.....			W. L. Dayton V-P.....		
1860	Abraham Lincoln P.....	11	172,161	S. A. Douglas P.....	160,215	{ Breckenridge P., and Lane V-P..... 2,101
	H. Hannin V-P.....			H. V. Johnson V-P.....		{ Bell P., and Everett V-P..... 4,913
1864	Abraham Lincoln P.....	16	189,495	G. B. McLean P.....	158,730	
	A. Johnson V-P.....			G. H. Pendleton V-P.....		
1868	U. S. Grant P.....	16	250,303	Horatio Seymour P.....	199,143	
	Schuyler Colfax V-P.....			F. P. Blair V-P.....		
1872	U. S. Grant P.....	21	241,941	Horace Greeley P.....	181,938	C. O'Connor P..... 3,058
	Henry Wilson V-P.....			B. Gratz Brown V-P.....		

L. L. BROCKETT.

Illinois, tp. of Pope co., Ark. Pop. 1657.

Illinois, tp. of Washington co., Ark. Pop. 1200.

**Illinois and Michigan Canal.** This important line of communication unites Lake Michigan with the navigable waters of the Illinois River—that is to say, the Gulf of St. Lawrence with the Gulf of Mexico—and the summit-level of the canal lies about 580 feet above tide-water. The near approach of these waters to each other was known to the early fur-traders and Indian missionaries of Canada. By the Fox River (by Green Bay) and the Wisconsin River, Father Marquette, the Jesuit, passed from the lake to the Mississippi, descending that river to the mouth of the Illinois. He returned to the lake by this last-named stream and Chicago River, having to make but short portages at the two intermediate points; this in the year 1673. Soon after the formation of the State of Illinois from the Northwest Territory—say, in the year 1822—Congress granted the right of way through the public lands “for the route of a canal connecting the Illinois River with the southern bend of Lake Michigan,” and in the year 1827 a further grant was made to aid the State in the construction of a canal—viz. a quantity of land “equal to one-half of five sections in width on each side of the canal, reserving each alternate section to the U. S. from one end of the said canal to the other;” this and a similar grant made to the State of Indiana, also in 1827, for aid in the construction of the Erie and Wabash Canal, constituted the first material support by grants of public lands made by Congress under the system of “internal improvements,” so called in that day. The number of acres included in the grant to Illinois orig-

inally was 286,000; but it having been discovered subsequently that the State had not received its full quota under the terms of the law, an additional 32,895 acres was granted in the year 1854, making the aggregate of 318,895 acres received by the State. Prior to this grant of land by the U. S., the State of Illinois, in the year 1825, had received a report from a board of commissioners appointed by the legislature to examine the route of the proposed canal, favorable to the project, stating the estimated cost of five several plans, varying in amount from \$639,000 to \$716,000; the length of the canal being about 100 miles. In 1829 a new board of commissioners was organized, with authority to construct the canal and to dispose of the lands granted by Congress to provide means for carrying on the work. In the following year experimental surveys were made by a party of engineers acting under the orders of the war department, but their investigations were confined principally to the question of a supply of water. In the year 1833 other surveys and estimates were made by the State, and the engineers then employed reported the cost of a canal 40 feet wide and 4 feet deep at \$4,043,000.

It was not until 1836, however, that really efficient measures were adopted for the prosecution of the work. A board of commissioners was again organized in that year, with authority to construct the canal, an experienced engineer was appointed, surveys were made, and estimates in detail furnished for an enlarged work—to wit, for a canal 60 feet wide at surface, 36 feet at bottom, and 6 feet deep. The estimate upon this basis for the work and its appendages was \$8,654,000. The work was put under contract in June, 1836, and was prosecuted uninterruptedly until Mar., 1841,



when operations were suspended for the want of adequate means to carry on the same. In Feb., 1843, the governor was authorized by law to negotiate a loan of \$1,600,000 solely on the credit and pledge of the canal, its tolls, revenues, and lands, for the purpose of completing the work. The negotiation of this loan occupied more than two years, for it was not until June, 1845, that the full amount of subscriptions required was secured. At that time a contract was agreed upon and executed between the State of Illinois and the subscribers to the loan of \$1,600,000. The canal and all its works, with 225,000 acres of land and 6000 lots in Chicago, Lockport, La Salle, etc., were placed in the hands of three trustees, with full authority to complete the canal, sell the lands and lots, and, possibly, to restore the canal and remaining property after payment of the loan and the bonds to the State of Illinois.

In the original plan of the canal it was designed to make a through cut from the waters of Lake Michigan to the main eastern branch of the Illinois River (the Des Plaines); by this the summit-level, some 30 miles in length, would receive a never ending supply of water from the lake for navigation and for lockage of the inferior levels—say, to the entrance of the main southern branch, the Kankakee, entering the Illinois River 50 miles below Chicago, and about midway of the canal. The formation of the land between the lake and the Des Plaines presented nothing formidable in appearance, being an almost flat prairie, more or less wet, and rising only from 12 to 15 feet above the ordinary level of Lake Michigan; hence the plan adopted for the construction of the line of canal between the two points named established itself, as it were, for there seemed to be no alternative to desire. However, during the year 1837 (the second season of work) the cuttings proved to be very difficult and expensive upon the summit division, 19 miles averaging 18 feet in depth, the lower 12 feet, being cemented clay, next 8 miles (Saganski Loup) the cutting was in magnesian limestone, 14 to 18 feet in depth, with abundance of water. These results, as developed during the later progress of the work, led to the modification of the plan of 1836, by the act of the legislature of 1843, in a most important feature—to wit, authority to abandon the through cut, to raise the summit-level one lock in height, and to rely for the supply of water therefor upon the tributaries of the Illinois River, the Calumet, Des Plaines, etc.

In June, 1845, the trustees before referred to were placed in possession of the canal, lands, etc., and proceeded to organize their work by distributing their duties among each other, appointing a chief engineer and assistants (the same who had planned and constructed the work from the beginning in 1836), a secretary, land agents, etc. Under the act of 1843 the lands and lots were valued by appraisers appointed for that purpose, contracts were entered into for the construction of the canal and feeders, and the work was pushed forward diligently and successfully to its completion and opening for purposes of navigation in Apr., 1848, the same falling within the period prescribed in the act of 1843—say, three years—and it may be added the cost of completing the canal and its subsidiary works fell within the estimate made by the chief engineer in the year 1843—\$1,429,606. This sum, added to the previous cost, estimated at \$4,740,620, exhibits the entire cost at \$6,170,226 at the opening of the canal for navigation, Apr., 1848.

*Description of the Canal and its Works.*—The eastern terminus of the canal is at the S. branch of the Chicago River, and 5 miles from the entrance of the main stream into the lake. The line is direct to the valley of the Des Plaines at Summit, about 8 miles distant; thence it pursues that valley uninterruptedly to the mouth of the Kankakee River, 42 miles, passing through the towns of Lockport and Joliet, and receiving within the distance named four feeders—Calumet, Des Plaines, Du Page, and Kankakee; between the junction of the Kankakee and Des Plaines the combined rivers take the name of Illinois, and within this valley the canal pursues its course to its western terminus, La Salle, passing through the towns of Morris and Ottawa, and receiving the important Fox River feeder at the last-named place; the entire length of the canal proper being 96 miles. The difference of level between Lake Michigan and the Illinois River at La Salle is 145 feet, and in the original or through-cut plan this fall was distributed through 15 locks, varying in lift from 24 to 24 feet each. Upon the modified or raised-level plan two additional locks became necessary—one of 8 feet at the eastern end of the summit level, and one of 10 feet at the western end, the difference, 2 feet, being given to the declivity between the two locks. The canal is 96 miles in length, 60 feet wide at the surface, 34 feet at bottom, and 6 feet deep. The 17 locks are 110 / 18 feet, designed for boats carrying 100 to 150 tons.

There are five feeders of the aggregate length of 25 miles, all navigable, and 40 feet wide and 4 feet deep; 4 aque-

ducts; and 7 dams—two of the last of some at Joliet, for crossing the river. There are extensive basins at Lockport, Joliet, Du Page, Ottawa, and La Salle; three of these furnishing ample water-power for manufacturing purposes.

Notwithstanding the full provision made for a supply of water by feeders in the original plan, it was found necessary in the modified or raised-level to introduce a further supply upon the summit-level to meet wants which might be produced by droughts. So, in addition to the Calumet and Des Plaines, it was decided to add two pumping-engines (steam) at the eastern terminus of the canal (Bridgeport), of power sufficient to raise any desired quantity of water from the lake-level that might be needed for the summit and for lockages below. As the lift was but 8 feet at an ordinary stage of the lake, the pumping apparatus required was quite simple and not costly. It consisted (finally) of two steam-engines, with the power applied to two wheels of 38 feet diameter, with buckets of 10 feet length or width, called, in England, "scoop-wheels," each wheel working in a stone cell or chamber, independently of each other, and each capable of delivering 15,000 cubic feet per minute upon the summit-level. The entire cost of these two machines, with all the necessary buildings and appendages, was about \$55,000, and these were continued in use every year, except the year 1855, from 1848 to 1870, inclusive. In connection with this brief account of these useful auxiliaries for purposes of the canal, they became indispensable to the city of Chicago at an early day for sanitary purposes. That is to say, the drainage and sewage of the city were discharged into the Chicago River for a distance of five or six miles, their only outlet being to the lake through the same river. Now, with the wind in a certain direction, the water of the river could not find its way into the lake; on the contrary, it was forced back towards the interior, and if long continued the effect upon the atmosphere was simply dreadful. To obviate this evil an arrangement was made with the city authorities by which the pumping-engines at Bridgeport were brought into use, thereby withdrawing the foul water from the river, emptying it into the summit-level of the canal, and as a consequence substituting the pure water from the lake for refilling the river. At a later day, when the drainage question became vital, the city of Chicago in the year 1865 obtained an act from the legislature providing for the completion of the Illinois and Michigan Canal upon the plan adopted by the State in 1836. Under the authority of that act the original or through-cut plan was carried out—an operation requiring about four years in time and an expenditure of some \$3,000,000; but the great object was secured—drainage for the city; for all that part of it, at least, which lies upon the S. side of the river, and on the S. branch, is carried through the canal to the Des Plaines River, and there discharged. Other means have been proposed, it is understood, for cleansing and purifying the N. branch, and, it is to be hoped, with like good results.

In connection with the Illinois and Michigan Canal, the improvement of the Illinois River by a system of locks and dams has been inaugurated by the State of Illinois, with some moneyed assistance from the general government. This river, for its very moderate fall, some 45 feet only from La Salle (outlet of the canal) to its mouth, a distance of 213 miles, is wonderfully well adapted to improvement by locks and dams, not more than seven, perhaps, being necessary to furnish an unbroken navigation from Chicago to the Mississippi River.

The following schedule exhibits the entire amount of money received and expended by the board of trustees of the Illinois and Michigan Canal from the organization of the trust in June, 1845, to Nov. 23, 1870—25 years:

Classification.	Receipts.	Expenditures.
Loan of \$1,600,000, principal and interest.....	\$1,601,891.90	\$1,134,771.34
Construction of canal, feeders, etc....	2,132.25	1,429,606.21
Canal-lands, sales, protection, etc....	4,698,320.02	115,023.23
Areas of interest on registered bonds.....		2,155,622.38
Principal of registered bonds.....		2,113,840.34
Maintenance and repairs of canal and feeders.....	111,003.97	1,828,802.05
Tolls, collections, inspections and salaries.....	4,385,675.77	157,895.17
Canal damages, towage, etc....		11,900.74
General expenses and contingencies.....		11,900.74
Premium on gold for dividends on bonds payable in London.....	938.83	362,000.05
Interest and exchange.....	179,911.00	21,073.80
Losses on "Wildcat" currency, counterfeit bills, broken banks, etc., 1848 to 1863, inclusive.....		14,563.52
Balance in hands of trustees Nov. 30, 1870.....		189,658.89
Total.....	\$10,028,811.18	\$10,959,811.18



By analyzing the figures in this table the cost of maintenance, repairs, and renewals of the canal and all its works, its feeders, pumping-engines, etc., for a long series of years, can be usefully exhibited, to wit: 96 miles canal proper; 25 miles navigable feeders; 2 pumping-engines, with necessary adjuncts of every description; the cost per mile per annum was \$616, the gross sum expended therefor having been \$1,717,300. The canal reverted to the State of Illinois in 1871, the registered canal bonds, principal and interest, and the loan of \$1,600,000, principal and interest, having been paid by the trustees under the terms of the contract with the State. The amount of the first was \$4,031,765, and of the last, \$2,153,771; total of both, \$6,785,537. Since May, 1871, the canal has been controlled and worked by three commissioners appointed for that purpose by the Legislature of the State. W. H. SWIFT.

**Illinois Indians**, a confederacy of tribes, including the Cahokia, Peoria, Kaskaskia, Tamaroa, and Moingwena Indians, who were Algonkins, and the Michigameas, probably of Dakota race. Their principal territories were in what is now Illinois, but they also occupied lands W. of the Mississippi. They were faithful allies of the French, and were often at war with the non-Algonkin tribes and with the Sacs and Foxes. At present there are a few relics of these once powerful tribes living in the Indian Territory. The name Illinois means "superior people," according to Gallatin.

**Illinois Industrial University**, at Urbana, county-seat of Champaign co., Central Illinois. It was the first college established under the laws of Congress of July, 1861, and July, 1866, and under acts of the legislature of Illinois bearing date Jan. 25, Feb. 28, and Mar. 8, 1867, "to teach in the most thorough manner such branches of learning as are related to agriculture and the mechanic arts, including military tactics, and not excluding other scientific or literary studies." The Congressional land-grant amounted to 480,000 acres, which was sold as scrip and the proceeds invested in interest-bearing bonds, except 25,000 acres, which were located in Nebraska and Minnesota, and are held by the university. The county of Champaign made a donation of \$450,000 in buildings, lands, and farms. The State of Illinois has for several definite purposes contributed nearly \$300,000. The assets of the university are nearly \$1,000,000, with a regular income of about \$40,000. The main university building is 214 feet in length, with two wings extending 124 feet to the rear, 3 stories high, with basement and mansards. It has one fireproof wing, with a library of nearly 10,000 volumes, a large cabinet of geological, zoological, and other specimens, and a physical laboratory; in the other parts of the building lecture and recitation rooms for 1000 students, a large chapel, society rooms, etc. The old university building contains a large chemical laboratory, with desks for nearly 100 students, chemical library, cabinet of apparatus and mineral specimens, and dormitories for about 250 students. The mechanical and military hall (128×80, two stories high with turrets) contains the mechanical and carpenter shops, iron and wood working machinery, a 20-horse-power engine of the university make, mechanical cabinet, pattern and paint room, foundry, etc. The upper story is one large drill-hall, with armories and artillery-rooms in towers. There is a farm of 410 acres, with large barn and farmhouse, collection of agricultural implements, specimen herds of Durham, Ayrshire, Herefordshire, Devon, and Jersey cattle, Berkshire and Essex swine, Southdown sheep, etc. The horticultural and experimental farms, 200 acres, with specimen orchard of 3000 fruit trees, large nurseries, forest plantation, experimental plots, farmhouse, large barn, and greenhouses. The university was opened in 1869; in 1871 women were admitted, and the attendance was as follows: 1869, 78; 1870, 196; 1871 (254 men, 23 women), 277; 1872 (308 men, 53 women), 361; 1873 (338 men, 76 women), 414.

The plan of instruction in this institution is quite broad and comprehensive, and is divided into the following colleges and schools: (1) College of agriculture and horticulture; (2) college of civil, mechanical, and mining engineering and architecture; (3) college of natural sciences, chemistry, and natural history; (4) college of literature and art; (5) school of commerce; (6) school of military science; (7) school of domestic science (for women). Dr. J. M. Gregory is regent of the university; the faculty consists of 13 professors, 9 assistants, and 6 foremen in the practical departments. The management of affairs is in the hands of a board of trustees of 9 members, who elect their president. They are appointed by the governor of the State, who himself, with the president of the State Agricultural Society, is an ex-officio member. This university is forbidden by State law to confer degrees, but gives certificates of scholarship, with record of all studies pursued, and standing attained in each. S. W. SHATTUCK.

**Illinois River**, the largest stream in Illinois, nearly bisects that State. It is formed by the junction of the Des Plaines and Kankakee rivers, and flows S. W., traversing Peoria Lake, and reaches the Mississippi River 20 miles above the mouth of the Missouri. It is navigable 245 miles by steamers, and, with the canal from Chicago to La Salle, affords an all-water route from the Mississippi to Lake Michigan. Its channel is to be dredged to the minimum depth of four feet.

**Illio-polis**, tp. and post-v. of Sangamon co., Ill., on the Toledo Wabash and Western R. R., 22 miles E. of Springfield. Pop. of v. 395; of tp. 1829.

**Illuminated Manuscripts** were very common among the Egyptians, who employed many colored figures, generally red; and the art of illuminating manuscripts was probably practised by all nations of antiquity in which papyrus and parchment were used. It has been denied that the ancient Romans illuminated their manuscripts, but passages in Ovid and Pliny fully indicate that some works were highly ornamented and illustrated. Byzantine and Italian illuminations are no doubt simple developments of an ancient classic art. Both styles are gorgeous with gold and bright colors, and deal very freely in old Greek and Roman architectural ornaments. Quite independent of classic art an original style of illuminating manuscripts sprang up in Great Britain, especially in Ireland, whence it was carried abroad by Irish monks, adopted in the schools founded by Charlemagne, and spread all over Europe. There is doubt as to whether the elaborately inter-twined knotwork, generally called Runic, is purely of Irish origin, but there can be none that the most elegant applications of it were Hiberno-Saxon. Of these works Mr. Digby Wyatt remarks, that in delicacy of handling and minute but faultless execution the whole range of paleography offers nothing comparable; a detailed description is found in Owen Jones's *Grammar of Ornament*. With the invention and general introduction of the printing-press the art of illumination vanished from Europe, but the Persians, Arabs, Turks, and Chinese still produce very delicately and beautifully illuminated works, charming as regards industry and grace, but inferior to the European with respect to strength and character. C. G. LELAND.

**Illumina'ti** [from the Lat. *illuminatus*, "those who are enlightened"]. From early times, both in Asia and Europe, the mystics and theosophists of different religions, believing that by abstraction and devotion to God a divine light was shed on the soul, have called themselves Illuminati, or the Illuminated, in one language or another. Among these were disciples of Jacob Böhme, Swedenborg, and many others of the seventeenth and eighteenth centuries. About 100 years ago, when the most radical theories as to government, religion, and morals were inspiring all Europe, two ideas became prevalent—the one of a skeptical philosophy, which taught men that they were free to do as they pleased; and the other of occult philosophy, by which they learned that they might become whatever they would. At this time Adam Weishaupt, a professor of Ecclesiastical law in Ingolstadt, inspired partly by hatred of the Jesuits, with whom he had some personal quarrel, and instructed by certain passages in the works of Bode, a professor in Frankfort, conceived the idea of a secret society which should unite all mankind in brotherly union, introduce justice, abolish all abuses resulting from priestcraft and aristocracy, extend education, surround kings with wise counsellors, and in short reform society. This union founded, it is said, May 1, 1776, received at first for its members the name of Perfectibilists, and then Illuminati. A mystical and magical order, called the Illumines of Avignon, had been already founded in 1760 by Pernety and Grubianca. It does not appear that Weishaupt inclined to magic or Rosicrucianism; in fact, his quarrel with the Rose-Croix Freemasons indicates the contrary. But his disciples were strongly imbued with these fancies. Beginning with his students, Weishaupt made rapid progress. Within three years he had lodges in Germany, Holland, and Italy, and thousands of adepts. The grades of initiation were those of novice, minerval, illuminatus minor and major, Scotch knight, epope or priest, regent or prince illuminatus, magus, and king. As in all mysteries of old, Weishaupt led his pupils through different grades of free thought up to complete "emancipation." A noted writer, Baron Adolph Franz Fried. Ludwig von Knigge, joined the order, and through his influence it rapidly increased. Weishaupt, who was a weak man, could not refrain from expressing to his neophytes his advanced opinions, and, moved by fear or jealousy, quarrelled with Knigge. This resulted in complete exposure, and works appeared revealing all the secrets of the order. On Jan. 22, 1784, an edict was issued for its suppression in Bavaria. Weishaupt was dismissed from the university, and retired



to Ratisbon and Halle, where he d. 1830, aged eighty-three. He had used German Masonry to forward his views, having been in advance of it as regards political radicalism: French Freemasonry in its turn borrowed largely from Illuminism, the latter being introduced into the seven Masonic lodges of Paris by Bode, who became chief of the order after Weishaupt lost his influence. It is said that Illuminati still exist; if so, they are probably to be found in the ranks of the Communists. The name Illuminati belongs rightly to the QUIETISTS and MYSTICS (which seen, who existed in one form or the other under this name since the earliest age of Christianity, but at present the word is popularly understood as applicable only to Weishaupt's order. (For works on this subject see l'Abbé Barruel, *Mémoires*; Prof. John Robison, *Proofs of a Conspiracy*, etc., Edinburgh, 1797; *Proofs of the Existence of Illuminism* (an abstract of the works of Barruel and Robison), by Seth Payson, Charleston (America), 1802. These works, however, are so prejudiced as to be of little real value to any save the most impartial reader. Also, Larousse, *Dictionnaire*, article "Illuminées," and an article by the writer on the same in the *Princeton-Nassau Monthly* 1842.)

CHARLES G. LELAND.

**Illumination.** See ILLUMINATED MANUSCRIPTS, by CHARLES G. LELAND, A. M.

**Illustrated Publications** are those which combine engravings and graphic figures with letter-press. The oldest form of book-illustration, that by wood-engravings, is still, on the whole, the best. During the eighteenth century, and still earlier, copper-plate engravings were frequent in books, but had to be separately printed. Aquatint came next into favor, but was open to the same objection. Finally, wood-cuts have been restored to favor, and in the hands of the best engravers have fairly surpassed, for illustrative purposes, anything ever done by the old masters of the art. Of late, photography, photozincography, photolithography, nature-printing, and a variety of other transfer processes have been considerably employed, and are valuable for special uses, but there is no process yet devised that is likely to supersede wood-engraving.

**Illyria**, tp. of Fayette co., Ia. Pop. 851.

**Illyricum**, or **Illyria**, a name which now has no geographical or political signification, but which at different epochs has denoted important provinces of different empires. It was in ancient times inhabited by a fierce, warlike, and savage tribe, allied to the Thracians and addicted to robbery and piracy. The eastern portion of the country, corresponding nearly to the modern Albania, was conquered in 359 B. C. by Philip of Macedon, and annexed to Macedonia. The western portion, comprising the modern Dalmatia, Croatia, Herzegovina, and parts of Bosnia, remained independent till the middle of the last century before the Christian era, when it was conquered by the Romans and made a Roman province. At the division of the Roman empire both Illyris Græca and Illyris Romana fell to the Eastern empire, but the Slavic tribes which had settled in Illyris Romana soon made themselves independent. During the Middle Ages Illyricum was divided between the Venetians, the Hungarians, and the Turks, and the name fell out of use until Napoleon in 1809 organized the Illyrian provinces, consisting of Carinthia, Carniola, Dalmatia, Istria, and parts of Croatia, and incorporated them with France. In 1815 these provinces were formed into a kingdom and annexed to Austria. The kingdom has since been dissolved, and for administrative purposes divided into provinces, but the territories are still Austrian possessions.

**Imen'**, a lake of North-western Russia, in the government of Novgorod. It is 30 miles long by 24 broad, and very rich in fish, but unfit for navigation on account of its storminess. The Volchow connects it with the Lake of Ladoga.

**Imenite**, titaniferous iron. See TITANATES.

**Imenium** [from *Imen*, a range of mountains in Siberia, where the ore is found], a supposed element announced by Hermann, regarded by Rose as impure niobium (columbium).

**Hopango**, a lake of Central America, in the republic of San Salvador, bordering on the departments of La Paz, San Salvador, and Cuscatlan, is situated in the centre of a very fertile, well-populated, and well-cultivated plain, and celebrated for its beauty.

**Image-worship**, or **Iconolatry**, as distinguished from idolatry, is the adoration of images or extreme honor paid to them by the Roman Catholic Church. According to ancient legends, images of Christ are as old as Christianity; St. Luke, say they, left portraits both of his divine Master and of the Virgin Mary; our Lord himself gave to St. Veronica a handkerchief upon which his face was mi-

raculously impressed: the woman who was healed by touching his garment (Mark v. 25) set up his statue at Casarea-Philippi. Some Greek controversialists, whose assertion is supported by Baronius, affirm that a council of Antioch in apostolic times sanctioned the worship of images; but most authorities, both Catholic and Protestant, agree that they were little, if at all, used during the first three centuries after Christ; and the correctness of this opinion is borne out by the silence of heathens on the subject. They were frequently reproached by the early Christians with adoring lifeless gods, yet we read of no instance in which they reprimanded; nor during the last persecution, when Christian churches were plundered, were any images seized in them. The Council of Elvira, about A. D. 300, decreed that pictures were not to be in a church, lest they should become objects of worship. In the same century Epiphanius, bishop of Cyprus, having found before the door of a certain church in Palestine a veil or curtain whereon was a picture of Christ, tore it down, and sent a plain one to be used in its stead. St. Augustine disapproved of images, which evidently were worshipped in his time. "I have known," he says, "many adorers of tombs and pictures" . . . whom "the Catholic Church condemns and daily studies to correct as froward children." The pictures of living persons were frequently put in churches. That of Paulinus, bishop of Nola, was during his lifetime placed in the church built by Severus. Paulinus caused the basilica of St. Felix to be adorned with paintings of Bible stories, that the peasants who assembled there might have their minds occupied with sacred subjects. In the sixth century, Serenus, bishop of Marseilles, seeing that his people gave undue honor to images, caused those in his diocese to be defaced or broken. For this deed, which offended many persons, he was censured by Gregory the Great, who, however, praised his zeal against the worship of things made by hands. From this time image-worship greatly increased, and in the eighth century disputes respecting it caused that great schism (see ICONOCLAST) which separated the Western from the Eastern empire. The decrees of the Council of Nicæa (A. D. 787) were rejected by nearly all Western nations, who, while adorning their churches with images, refused to worship them, and this decision was confirmed by the Councils of Frankfort (794), of Paris (825), and of Aix-la-Chapelle (829). But iconlatry spread by degrees through the whole of Europe. Miracles were attributed to a particular picture or statue, around which flocked crowds of worshippers bringing rich offerings to the church wherein it was placed. This preference for some special image—a remnant, doubtless, of the old pagans' tutelary idolatry—was discouraged by many wise ecclesiastics and condemned by the Council of Mayence (1549), which decreed that such objects of peculiar devotion should be removed from churches. The doctrine, still held by enlightened Roman Catholics, that images are mere reminders of Christ and the saints, was set forth by the Councils of Poissy (1561) and of Trent (1563, sess. 25); the latter insisted that such representations are to receive due veneration, not on account of any divinity or virtue in themselves, but because honor is thus reflected on those whom they represent. This same doctrine is very clearly explained by N. Sanders, a divine of the seventeenth century.

Both pictures and statues are used in the Roman Catholic Church. The Greek Church forbids statues, but this prohibition is comparatively modern, for one of the Virgin was placed by the emperor Johannes Zemiseus (A. D. 970) in the metropolitan church, and was honored as the palladium of the state. And in the eleventh century Alexius Comnenus, needing money, caused many gold and silver images to be taken from the churches and made into coin, which act Leo, bishop of Chalcedon, denounced as sacrilege. At the Reformation, images were condemned by Zwinglius and Calvin, but Luther regarded them as unimportant ornaments, useful for instructing the people; and his followers still admit them into their places of worship. They are forbidden by the Church of England, though some of the more advanced Ritualists defend their use.

Even after image-worship was sanctioned by the popes, it was forbidden to delineate God the Father. This may be attributed partly to the influence of Gnostic theories, partly to a fear lest the idea of Jupiter should be recalled. Paulinus describes a painting where the Father is represented by a voice:

"Pleno corosant Trinitas mysterio;  
Stat Christus agnos, vox Patris adlocutus;  
Et per columban spiritus Sanctus illuc."

At a later period God the Father was represented by a hand extended from clouds, generally in the attitude of blessing. After the twelfth century he was depicted as a venerable man, frequently wearing royal or papal attire. Christ was at first represented as a lamb or a lion; afterwards as a man, generally of great beauty. A dove has



always been emblematical of the Holy Ghost; in the twelfth century artists began to depict him as a human being, sometimes very young, but more commonly of mature age. The cross is not merely a symbol of Christ's death, but in itself is an object of veneration. It is personified, as it were, and the details of its history are given. It has been made the subject of many poems, especially by Rabanus Maurus, bishop of Mentz. Saints and martyrs are represented with certain appropriate emblems, for details of which see Dillon's *Iconography Christiana*; Mrs. Jameson's *Sacred and Legendary Art*, etc. JANET TICKLEY.

**Imag'inaries** (in mathematics). It is a very remarkable and important attribute of all *symbols* that, while absolutely essential aids not only to reasoning, but to the very expression of thought, they ever refuse to limit their meaning to the particular idea for the expression of which they were invented. From mere *aids*, they become not only provocatives of thought, but, as it were, revealers of new fields of investigation. Thus, the symbol of *subtraction*, from being the mere sign of a simple arithmetical operation, has become incentive to, and symbolic of, the most transcendental of mathematical conceptions.

If, passing from arithmetic to algebra (or *universal arithmetic*), we symbolize magnitudes by letters *a* and *b*, and the operation of subtraction by the minus sign, the expression  $a - b$  is symbolic both of the operation performed and of the result of the operation. So long as *b* is less than *a*, the symbolism, without any stretch of meaning, is complete and simple. But what if *b* exceed *a*? Since the given magnitude can yield to the process of subtraction no more than itself, what can  $a - b$  (*b* exceeding *a*) indicate but an *impossibility*? If we commence with considering hypothetical values of *b* less than *a*, and go on increasing them, the remainders become smaller and smaller, and finally (*b* = *a*) becomes zero (or *nothing*), reaching the absolute limit of magnitude, considered as such *merely*. A quantity less than nothing is simply an "impossibility," or a contradiction in terms. Nevertheless, so long as our subtraction is algebraic (that is, merely *symbolic*), and the quantities *a* and *b* are in *terminis*—that is to say, representatives of any pairs of single values we may have cause to assign—we operate algebraically upon the expression  $a - b$  without concerning ourselves with their relative magnitude; and if we obtain a negative quantity as the final result of our operations, instead of regarding it as imaginary, or involving in the problem data of *impossible* fulfilment, we evade this by an interpretation which involves considerations other than those of pure magnitude. The geometrical idea of *direction* is one of the most common of these. If *a* and *b* be supposed to represent linear extension (which is but one of many notions of *magnitude*),  $a + b$  must represent a length equal to the sum of the respective lengths. But if *a* be a distance measured in *given direction* from a given point, the adding of another distance implies the laying off of the distance *b* from the extreme limit reached by *a* in the *same direction*; the subtracting will therefore imply the *reverse direction*; and if *b* exceed *a*, the excess will extend in this reverse direction beyond the starting-point of the distance *a*. Thus, we have the negative result  $a - b$  interpreted as a distance equal to the absolute difference, but laid off as a distance in the *reverse direction*.

Now, it appears that if we multiply together algebraical or numerical expressions made up of several terms connected by the signs of addition and subtraction, + and -, the individual products resulting from the combination of terms of multiplier and multiplicand having like signs must receive the plus sign; of unlike signs, the minus sign. Hence, the "rule of signs" of multiplication and division. But what meaning can we attach to multiplying  $-a$  by  $-b$ , or (reverting to numbers)  $-4$  by  $-5$ ? The sign  $-$  was invented simply to indicate subtraction without ulterior reference; its existence, therefore, implies a *minuend* as much as it does a *subtrahend*. We have already encountered the difficulty of assigning meaning to the isolated expression  $-b$ , and now we have another logical problem; we have to use the negative sign as an integral part of a multiplier—i. e. to determine how it shall operate in an "operation" quite alien to the idea of that particular one to express which it was invented. Algebraists appreciate very well the *rationale* of the (before-mentioned) "rule of signs," and we need not dwell upon it. It is a logical necessity of our agreeing to accept  $a - b$  as symbolizing both the operation of subtraction and the remainder, without regard to (still undetermined, perhaps) relative values of *a* and *b*. We have shown how the "impossibility" of a "negative" quantity disappears when we call in besides the ideas of pure physical magnitude some of its attributes, such as that of *direction*. A negative dimension must be interpreted as one laid off in the *reverse direction* to that attributed to the positive one; i. e. the negative sign *reverses direction*. This was arrived at without reference to

multiplication; we now see that it is in perfect accordance with the logic of the latter algebraic operation. If multiplying by  $+1$ , one be understood as taking the multiplicand *once, just as it is*, multiplying by  $-1$  must be understood as reversing its *direction*. Logical as all this is in its geometrical interpretations, we must still remember that we have, in inventing a universal *arithmetic*, departed very far from the simple meanings we assigned to the "operations" of common arithmetic. To "multiply" any thing, or any magnitude, or any number, is to take or "repeat" the thing, magnitude, or number a specified number of times. Hence, multiplying by anything but an arithmetical number is unmeaning; still more unintelligible (abstractly) would be multiplying by something *itself less than nothing*. It very soon appears, however, that we cannot make an algebra without conceding wider meaning to its symbols; and in fact they have an inexorable logic of their own which forces such extension of meaning.

Since, by the rule of signs, a negative quantity multiplied by itself produces a positive product, we have no means of representing the square root of a negative quantity except by indicating upon it the operation itself. The square root of  $a^2$  can be written either as  $+a$  or  $-a$ ; but for the square root  $-a^2$  we have no alternative but to write  $(-a^2)^{\frac{1}{2}}$ , or  $1' - a^2$ ; or, separating  $-a^2$  into two factors,  $a^2$  and  $-1$ , to perform the operation on the first and indicate it on the second,  $-1$ ; thus  $a1' - 1$ . Hence, the symbol  $1' - 1$  is the symbol of "impossibility," or, as more commonly known, the symbol of an "imaginary quantity." Why? Because we cannot interpret it by any real representation of magnitude associated or not with other attributes? We have seen how the absurdity of *quantity less than nothing* was evaded (geometrically) by associating the idea of *direction*. Now, if we multiply *a*, considered as a line laid off to the right, by  $1' - 1$ , the analytic product is  $a1' - 1$ ; multiply again, and the second product is  $-a$ ; i. e. we have, by two successive operations, reversed the direction, as if we had revolved the length *a* about its starting-point through a semicircle. Is it not, therefore, perfectly logical to consider one operation of the  $1' - 1$  to be half this rotation—i. e. that  $a1' - 1$  shall indicate the length laid off in the direction perpendicular to the direction chosen for *a*?

So long as we deal with dimensions of length only, and interpret these, when real, geometrically by one single line of real direction, this interpretation of  $1' - 1$  is logical and consistent. If we concede that the application  $1' - 1$  be interpreted as indicating a direction perpendicular thereto, and furthermore that the sum of  $a + b1' - 1$  be the distance accomplished from the origin, after traversing the distance *a* in the fixed direction, and then the distance *b* in a direction perpendicular thereto, and call this accomplished distance  $\rho$  (involving also the conception of its direction), and call the linear distance *p*, we shall have  $\rho = (a + b1' - 1)$ . Let  $\theta$  be the angle which  $\rho$  makes with the direction of *a*; then the foregoing is equivalent to  $\rho = r(\cos \theta + \sin \theta 1' - 1)$ . If, by Maclaurin's theorem,  $e^{\theta 1' - 1}$  be developed ( $e$  being the Napierian logarithmic base) into  $1 + \theta 1' - 1 + \frac{\theta^2}{2} \frac{\theta^2}{2 \cdot 3} 1' - 1 + \frac{\theta^4}{2 \cdot 3 \cdot 4}$ , etc., we shall find two sets of terms—one real, and

the other having  $1' - 1$  as a factor; the sum of the first set makes up the algebraic development of  $\cos \theta$ ; the sum of the others that of  $\sin \theta 1' - 1$ ; hence, the equation, which is the connecting bond between *exponentials* and *circular functions* (the so-called "transcendentals"),

$$e^{\theta 1' - 1} = \cos \theta + \sin \theta 1' - 1. \quad (1)$$

Hence also

$$r(\cos \theta + \sin \theta 1' - 1) = \rho e^{\theta 1' - 1} = \rho.$$

We must therefore interpret  $e^{\theta 1' - 1}$  as the symbol of rotation through the angle  $\theta$ ; and as  $\theta$  may be any angle whatever, it readily follows from (1) that

$$\cos \frac{1}{n} \theta + \sin \frac{1}{n} \theta 1' - 1 = (\cos \theta + \sin \theta 1' - 1)^{\frac{1}{n}} = e^{\frac{\theta}{n} 1' - 1},$$

a result well known as "De Moivre's theorem."

The conception of *multiple roots of unity*—the assumption of their necessary existence—is a secondary one; and the conception and the assumption come not from the nature of things, but as corollaries of the logic of our symbolism. The idea of "powers" and "roots" is based on numbers; nothing can, in the strict and original meaning of multiplication, multiply itself by itself, but a number. Hence, there is no other root of unity but unity. Our algebraic symbolism has carried with it an extension of the idea of multiplication, and has created a "rule of signs" by which we have come to regard  $-1$  also as a real root.



For the idea of *still more* "roots"—of roots in number equal to the degree—that comes from other considerations. If we multiply together  $n$  factors of the form  $x - a, x - b, x - c$ , etc., we obtain an *analytical expression* of the  $n$ th degree in  $x$  of the form

$$x^n + (a + b + c, \text{ etc.})x^{n-1} + (ab + ac + bc + \text{ etc.})x^{n-2} + (abc + \text{ etc.})x^{n-3} + \text{ etc.} \dots + abcd, \dots$$

A superficial examination will show the law by which the coefficients of the different powers of  $x$  are formed from the  $n$  symbols  $a, b, c$ , etc.; that the independent term is (abstraction made of *signs*) the *product of them all*. Conversely, given an expression of the  $n$ th degree,

$$x^n + Ax^{n-1} + Bx^{n-2} + \dots + Q,$$

it should be resolvable into factors  $x - a, x - b$ , etc., of which the  $a, b, c$ , etc. would be determinable in terms of the  $n$  given coefficients  $A, B, C, \dots$  and  $Q$ ; just as, given  $a, b, c$ , etc., we have the values of

$$\begin{aligned} A &= -(a + b + c + d, \text{ etc.}), \\ B &= +(ab + ac + bc + \text{ etc.}), \\ Q &= +(abcd + \dots); \end{aligned}$$

so we should, conversely, have  $n$  different expressions for  $a, b, c$ , etc., as *analytical combinations* of  $A, B, \dots, Q$ ; combinations which have no reference to  $A, B, \dots$  etc., as representations of *magnitude* or *quantitative value* (to which, indeed, we have made no reference), but which should result from certain *laws of analytical combination*. For all analytical expressions of the 2d, 3d, and 4th degrees, and, exceptionally, for some cases of the higher degree, we know these combinations;\* but whether we know them or not, they are supposed to be determinable, and in the sense of *symbolic determinations* they would, if found, all be real. Thus, for the 2d degree we would have

$$\begin{aligned} (3) \quad a &= -\frac{1}{2}A + \frac{1}{2}\sqrt{A^2 - Q}, \\ b &= -\frac{1}{2}A - \frac{1}{2}\sqrt{A^2 - Q}. \end{aligned}$$

These are the *two* analytical or symbolic roots (as they may properly be called). Substituted for  $a$  and  $b$  in the factors  $x - a, x - b$ , their product becomes  $x^2 + Ax + Q$ , (the given expression); and in like manner we should obtain  $x^n + Ax^{n-1} + Bx^{n-2} + \dots + Q$ , had we the  $n$  corresponding expressions for  $a, b, c$ , etc. If, now, we pass to *quantitative considerations*, and ask for *values of  $x$*  which shall render the above expression "equal to zero," we recognize that the very "roots" we have obtained are the symbols of such values. Does it follow, therefore, that there are  $n$  different *quantitative values* for  $x$ ? By no means.

If it turns out, on coming to assign values (that is, on converting our symbols into specific magnitudes) that  $Q$  is greater than  $\frac{1}{4}A^2$  (in our expression of the 2d degree), then the *difference* (which we may call  $D$ ) must have the minus sign, and the symbol of *impossibility*  $\sqrt{-1}$  makes its appearance, and we have

$$a = \frac{1}{2}A + \frac{1}{2}D, \quad b = \frac{1}{2}A + \frac{1}{2}D\sqrt{-1};$$

by which we learn that the *particular conditions* cannot be fulfilled by any linear magnitude; but all this is an after consideration. The roots are "imaginary" because we cannot assign any idea of "quantity" or "magnitude" to them. But the two symbolic roots (3) are the *real solutions* of the equation, nevertheless. And did we know how to combine  $A, B, \dots, Q$ , etc. for the equation of the  $n$ th degree, we should have  $n$  symbolic expressions for  $a, b, c, d, \dots$ , the reality of which (as distinguished from "imaginary") is entirely a subordinate question; as analytical or symbolic expressions they would be always the same, and *always real*. If we deal directly with numbers in place of the letters  $A, B, C$ , etc., the positive or negative character of quantities under the radical sign are indeed forced into notice at once. Nevertheless, it is supposed that the symbolic combinations which satisfy the conditions—whether we choose to call them *real* or not—*must exist*. Hence, the expression  $x^n - 1 = 0$  (a particular case in which  $A, B, C$ , etc. are each zero, and  $Q = -1$ ) should be resolvable into symbolic factors,  $n$ , in number. It is in this sense that we assert that the number of "roots of unity" must equal the index of the degree of extraction. Analysts have not been able to *discern* the symbolic forms of the roots of the general equation of the  $n$ th degree. Nor have they been able to solve *directly* the particular form  $x^n - 1 = 0$ . They know, however, that had they the *general solutions* for  $a, b, c$ , etc. in terms of  $A, B, C, \dots, Q$ , by making in them  $Q = -1$  and  $A, B, C$ , etc. zero, they would obtain  $n$  different symbolic expressions, each of which would have unity for its  $n$ th power; and, moreover, they would have

$Q = +1$  for their product, and  $A = 0$  for their sum, and  $B = 0$  for sum of products taken two and two, etc. Inasmuch as none of them can be zero, and no combination of  $+1$  and  $-1$  can meet these conditions, the sole remaining symbol (for all even degrees of extraction resolve into this)  $\sqrt{-1}$  must enter; and the roots containing it must be in pairs involving like terms multiplied by it with contrary signs, so that the sum of them all (which constitutes the coefficient  $A$ ), and the sum, in pairs (which constitutes  $B$ ), etc., shall all be zero.

But such general analytic combinations have never been arrived at (except for a few of the lower degrees) by algebraic solution. The real *symbolic* relation between exponentials and circular functions indicated by De Moivre's theorem (already given) led to the discovery of the roots of the particular form  $x^n - 1$ .

Suppose  $\theta$  to be zero or  $2\pi$ , or any even multiple  $2m$  of  $\pi$ :

the second member of (2) becomes  $1^n$ , while the first mem-

ber  $\cos \frac{2m}{n}\pi + \sin \frac{2m}{n}\pi \sqrt{-1} = 1$ . For  $1^n$ , therefore, we get as many symbolic expressions for the  $n$ th root of unity as we can give different forms to the first member by assigning to  $m$  values from zero to  $n$ . If, e. g., we take 12 for the value of  $n$ , we have the twelve roots, grouping them in pairs (since  $\cos 30^\circ = \cos 330^\circ$  and  $\sin 30^\circ = -\sin 330^\circ$ , etc.).

$$\begin{aligned} \cos 0^\circ + \sin 0^\circ \sqrt{-1} &= 1 + 0\sqrt{-1}, \\ \cos 30^\circ + \sin 30^\circ \sqrt{-1} &= \frac{1}{2} + \frac{1}{2}\sqrt{-1}, \\ \cos 60^\circ + \sin 60^\circ \sqrt{-1} &= \frac{1}{2} + \frac{\sqrt{3}}{2}\sqrt{-1}, \\ \cos 90^\circ + \sin 90^\circ \sqrt{-1} &= 0 + 1\sqrt{-1}, \\ \cos 120^\circ + \sin 120^\circ \sqrt{-1} &= -\frac{1}{2} + \frac{\sqrt{3}}{2}\sqrt{-1}, \\ \cos 150^\circ + \sin 150^\circ \sqrt{-1} &= -\frac{1}{2} + \frac{1}{2}\sqrt{-1}, \\ \cos 180^\circ + \sin 180^\circ \sqrt{-1} &= -1. \end{aligned}$$

In the sense of being *symbolic solutions*, these expressions are truly and perfectly such, and therefore completely *real*. We see also how curiously these solutions lend themselves to interpretation—almost flow from—the geometrical interpretation of *direction*, or the mechanical one of *rotation*. Each one of these roots, thus interpreted, indicates a unity-line, or radius, rotated from the normal  $+1$  direction through an angle which, *twelve times repeated*, restores that radius to that normal position.

For many fields of investigation this wholly logical interpretation of  $\sqrt{-1}$ , or modifications of it, is fruitful of results. Applied to the study of certain functions of a single variable (that is, of a single geometrical dimension), it led to the discovery by Abel of *double periodicity* in certain important and well-known functions, the theory of which, as developed by Cauchy, has led to results of great importance. From what goes before, it need excite no surprise that the consideration of imaginaries—so called—has played so important a part as it has done in the theory of equations, and it seems destined to equal potency in developing the theory of functions. "But," say the authors of the *Théorie des fonctions doublement périodique*, "to comprehend the importance of this idea we must do away with the sort of antagonism or opposition which has been permitted to subsist between what, up to the present time, have been called *real* and *imaginary* quantities."

Would it not be more correct to say that when we resort to symbols as aids to reasoning, we should dismiss the idea of *quantity* (to which, after all, we attach no very precise notions, blending in various ways the fundamental notions of *magnitude* and *number* with sundry incidentals thereto), and simply accept all the forms which under the laws of symbolization make their appearance, as *real*; at least so long as they are merely serving their purpose as aids to reasoning. There should then never have been a doubt concerning the legitimacy and truth of solutions obtained through agencies or intervention of the so-called imaginaries.

In thus claiming reality for the imaginary forms as legitimate symbolic instruments of investigation, it is not to be understood that, though geometrical interpretations have been found for imaginary expressions where only linear dimension is concerned, *all* imaginary forms are susceptible of or need other interpretation than that of "impossibility."

The Cartesian equations of the circle and the right line involve *two* dimensions of space measured by a common linear unit. We cannot, therefore, use either as a *direction* indicated by  $\sqrt{-1}$ . If we eliminate between them the symbol representing one of these dimensions ( $y$ , for instance), we have an "equation" of the 2d degree in  $x$ , the two roots of which are the values of  $x$  for which  $y$  is the

\* It is curiously illustrative that for the case of three real roots for equations of the third degree, these combinations are so purely *analytical* that they cannot be interpreted as expressions of magnitude.



same in the two equations: in other words and geometrically speaking, the two roots correspond to the abscissæ of the two intersections of the line with the circle.

If the perpendicular distance of the line from the centre exceed the radius of the circle, there can be no intersection; but this is a matter which results from assigning definite values to the symbols by which these relations are determined. Hence, these *analytical roots* must always exist under forms irrespective of such assignment, and whether there be intersection or not. If there be no intersection, there can be no linear value of  $x$ , answering as an interpretation of the result; if there were, it would be in direct conflict with the geometrical fact, and prove our symbolic

logic wrong. The symbol  $\sqrt{-1}$  which first revealed itself as one to which no idea of pure magnitude could be assigned, here comes in very logically (after specifying values) as the symbol of geometrical impossibility. Both planar directions of space have been appropriated otherwise, so that our former interpretations are excluded, and whether there may or may not be, nevertheless, some logical interpretation, is another question. For such a case that of "impossibility" is wholly sufficient, and the expression of it necessary. Nevertheless, the processes of analysis—and this is the point to be insisted on—take no account of the distinction between real and imaginary, so important in pure geometry. If, in the above example, we take the combined figure of circle and intersecting line and deduce certain properties (e.g. those concerning *poles* and *polars*), such properties may hold true and be predicated on purely analytical grounds (see Salmon, *Conic Sections*), though there be no real intersections. This principle "of continuity" is but another form of the proposition that the so-called "imaginary" forms of symbols are, in the purely symbolic regions of thought to which they legitimately belong, as real as any other symbolic forms.

It has been shown that the notion of " $n$  roots" to every equation of the  $n$ th degree is a purely analytical conception, founded upon the assumption that since the  $A, B, C$ , etc. of the equation are easily derived from the  $a, b, c$ , etc. of the factors ( $x - a$ ) ( $x - b$ ), etc., when the latter are known, the inverse operation must be practicable. But it is not, and it may be safely asserted, I think, that our algebraic symbols are not susceptible of the required combinations. All efforts to find them have failed for equations of higher than the 4th degree. It is reasoned, indeed, that there must be certain functions of  $A, B, C$  to express such real values of  $x$  as will satisfy the equation, since these values depend upon those of the coefficients. But this is another question; the hypothetically realizable analytical solutions could make no distinction between "real" and "imaginary;" they could differ from one another only by permutations of letters and signs, while the distinction of "real" and "imaginary" is an *after* result ensuing in the transition from the general to the particular.\* Values, indeed (if there be such), which satisfy the equation may be found with all desired accuracy by the tentative and test processes known to the "theory of equations" and "higher algebra," but these are not "roots" in the analytical sense. It would, therefore, in the writer's opinion, be quite warrantable to say that, instead of " $n$  roots," there are (in general) *no roots at all* to an equation of the  $n$ th degree, where  $n$  exceeds four. Conceptions due to symbolism, the symbolism which should exhibit them, is, as yet, quite as "imaginary" as the so-called "imaginaries" for which I have claimed a logical *raison d'être*, and a reality not only as agents of thought, but as true analytical solutions. That a higher transcendental analysis may yet give, in visible form, a "local habitation" to these "airy nothings," is quite possible, and, indeed, is rendered, by the theorem of Cauchy, and by other considerations, quite probable.

J. G. BARNARD.

**Imagination** [Lat. *imago*, an "image;" *imaginari*, to "imagine"]. An image is simply the representation of anything formed of real substance, but as in early times it generally set forth some being which had only a fancied existence, it soon became the base of a verb signifying not only the voluntary creation in the mind of literal things, but all formation of ideas or representations by modifying and combining conceptions. The first stage is clearly set forth by Glanvil when he says, "Now, our simple apprehension of corporal objects, if present, we call *sense*; if absent, we properly name it *imagination*." From this root, *imago*, which according to Vossius and Festus is derived from *imitor*, to "imitate" (*ab imitatione dicta*), came several words bearing varied meanings, as, for instance, *imaginosa*, "whimsical, full of strange fancies" and "conceits,"

and *imaginatus*, "fashioned or formed;" in all of which the English language has unfortunately not only followed the Latin, but even gone beyond it, as when, for instance, we hear "I imagine that you are in the right," instead of "I think" or "believe." The consequence of this weakness, so characteristic of Latin derivatives, has been to burden a few words, all from the same source, with very different meanings, the further result being frequently a great confusion of ideas, even among good writers. According to Addison, all that is pleasurable to the imagination—i. e. all that engages its active powers—is reduced to greatness, novelty, and beauty. Thus, the *imaginary* here chiefly involves three of the noblest attractions which can give value to a work, while Blair, on the contrary, uses it to signify simply the worthless. The German word for imagination, *Einbildung* (i. e. in- or on-building), is derived from *Bild*, an "image," but is more accurately defined and applied than its English synonym. "It is," says Kant, "the power to bring an image when absent before the perception;" while, according to Fichte, "it is the ability to *image* under the name of imagination." In analyzing the faculty we may first observe that when we recall the image of anything we simply remember, and do not in reality imagine it, though many people would misuse the word in this manner. If we recall the image involuntarily, but in any other relation than its own, we exert, so to speak, a passive imagination. But if we deliberately vary and combine ideas derived through observation or memory into new forms and relations, we then exert our active imagination. When the mind devotes its active power to truthful and practical objects, we recognize it as *reason*; when it gratifies simply taste, as for the new, the beautiful, or what is agreeable through association or culture, it acts as the imagination. In reasoning we select from or classify that which already exists or is created; in *imagining* we endeavor with this material to create. Hence, imagination is identified with invention and originality. In verbal expression its chief form is poetry, the identification of which art with original creation is shown in the Greek origin of the word *poesis*, from *poiein*, to "make;" also in the Old English word *maker*, a "poet."

Imagination is the guiding power in art, as reason is of science. In pure chemistry, geology, or astronomy the only object is to ascertain what exists. As science becomes technology—i. e. applied to specific wants, or creative—it also assumes the character of art. Our reasoning power, it may be said, occupies itself with discovering that which is true, which in turn is the basis of the useful; but imagination ministers chiefly and directly to pleasure. Between reason (or science) and art (or imagination) lies, however, a vast range of the application of skill to the *arts*, by which plural we understand something more practical and useful than art in its higher forms. But as no work of imagination can be successful as to the end in view without an outline of reason, so no rational investigation and no sciences appeal to human sympathy unless they be inspired with that spirit of originality which is akin to imagination. It is not unusual to say of men who write on the driest topics, though they confine themselves strictly to the subject, that they are *genial*—meaning that they manifest the keen and active interest caused by genius, and are quick to perceive and set forth what is new. Such minds are those in which imagination is active and makes itself felt, even while strictly reasoning. The poet without reason becomes fantastic, or so unreal that his works are most widely remote from aim or usefulness; while the man of science without imagination sinks into the mere analyst and dull investigator, who plays only a secondary part in the pursuit of truth. The concurrent opinion of mankind establishes the fact that there is such a thing as beauty, and a comparison of human intellect and of natural laws, as developed in form and color, gives us an approximate standard of the beautiful. The Venus of Milo is not only beautiful because people have been trained to think so, but because anatomy has determined that practical perfection agrees with the so-called *æsthetic*. Now, as the exercise of the imagination is a pleasure, and as the beautiful is a pleasure, the two possess a common ground; and it is with the latter that the former is chiefly occupied. It is true that the imagination, like nature, can, and often does, display its power in that which is repulsive, but in precisely the same proportion both seem to act most naturally on the agreeable, the harmonious, or, in a word, on the beautiful. Hence it is generally agreed that the greatest artists, whether painters or sculptors, and the best poets, are also the most imaginative of men; and it is certain that the first among them have devoted their powers to setting forth that which is most purely agreeable—that is, what is most beautiful. The craving for novelty, variety, and contrast is a deeply seated want, Nature herself indicating this in

\*Even the appearance of an essentially imaginary form  $1 - a^2$  would not prove non-reality; for we have observed that in the simplest case of the 3d degree real roots appear inextricably involved in imaginary forms.



the constant changes and effects which she makes in colors and in all things. When the imagination leaves the purely beautiful, and busies itself more with widely varied elements for the sake of gratifying the taste for change and contrast, it develops the appalling, the startling, the grotesque or quaint; and when some remarkable incongruity presents at the same time a resemblance to something congruous and real, it gives us humor with its subordinate form, wit. Hence we may say that a writer has a witty imagination, or one which is humorous, grotesque, terrible, or appalling. The same general faculty, that of creativeness, of originating forms and combinations which never existed, underlies all these different developments. It may be observed that there are arts in which a great degree of feeling, whether of beauty, humor, horror, or other sentiments, may be excited with but little imagery—i. e. with comparatively little creative imagination—as by music, which acts through ill-defined association; and there are also artists who can produce great effects without much imaginative effort. For imagination is always creative in proportion to its integrity, and though great effects may be produced, they are not due entirely to the imagination of the artist when by suggesting he causes the beholder to complete the work in his own mind. Many modern paintings illustrate this. The connection of association with imagination, as of actual thought and mere emotion, is difficult to analyze, and yet it is in this obscure realm that our creative faculty, often with very little material, exerts some of its most startling effects. A flash of light in darkness or a mysterious whisper will excite the imagination into presenting the most extraordinary forms or apprehensions; and of this we have remarkable illustrations in the witch-maniacs, vampire-faiths, and similar mental epidemics which have swept over Europe. When the brain is so affected that imagination alone remains active, without the guiding power of reason, insanity invariably exists, while the mind utterly devoid of imagination is that of an idiot. It has been observed that as the flower precedes the fruit, so in the history of races the period in which imagination exerts its principal influence always goes before a more matured and rational age. Thus, the Middle Ages presented in contrast to the nineteenth century a carnival of gay, beautiful, and grotesque life, inspired by imagination, and not without full development of all its darkest and most mysterious forms. Due regard should be had to the true meaning of the imagination in the use of certain words which partake of its nature. One of these is *fantasy*, from which is derived "fantastic." It is generally held that the more a work of imagination is separated from the reasonable, and the more it is devoid of actual meaning or what is popularly understood by a moral, the more fantastic does it become. A work may be highly imaginative without being fantastic, but it is difficult to conceive of any fantastic work proceeding from human will which is not of the imagination. Dreams in their relation to thought and the cello harp in music are purely fantastic, and the word is well applied to such writings or paintings as resemble them. Closely allied to the fantastic is the *grotesque*, in which, however, the chief distinction is simply as to form and material. When the parts of a composition are extremely varied, novel, and unexpected, it is grotesque. It may have both meaning and moral, but while it is in substance like the fantastic, it differs from it in this, that the fantastic need not necessarily be varied and novel in its elements or inspired with startling incongruities. By *fancy* we understand the imagination when it creates fantasies. Common usage, however, while it allows to fancy an action in what is light and graceful, seems to separate it from the fantastic, as though the latter were more extravagant or more nearly allied to the grotesque. To fancy may, in fact, be defined as to imagine, to believe, or to conceive without certainty. To fancy in the sense of to like implies that a downright, deeply settled desire is not as yet in being, but only that imagination has surrounded the object with agreeable associations. In one sense, to fancy is used as a synonym for to imagine, which is, strictly speaking, incorrect, since in expressing the act of imagining we should qualify it with some word indicating whether it be devoid of reason.

CHARLES G. LELAND.

**Imbecility.** The term imbecility, at law, follows in interpretation the etymology of the Latin adjective *imbecillus*, from which it is derived, and means "weakness of mind." But inasmuch as its import, when applied to the admeasurement of civil rights and responsibilities, is one of variable character, the law treats it as a condition of *qualified* rather than *absolute* incompetency. Hence, the acts of imbeciles, whether in the nature of contracts, wills, or torts, are always open to the suspicion of lacking a legally assenting mind, and as such the former are voidable wherever things can be restored to their previous con-

dition. In the Roman law a refined distinction was made between incapacity arising from mental weakness and that arising from disease. In the former case it placed the party under a *tutor*, in the latter under a *curator*. The former were regarded as mental infants, or minors whose weakness age might cure if of the male sex, while women were held to be perpetual minors and always under guardianship. (See *Instit.*, lib. 1., tit. xiii., *de Tutelis*.)

The liberality of the common law has never tolerated such refinements in mental discrimination between the sexes as this, nor imported such subtle distinctions into the field of guardianship. Under its canons imbecility derives no special complexion from the sex of its subjects, and their acts are never weighed *per se*, so much as *quoad hoc*, or in relation to the merits of a particular transaction. Imbeciles being possessed of some share of mental capacity, whatever may be its degree, are not therefore disqualified from performing legal acts involving legal responsibilities. But their acts are always looked upon with suspicion, as likely to be influenced by fraud or compulsion; for it is particularly against extraneous influences that such persons need to be guarded. Says Mr. Justice Story in this connection: "The acts and contracts of persons who are of weak understanding, and who are thereby liable to impositions, will be held void in courts of equity if the nature of the act or contract justify the conclusion that the party has not exercised a deliberate judgment, but has been imposed upon, circumvented, or overcome by cunning or undue influence." (1 *Eq. Jurisp.*, § 238.) Under this principle any misrepresentations, over-importunities, improper influences, or anything, in fact, which limits the free moral agency, will tend to annul the acts of an imbecile, although they might not be sufficient to operate coercively upon an ordinary mind; for legal competency must be estimated by the character of the act performed, as well as by the mental power of the actor; and it is by this rule alone that an equitable interpretation can be applied to the contracts of a person alleged to be imbecile. It will be seen by this that the contracts of such persons, whether of marriage, purchase or sale, labor or hire, are not necessarily void, but simply voidable, upon proof that they were made under circumstances disadvantageous to a right comprehension of their full import by the party of weak understanding, and provided always that things can be restored to their original status. But an imbecile has the same right as any other person knowingly to enter into a contract where the advantages to be gained are not mutual. The law can only protect him so far as he did not know the true nature and consequences of the act he was performing, and to that same extent could not be said to have given a legal assent to the transaction.

The voidability of any contract made under such circumstances will further depend upon the fact of its present condition. Is it still *executory* or is it *executed*? And if the latter, to what extent? If not completely so, and the condition of the things operated upon by the contract is not materially altered, then the contract may be annulled, and the parties restored to their previous condition. But in the case of wholly executed contracts, this reintegration of parties cannot always be accomplished without serious detriment to third and innocent parties, who have acted *bona fide* and in ignorance of the taint in the original contract. Hence, in such cases the contract will have to stand, and the injured party must seek his remedy in another way, for here equity follows the law.

In regard to *wills* made by imbeciles, whether the imbecility be congenital or supervene as a consequence of old age, the general rule is to allow the instrument to prove the capacity of the testator, and not to set it aside as void *ab initio* because executed by a person of weak understanding. The subject-matter of wills differs so widely that an imbecile may often find it entirely within the range of his comprehension to dispose rationally of what he possesses. Particularly is this the case where personal property is involved, and the leniency of construction put upon the condition of such testators has always been deemed wiser and more humane than to insist upon the possession by them of a mental power superior to the necessities of the act to be performed. Hence, wills have been sustained where testators were very aged and greatly debilitated; where they were very deaf and partially blind; where they were so paralyzed as to be unable to write or feed themselves; and where they exhibited ridiculous eccentricities in conduct or religious belief. In all the above cases it was shown that they had reason enough to know intelligently what they were doing. The law asks no more. Whatever, therefore, may be the physical condition of a testator, either as to age or bodily infirmities, so long as he has the mental ability to perform the act intelligently, his legal capacity cannot be called into question.

As to *torts* committed by imbeciles, they are placed upon



the same footing as those committed by the insane, and their estates are responsible in civil damages to any party aggrieved. Whenever the tort becomes a crime with a personal penalty affixed, then the legal responsibility of the wrongdoer will be tested by a similar standard to that applied to those who labor under partial insanity. The analogy upon which this rule is founded is not a perfect one in any sense, since mental weakness in the imbecile is not contemporary with actual physical disease, as in the insane; but it serves the purposes of justice and humanity best to associate these two classes into one category, because the law does not concern itself so much with the possible causes of mental weakness as with their consequences upon human conduct; and if an act be done by any mind incompetent at the time to act intelligently and as a free moral agent, it is alike the act of an irresponsible being, whether that being be styled imbecile or insane. In either case the law considers the *malus animus* to be wanting. But this does not negative the fact that both imbeciles and persons partially insane are often found who are legally competent to commit crimes, and if so are fit subjects for punishment.

JOHN ORIBONAX.

**Imbert'** (BARTHOLOMEW), b. at Nîmes in 1747; studied in his native city, and removed in 1767 to Paris, where he engaged in literary pursuits, and d. Aug. 20, 1799. His poem, *Le Jugement de Paris* (published in 1772), achieved a great success, but in spite of the many small triumphs which he enjoyed in nearly all fields of fiction, tragedy, comedy, etc., the only work which has proved to be of lasting interest is his *Choix d'anciens fabliaux*, in verse (2 vols., 1788).

**Im'bros** [*Iaspos*, now *Embro*], a Turkish island of the Egean, 11 miles W. by N. of the entrance to the Hellespont. It is 18 miles long from E. to W., and contains several villages, though none of them are historically important. The island is rough and wooded, but very fertile, producing corn, wine, oil, and cotton. The highest peak is 1845 feet above the sea. Pop. 4000.

**Imhof** (JACOB WILHELM), b. at Nuremberg Mar. 8, 1651; studied at Altorf; travelled much in Germany, the Netherlands, France, and Italy, and settled in 1673 in his native city, where he devoted himself to genealogical studies, and d. Dec. 20, 1728. His most important works are—*Spicilegium Ritterschannica*, 6 vols., Tübingen, 1682–85), containing seventy new genealogical tables, and *Notitia S. R. G. Imperii processum*, 2 vols., Tübingen, 1684), of which a fifth edition was issued in 1732, containing fifteen plates of arms. He has also given numerous genealogical contributions to English, French, and Italian history.

**Im'ides**, monamides in which two atoms of hydrogen are replaced by a diatomic radical, as *succinimide*,  $\text{N}(\text{C}_4\text{H}_4\text{O}_2)_2\text{H}$ , and *pyrotartarimide*,  $\text{N}(\text{C}_4\text{H}_5\text{O}_4)_2\text{H}$ . (See AMIDES, by PROF. C. F. CHANDLER, Ph. D., M. D., LL.D.)

**Imitation**. In music, a subject, group of notes, or short strain is said to be *imitated* when, after its first appearance, it is repeated, with more or less exactness, by one or more of the various parts of the composition. Imitations of a given theme may take place, under certain conditions, on any of the intervals of the diatonic scale, and admit of great diversity in their treatment. Imitations may be either *strict* or *free*, *direct* or *inverted*, *retrograde* or *inverse-retrograde*. In strict imitation the answer must correspond exactly with the theme, not only in movement, degrees of the scale, and quality of notes, but also in the succession of tones and semitones in each step of its progress. This rigid species of imitation is practicable only under certain limitations, on account of the peculiar structure of the diatonic scale. If the scale consisted of a regular succession of *chord tones*, it is evident that a given theme might be repeated on any degree of such a scale without undergoing any material change or distortion. But as the scale really is a succession of *tones* and *semitones* in a certain fixed order, it follows that a theme when moved from its place to a higher or lower one on the scale (the octave excepted) will no longer be strictly true in the succession of its intervals. In *free* imitation all this precaution is unnecessary, as a general resemblance to the theme is sufficient.

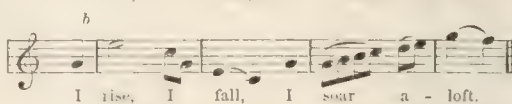
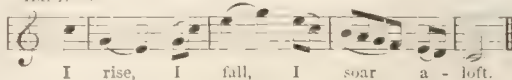
WILLIAM STAUNTON.

**Im'itative Mu'sic**. Under this term is comprehended such music as is intended to be representative, descriptive, or suggestive of certain ideas and things *external to the music itself*—i. e., to music considered as mere melody and harmony. Music thus possesses two distinct properties or offices. A strain of music may be beautiful, grand, and impressive in its own nature, and capable of producing in the mind certain peculiar feelings and sentiments not obtainable from any other agency; or, on the other hand, music may be so contrived and ingeniously written as to bear so near a resemblance to particular external objects, sounds, motions, and even strongly-marked events, as to

recall them to the mind of the hearer, *in addition* to the emotions arising out of its own intrinsic powers and emanating from itself alone. A similar effect may also result from mere association of ideas—as, for instance, when theatrical music reminds us of the theatre, and church music of the church, because the music and the place where it is generally heard have become associated together in our minds. But such a case must not be confounded with what we call imitative music. Nor can the mere reproduction of certain sounds under new conditions—as, for instance, when the actual notes of the hunter's horn, the military bugle, or the chimes and changes of church-bells are played on other instruments—be included under this term; they are mere copies.

The simplest kind of imitative music is that which represents *motion*, whether on an even plane, or on ascending and descending grades, or by leaps from high to low, and low to high, etc. There seems to be some mysterious analogy very generally felt between the grave or acute in the musical scale and the familiar idea of depth and height. When we move from the graver part of the scale to the more acute we call it *ascending*, and progress from acute to grave we call *descending*. A sound is said to be *high* or *low* in proportion as it is acute or grave, and the extremes are regarded as very deep, profound, and abysmal, or very high, lofty, and soaring. Advantage is taken of this impression by composers when they connect with words signifying motion, height, depth, etc. notes suggesting corresponding ideas. That this resemblance is not altogether arbitrary or fanciful, but founded on some natural principle, will appear from an examination of EX. 1. where at *a* the music and the words seem to be in antagonism, while at *b* they mutually support each other:

EX. 1.—*a*



Among imitations, properly so called, are those representative—or at least suggestive—of a large class of *noises* or *unmusical sounds*, such as the roar of cannon, the clashing of swords, the tramp of horses, the steady marching of troops, the cries of wounded men, the wails of the distressed, and the groans of the dying; the solemn movement of a funeral procession, and the elastic spring of merriment in a ball-room; the familiar sounds uttered by domestic animals, the lowing of cattle, the screams and roaring of wild beasts, the croaking of frogs, and the buzz of insects; the pattering of rain and the clatter of hail; the roll of distant thunder, the moaning of the wind, and the furious rushing of the storm. All these and many other noises, including crying, sneezing, and uproarious laughter, the hum of the old spinning-wheel, the strokes on the smith's anvil, the chirp of the cricket, and the rocking of the cradle, have been imitated with more or less success in musical compositions; or, in other words, musical forms and combinations have been so used as to remind the hearer of things which are essentially *unmusical*.

More nearly approaching the sounds represented on the diatonic and chromatic scales are the songs or utterances of certain birds, to which may be added the crowing of cocks, the alarm-cry of hens, the cooing of doves, the solitary notes of the cuckoo, and the dismal screech of the night-owl; also the tap and roll of the military drum, the half musical cries of sailors in hoisting and of hawkers in the streets, together with the rude noises of barbaric music and gypsy songs. Some of these may be imitated so closely as to be understood or recognized by the hearer without effort or previous admonition. With less distinctness music may be made to represent the calmness of eventide, the sweets of pastoral life, the tumult of war, the raging of the sea, the noise of floods, earthquakes, tornadoes, etc. Very few persons, on hearing the introductory movements to Haydn's *Seven Last Words* and the *Creation*, would suspect that the former was intended for an earthquake, or that the latter was set forth as a "representation of chaos."

The most extraordinary of all musical imitations are those which profess to deal with objects not of hearing, but of *sight*. There is an apparent absurdity in all such attempts to represent through one sense things that belong to another. And yet between sight and hearing a certain correspondence has been found to exist, sufficient to form a basis for a partial interchange of symbols. It is very necessary, however, for complete success that the *hearer* should be apprised *beforehand*, or by words annexed, what



it is that the music is intended to represent. More than half of the effect lies in the preparation of the hearer's mind: for the very same music might have been used—had the composer so pleased—for the stirring up of an entirely different class of emotions. Haydn's representation of the creation of light, for example, has been both severely criticised and enthusiastically admired. In itself, it is doubtless nothing more than a common major triad coming with sudden force on the ear as the termination of a progression in the minor mode. In any other connection, or in any other piece, it would have attracted no special notice: but the hearer's mind having been prepared by the previous words and music, and brought into an attitude of eager expectancy by the Divine command, "Let there be light," he is forcibly struck with the outburst on the words, "And there was light," so that, as Bombet remarks, his eyes are dazzled, "as by the flash of the midday sun on one just emerging from a dark cavern." Many other visual objects are thus successfully illustrated in musical works by an appeal to the ear, as may be seen in the *Creation*, the oratorios of Handel, Spohr's *Last Judgment*, Mendelssohn's *Elijah*, etc. Among these objects are the brooding of darkness over the deep, the fall of the apostate angels, the rushing floods, the upheaval of mountains, the rising of the sun and moon, the growth of plants, the whirl of insect life, the leaping of deer, the dark and bright sides of nature, decay and death, and finally the resurrection. But music representing these, however skillfully written, cannot be its own interpreter from the very nature of the case. When, however, its meaning is conveyed by words or otherwise to the hearer's mind, there is no difficulty in tracing resemblances, even though their vividness must depend, for the most part, on the help of imagination.

WILLIAM STAUNTON.

**Im'lay**, post-tp. of Lapeer co., Mich. Pop. 1243.

**Im'lay City**, post-v. of Imlay tp., Lapeer co., Mich., on the Chicago and Point Huron R. R., 34 miles W. of Port Huron. It has a very large grain-elevator.

**Immaculate Conception of the Virgin Mary**, a modern dogma of the Roman Church, proclaimed by Pope Pius IX. on the feast of the Conception, Dec. 8, 1854, in the church of St. Peter, and in the presence of more than 200 cardinals, bishops, and other dignitaries, in these words: "That the most blessed Virgin Mary, in the first moment of her conception, by a special grace and privilege of Almighty God, in virtue of the merits of Christ, was preserved immaculate from all stain of original sin" (*ab omni originalis culpe labe preservatam inveniunt*). This the papal bull "Ineffabilis Deus" declares to be a divinely revealed fact and dogma which must hereafter be constantly believed by all Catholics, on pain of excommunication. The dogma was not sanctioned by any oecumenical council, but since the Vatican Council of 1870 declared the pope infallible, independent of a council, the decree of 1854 must be received as an infallible utterance, and cannot be changed. Pius IX. had previously, by an encyclical of Feb. 2, 1849, invited the opinion of the Catholic bishops on the subject, and received more than 600 affirmative answers; only 4 dissented from the pope's view, and 52, while agreeing with him in the dogma itself, deemed it inopportune to define and proclaim it. This shows that the tendency of the Roman Church was strongly in this direction. The dogma of the immaculate conception and the Vatican dogma of papal infallibility are the characteristic features of modern Romanism, as distinct from the Romanism of the Council of Trent, and widen the breach between it and the Greek and Protestant churches. By the decree of 1854 the Virgin Mary is taken out of the family of the redeemed, and declared absolutely free from all complication with the fall of Adam and its consequences. The definition of such a dogma presupposes a divine revelation, for God omniscient alone knows the fact of the immaculate conception; and as the Bible nowhere informs us of it, God must have revealed it to Pius IX. in 1854, either directly or through the voice of the 600 bishops assenting to his view. But if he is really infallible, he did not need the advice of others.

From the Roman standpoint this dogma completes the Mariology and Mariolatry, which step by step proceeded from the perpetual virginity of Mary to her freedom from actual sin after the conception of the Saviour, then to freedom from sin after her birth, and at last to her freedom from original or hereditary sin. The only thing left now is to proclaim the dogma of her assumption to heaven, which has long since been a pious opinion in the Roman Church. To this corresponds the progress in the worship of Mary and the multiplication of her festivals. Her worship even overshadows the worship of Christ. She, the tender, compassionate, lovely woman, is invoked for her powerful intercession, rather than her Divine Son. She is made the fountain of all grace, the mediatrix between Christ and the

believer, and is virtually put in the place of the Holy Ghost. There is scarcely an epithet of Christ which devout Roman Catholics do not apply to the Virgin (see St. Liguori's *Glories of Mary*), and Pope Pius IX., who is himself an intense worshipper of Mary, has sanctioned the false interpretation of Gen. iii. 15, that she (not Christ) "crushed the head of the serpent."

As to the history of the dogma, no passage in its favor can be found in the Old or New Testament (for the interpretation of the *Protoevangelium* just alluded to is clearly ruled out by the Hebrew text). On the contrary, the Bible declares all men to be sinners and in need of redemption, and exempts Christ alone, the sinless Redeemer, from this universal rule. Mary herself calls God her Saviour (Luke i. 47), and thereby includes herself in the number of the saved; which implies her sense of personal sin and guilt. With this corresponds also the predicate given her by the angel (i. 28), *endued with grace, highly favored* (*κεχαριτωμένη*), which the Vulgate has mischievously changed into the active *gratia plena, full of grace*. The Christian Fathers, though many of them (even St. Augustine) exempted Mary from actual transgression, know nothing of her freedom from original sin, but always imply, and often expressly teach, the contrary. Some, as Irenæus, Tertullian, Origen, and Chrysostom, interpret Christ's words at the wedding of Cana (John ii. 4) as a rebuke of her unreasonable haste and immoderate ambition. The origin of the dogma must be sought in the Apocryphal Gospels, which substituted mythology for real history, and nourished superstition rather than rational faith.

The doctrine crept into theology through the door of worship. The first clear trace of it is found in the twelfth century, in the south of France, when the canons of Lyons introduced the festival of the conception of the immaculate Mary, Dec. 8, 1139. This proves that the belief then existed as a pious opinion, but by no means as a dogma. On the contrary, St. Bernard, the greatest doctor and saint of his age, opposed the new festival as an unauthorized innovation, derogatory to the dignity of Christ, the only sinless being in the world. He asked the canons of Lyons whence they discovered such a hidden fact. On the same ground they might appoint festivals for the conception of the mother, grandmother, and great-grandmother of Mary, and so back to the beginning. The same ground is taken essentially by the greatest Schoolmen, as Anselm, Bonaventura, Albertus Magnus, Thomas Aquinas. But during the fourteenth century, through the influence chiefly of Duns Scotus, "the subtle doctor," the doctrine of the immaculate conception became a part of the theology of the Franciscans or Scotists, and was a bone of contention between them and the Dominicans or Thomists. They charged each other with heresy for holding the one view or the other. The Council of Trent did not settle the question, but rather leaned towards the Franciscan side. Soon afterwards the Jesuits took up the same side, and defended it against the Jansenists. To their zeal and perseverance, and their influence over Pope Pius IX., the recent triumph of the dogma is chiefly due. The whole Roman Catholic world quietly acquiesced until the Vatican Council roused the "Old Catholic" opposition against papal infallibility, which extended also to the dogma of the immaculate conception.

**Literature.**—The papal bull *Ineffabilis Deus* (Dec. 8, 1854); Perrone, *On the Immaculate Conception* (Latin, German, etc., 1849); Passaglia, *De immac. Deipara semper Virg. conc.* (1854 seq. 3 vols.); Preuss, *The Romanish Doctrine of the Immaculate Conception* (German and English, 1865); Pusey, *Eirenicon* (part ii., 1867); H. B. Smith, *Method. Quarterly Rev.* for 1855; Hase, *Handbook of Protestant Polemics* (1871). Of older Catholic works we mention J. Turresemata, *De veritate conceptionis beat. Virginis* (1547; republished by Pusey, 1869); and J. de Launoy, a Jansenist, *Prescriptions de Conceptu B. Mariæ Virg.* (1677), both against the immaculate conception.

PHILIP SCHAFÉ.

**Im'mermann** (Karl LERBECHT), b. at Magdeburg Apr. 24, 1796; studied 1813 at Halle; took part in the campaign of 1815, and wrote, in opposition to the political enthusiasm prevailing at that time at all German universities, *Über die Streitsigkeiten der Studierenden in Halle* (1817), which book was solemnly burnt at Wartburg by the students. Shortly after he received a government office in his native city, whence he removed to Münster in 1823, and to Düsseldorf in 1827. From 1834 to 1838 he undertook the management of the theatre of Düsseldorf, in which, however, he succeeded only partly, though his perfect taste and pure enthusiasm exercised a beneficial influence on the German theatre. The most remarkable of his many comedies are *Das Aepf der Liebe* (1824) and *Die Schule der Frauen* (1829); of his tragedies, *Alcibiades* (1832) and *Ghiemonda* (1839); of his romances, *Epigonen* (1836) and *Münchhausen* (1838). As an author he had



more artistic training than natural talent, and a greater power of reflection than of imagination or feeling; very charming, however, is his tale, *Telleranchen* (1830), on account of its naïveté. His controversy with Platen made a great sensation, or rather scandal, and brought no results. D. Aug. 26, 1840.

**Immortality (of the Soul)**, the doctrine that the human soul is imperishable, being separable from the body at death and destined to a conscious life beyond the grave. The history of this doctrine is the history of the development of the idea of substantiality, or, indeed, of the idea of God. Without a personal God there could be no immortality. If the substantial is found to be a rigid, lifeless substance or an unconscious force, there can be no persistent individuality. But, in spite of philosophical or theological tenets, the belief in a future life is almost universally prevalent. Among degraded savages, as in Central Africa, it takes the form of demonology, or belief in spectres or ghosts. In Asia, where the theological dogmas do not reconcile the Universal or Absolute with the existence of the individual being, making the Supreme Being an unconscious substance destined to absorb the individual man at death, still the popular belief holds to the doctrine of immortality. Egypt is especially noted as the country where great stress was laid on the doctrine of immortality. The temples, sphinxes, statues, and pyramids, all had some suggestion of the future life of the soul. The cycle of the rise and fall of the Nile, and of the life of the seed in its germination, growth, fruit-bearing, and decay, is closely connected with the doctrine of immortality. The soul's cycle is set at 3000 years, after which it returns from its wanderings to the body again. Hence the care with which the Egyptians preserved the body by embalming it, and the extravagant outlay of human labor on the Pyramids as tombs of the kings and symbols of their faith. With Greece the Oriental idea of the subordination of the soul to nature gives way for a more spiritual theory. The Greek conceives the spiritual as something independent of, or at least as a reaction against, nature. Spirit is essentially self-determining and free. The portrayal of its ideals of free activity gave to the world the forms of the divinities of Olympus. The Titans or powers of nature are subdued and made serviceable to spirit. The Roman phase of civilization is devoted to the formulating of the will into laws and defined rights. The subordination of the individual to the general will as embodied in the state is the characteristic Roman principle. Immortality, with Greece and Rome, assumed a definite shape, elevated far above the Oriental conception, inasmuch as it eliminated the principle of transmigration. But there was not an adequate realization as yet of the principle of infinite responsibility, which the Christian religion first added to that of the immortal destiny of the soul, making man, moreover, the object of divine mediation. The growth of the idea of the substantiality of the soul, as thus traced, is marked in the world's history by the corresponding growth of institutions of a humanitarian character.

The proofs of immortality are numerous and of varying degrees of strictness. Among those most relied upon by the popular mind are the following: I. The return or resurrection from the dead. II. General belief in the existence of the soul after death; probability that such general beliefs of mankind are well founded. III. General desire of man to live for ever, and his horror at annihilation. IV. The infinite perfectibility of the human mind, never reaching its full capacity in this life; contrary to the course of nature or to the Divine character to endow a being with capacities never to be developed. V. The fact that perfect justice is not dispensed in this life; the good suffer and the wicked triumph; necessity of future retribution to justify God's government.—The metaphysical doctrine of immortality includes various positions, favorable and unfavorable, the most important of which are the following: I. The highest principle is regarded as indeterminate—pantheism; consciousness considered to be a disease or evil of which death or unconsciousness (Nirvana) is the cure. II. Highest principle a rational intelligence—monotheism; the soul a transient incarnation which vanishes in death (Arabic interpretation of Aristotle). III. The soul held to have pre-existed in an intelligible world, and to have come hither through a lapse from holiness or for necessary experience; death releases the imprisoned soul, and it rejoins its former state or enters a new body (emanation theory—Plato). IV. Aristotle's doctrine of the pure reason (*voûs*) as an unconditioned energy, imperishable, while the lower faculties of the soul, such as sensation, imagination, feeling, memory, etc., are perishable. This doctrine has been the occasion of much controversy. An immortality which should cut off an individual from his past would not preserve his identity. But the experience of ordinary life exhibits to us a constant wan-

ing of the faculties of mere sensuous perception, of mere mechanical memory, and of fancy, with a corresponding increase of the higher faculty of inference or reason. Hence, the lower faculties may be said correctly to be perishable, while the faculty of insight, which sees in an individual all its past history at a glance, is immortal or continually on the increase. The immortal life would use the perishable faculties less and less, but might never lose them altogether. The disputes of the Schoolmen over this question were very essential to the support of the Christian dogma. V. From the time of the Schoolmen, arguments in favor of immortality, drawn from the "simplicity of the soul," were in vogue, and especially elaborated by the Leibnitz-Wolfian philosophy. VI. Kant attacks all theoretic proofs of immortality as based on a paralogism involving an unwarranted inference from the phenomenal appearance of the soul as *Ego* to the same as *Noumenon*. But he finds immortality to be established as a practical postulate of the Will. VII. Hegel exhibited immortality as the essential attribute of conscious beings, denying it to animals (in the closing chapter of his *Philosophy of Nature*). Recent discussions of the subject have been rather skeptical in their tendency, especially in Germany, England, France, and America, owing to the prevailing evolutionary theories in science. German literature was quite prolific in treatises on immortality for several years after the death of Hegel. Feuerbach, Strauss, Conradi, Michelet, F. Richter, and others held a negative attitude toward the doctrine, and contended that the only immortality is that of the race or species. Marheineke, Blasche, Weisse, Hinrichs, Fechner, J. H. Fichte, and, above all, Gûschel, defended the doctrine of individual immortality. W. T. HARRIS.

**Immortelles'** [Fr., "immortal"], or **Everlasting Flowers**, are flowers largely employed in Europe, especially in France, for the manufacture of wreaths and crosses for the adornment of churches and cemeteries. The *Helichrysum Orientale*, a native of Crete, but much cultivated in Southern France, is the flower chiefly used for the above purpose, though there are many other genera of plants, such as *Rhodanthe*, which are also occasionally employed. The use of immortelles in America is of recent origin, and they are usually imported from France.

**Imola** [Lat. *Fœnum Coecæ*], town of Italy, in the province of Bologna, about 20 miles E. S. E. of the city of Bologna. It was enlarged and embellished, if not actually founded, by the dictator Sulla, who sent a colony here about 80 B. C., and throughout the Roman period it was a town of some importance. Cato had a villa here. During the Middle Ages it was claimed by the see of Rome as a part of the gift of Constantine, but was subject to frequent assaults and occupations by the rival powers that then divided the Peninsula. From the time of Julius II. it formed a part of the Roman states, except when held for a short time by the French in 1797, until the whole papal territory was annexed to the new kingdom of Italy. The town is well built, and surrounded by its old walls with towers and trench. Its manufactures, leather, wax, glass, majolica, silk, and hempen stuffs, are very considerable. A choice wine called *vino santo* is made here. Pop. about 12,000.

**Imola** (INNOENZIO FRANCESCHI), an Italian painter of Bologna, an imitator of Raphael. D. 1549.

**Impale'ment, or Empalement** [Lat. *in*, and *palus*, a "stake"], a form of capital punishment by means of a stake thrust through the body. The victim was often raised up from the earth, and one end of the stake was driven into the ground; hence the Greeks applied the name *σταυρωσις* ("stake-punishment") to crucifixion as well as impalement. Impalement is still practised in half-civilized and barbarous countries. The driving a stake through the heart of a suicide and his burial under the cross-roads arose, it is believed, from a fear that his spirit would otherwise walk and frighten the living.

**Impana'tion** [Lat. *in*, and *panis*, "bread"], a term belonging to the Eucharistic controversy, invented soon after, and in opposition to, that of *Transubstantiation*. It was intended to express the intimate union of the blessed body and blood with the consecrated elements, without a destruction of the substance of the bread and wine. Rupert, abbot of Deutz near Cologne (d. 1135), who first used the word, likened the mystery implied to that of the incarnation, wherein the divine nature was conjoined with the human nature in the one person of Christ. By body he meant that which hung upon the cross, and by blood, that which flowed from the Crucified; but yet he denied the real presence in a gross and carnal sense: "Fit corpus Christi et sanguis, non mutatum in carnis saporem sive sanguinis horrorem, sed," etc. Impanation, like all terms intended to simplify our conception of a mystery, is liable to misinterpretation, and is not now used by any one as expressive of his own views. W. F. BRAND.



**Impeachment**, in law, is commonly used to denote a mode of trial of a criminal offence. The same word is used in the law of evidence to mean the act of discrediting a witness before a jury or court trying a question of fact, by showing that he is unworthy of belief. In this article it will be employed exclusively in the sense first pointed out.

In the early English law when a crime was committed it was regarded in three aspects—either as an injury to the individual or his family, to the king, or to the state or nation. The injury to the individual was prosecuted by a proceeding called an appeal; that supposed to be done to the king or executive officer, by indictment; while the wrong done to the state was redressed by a proceeding termed an impeachment. The appeal having become obsolete, there remained two great criminal proceedings—indictment and impeachment. The resemblance between an indictment and an impeachment should be briefly noticed. The office of an indictment is to present to an ordinary court of justice the opinion of a select body of citizens that there is apparent reason to believe that there has been a criminal violation of law by a specified person. Notwithstanding this, the law still presumes his innocence, and takes no action against him except that which is necessary to secure his attendance at the trial. Ultimately, the case is presented to another (or trial) jury, by whom the result is determined, either acquitting or convicting the person charged in the indictment. It is apparent that an indictment is but a mode of procedure adopted for the purpose of securing caution and deliberation in judicial affairs. It presupposes the existence and definition of the crime for which the prisoner is to be tried.

The same general train of thought is present in the case of an impeachment. Instead, however, of being made by a small number of persons, it is a presentment of the House of Commons as representing the state. It is made in writing under the name of "articles of impeachment." The articles are presented before a tribunal acting judicially—not, it is true, an ordinary court of justice, but the entire House of Lords. The Commons may impeach for any crime, whether it be a felony or misdemeanor, no matter by whom committed, whether a peer or commoner, and may attach to conviction the ordinary punishments. There is one important distinction that should be noticed between the two modes of proceeding. An indictment can only be found in a particular county, and in general only in that where the offence was committed. An impeachment, from the nature of the case, is confined to no locality. It has been sometimes resorted to in England for the prosecution of an ordinary crime, to avoid the necessity that would otherwise exist of prosecuting the case by indictment in a particular county. The effect of an impeachment by the House of Commons, like an indictment by a grand jury, is only an affirmation that there is reason to believe that there has been a violation of law by the person impeached. It must be conducted in accordance with rules of evidence. The person impeached can only be convicted of a crime already known to the law to which regular methods of punishment can be attached.

A court of impeachment should be distinguished from the "court of the lord high steward." This court is organized in the following case. Whenever a peer of the realm is indicted in an ordinary court of justice, in order that his case may be removed to be tried by his peers, the king issues a commission to a particular nobleman to act as judge, who is then called, for the time being, "lord high steward." By the commission other noblemen are associated with him to decide the questions of fact which may arise in the case. The court is therefore substantially composed of a judge and jury. It differs from a court of impeachment in three respects: it can only dispose of the questions arising upon an indictment found by a grand jury; it may, and perhaps must, sit during a recess of Parliament; and it may consist of a small number of peers (e. g. twelve), instead of the entire house. It is a court that a king might easily pack with his own creatures in order to ruin an obnoxious nobleman. This is forbidden by statute in cases of trial for treason, and the entire House of Lords must in that case be summoned. As the presiding officer of the court of impeachment in capital cases is also termed a "lord high steward," much care is sometimes required in reading legal history to distinguish between the two tribunals.

The judicial nature of an impeachment is also readily seen by contrasting it with a bill of attainder or of pains and penalties. These latter are mere laws. The houses of Parliament in passing such bills enact that a person is guilty of a crime. Though they may go through forms of judicial inquiry, their decision is a law and not a judgment. Bills of attainder are wholly contrary to sound legislation, as they are an assumption by a legislature of judicial power.

An impeachment is decided by the House of Lords alone. Unless that body were to follow judicial forms, and to give their decisions upon evidence and inquiry as applied to a violation of law, an impeachment would be more objectionable than a bill of attainder, for it would need only the arbitrary will of one house to take away one's liberty or life, instead of the concurrence of two.

The result is, that under the English law there have been from time immemorial two parallel modes of reaching an alleged criminal: he might be either indicted or impeached. The two proceedings are deemed to be wholly distinct. If he is indicted first, he may be impeached afterwards; and, conversely, an impeachment is no answer to an indictment. It might seem, at first sight, that if this were so, an impeachment should never be resorted to, as this proceeding is dilatory, cumbrous, and expensive. The reasons for adopting it in special cases have mainly been because it could more readily be made an instrument of faction, or because it was a powerful weapon in times of political disturbance or revolution. Again, there have been instances of a salutary effect from its use, where an alleged criminal was a man of power and influence, and likely by the weight of his name and by his position to disturb the judgment of the ordinary criminal courts. It is a weakness necessarily appertaining to this court that there is no appeal from or review of its decisions. Unlike all other courts with which men trained in English jurisprudence are familiar, it decides at once and irreversibly both upon the law and the fact. The absence of repeated discussion and consideration, which are, in general, so fully accorded to suitors through the action of appellate courts, may in times of political excitement lead to inconsiderate and unjust decisions, and it is too much to expect from these tribunals that there will be an unbroken adherence to wise and safe precedents.

One of the most important questions connected with this whole subject is, whether an impeachment can be had where the act is of such a nature that it cannot be prosecuted by indictment. Can an impeachment be had for any act unless it constitutes a crime against the general law of the land? Can this mode of trial be extended to mere acts of indecorum having no fixed criminal aspects? Crimes may, of course, exist either by the rules of the common law or by statute. Can there be an impeachment in the absence of any form of crime? If this question is to be decided by the rules of the English law, it would have to be said that principles and precedents are both opposed to an impeachment except for a crime. The most recent and leading cases upon this subject are those of the earl of Macclesfield, of Warren Hastings, and of Lord Melville. In the case of the earl of Macclesfield, who was impeached for the sale of offices connected with the administration of justice, the whole argument of counsel was, on the one hand, to show, and on the other hand, to disprove, that the sale of such an office was contrary either to a rule of the common law or of an act of Parliament. He was declared guilty, but only on the ground that a statute passed in the reign of Edward VI. had been violated. Lord Campbell, a great jurist of our day, who defends the impeachment, rests its lawfulness solely on the ground that this statute had been violated. (4 Campbell's *Lord Chancellors*, 536; 16 Howell's *State Trials*, 823.) In the case of Warren Hastings (1788), the Lords resolved that they would insist on the same rules of evidence as were applied in the inferior courts of justice. In the trial of Lord Melville in 1806 for malversation in office, the question was put to the judges whether the acts with which he was charged were unlawful, so as to be the subject of information or indictment. It having been decided that they were not, Lord Melville was acquitted. (29 Howell's *State Trials*, 1470.) These decisions were made at a time when there was no party feeling, and when the House of Lords intended to act with judicial impartiality. They are therefore entitled to much weight. In many instances it should be observed that the court asks the opinion of the ordinary judges upon the law of crime and the relevancy of evidence, and closely follows their views. Reference may also be made to the opinion of leading text-writers and jurists. Wooddeson is particularly clear and emphatic. He says: "The trial differs not in essentials from criminal prosecutions before inferior courts. The same rules of evidence, the same legal notions of crimes and punishments, prevail. For impeachments are not framed to alter the law, but to carry it into more effectual execution where it might be obstructed by the influence of two powerful delinquents, or not easily discovered in the courts of ordinary jurisdiction by reason of the peculiar quality of the alleged crimes. The judgment there is to be such as may be arrived at by legal principles or precedents." (2 Wooddeson, 611.) The same view is well expressed by Lord Chancellor Cowper in the year 1715, who says: "Though one of your lordships supposes this impeachment to be out of the ordinary and common



course of law and justice, it is yet as much a course of proceeding according to the common law as any other whatever." (See also Cushing, *Law and Practice of Legislative Assemblies*, § 2,69; 4 Blackstone's *Comm.*, 269; and the able argument of Mr. Webster, 5 *Works*, pp. 513-515, in defence of Judge Prescott.)

This subject has assumed great importance in recent trials by impeachment in the U. S. It must be conceded that public and professional opinion is here to some extent divided upon it. Impeachment as used under American law does not have so wide a scope as in England, though we have derived it from the law of that country. The object of the trial here is to reach official delinquency, and to remove the offending officer from office or to impose a permanent disqualification upon him. It is, however, conceived that this does not vary the case. The impeachment is still for a crime; the officer is to be removed or disqualified because he has committed an act in the nature of a crime. On no other theory can there be a strictly judicial proceeding. There must have been a wrong committed, but how can that be unless there has been a violation of law? Without a crime how can there be a trial, and how is it possible to apply any rules of evidence? Mr. Hallam contends, with great force of reasoning, that not only must a crime be committed, but it must be set forth in the articles of impeachment. Thus, if there were an impeachment for treason, the offence described should of itself, in point of law, constitute treason. His argument is that the court can only try an offender for an existing crime. It cannot create an offence by its fiat. (2 *Const. Hist.*, 412, 413, Murray's ed. 1866.) (An able presentation of an opposite view has been made by Judge William Lawrence of Ohio. See *American Law Register*, vol. vi, p. 644.)

In the constitution of New York of the year 1777 impeachment and indictment are coupled together, as if they were deemed to be only different modes of trial of the same offence: "In every trial on impeachment or indictment for crimes or misdemeanors the party impeached or indicted shall be allowed counsel as in civil actions." (Art. 34.) In the U. S. Constitution it is "declared that the President and other civil officers of the U. S. shall be removed from office on impeachment for and conviction of treason, bribery, and other high crimes and misdemeanors." (Art. 2, § 4.) Who can doubt that the words "treason" and "bribery" are here used to mean specific crimes. According to all ordinary rules of construction, the words "other crimes" must have a similar application. The same general question was discussed to some extent by the judges of the New York court of appeals in the recent case of the impeachment of George G. Barnard as a judicial officer of the State. The drift of the opinions would seem to be that an act to be impeachable must be of a criminal nature, and usually the subject of an indictment, though this rule might not always apply to a judge. Thus, on grounds of public policy he may be exempt from ordinary criminal prosecutions for acts affecting the administration of justice. (See opinions of Oliver, Andrews, and Folger, judges, *Trial*, etc., vol. iii, pp. 2087, 2167, 2170.)

*Made of Procedure.*—When an impeachment is resolved upon in England, a member of the House of Commons usually rises in his place and makes a charge of crime, which he supports by proofs, and then moves for an impeachment. If this motion is sustained, the member is ordered to go to the House of Lords in company with others to institute the impeachment. Written articles are subsequently presented. In this country the impeachment is commonly brought forward by the report of a committee of the more popular branch of the legislature. The matter of arrest of the person impeached is of much consequence in the English law, as the proceeding may involve liberty or life. In the U. S. no arrest is necessary, as, if the party has been properly summoned, the trial may go forward in his absence, and the whole object of the proceeding is achieved by removing him from office or imposing a disqualification for the future, or both. The subject of suspension from office is, however, one of grave consequence, particularly in the case of so important an officer as that of President of the U. S. A constitution may provide for a suspension in office while an impeachment is pending, when of course no question arises. The U. S. Constitution is silent upon the subject, and the only source of information open to us is the practice adopted in England. It is not necessary to consider the case which has frequently occurred in England, of the impeachment of a member of either house of the legislature, as no such practice is adopted here, each house by the U. S. Constitution having the power of expulsion. The inquiry will accordingly be limited to the case of the suspension of executive or judicial officers from office after impeachment and before judgment. These cases are of two general classes: (1) where the office is held at the king's pleasure; (2) where the tenure of office is fixed, so

that the officer has a claim to continue in his office. In the first class of cases the only way in which the impeaching bodies could express their wishes to the king would be by an "address" or joint resolution. Although the Commons have frequently asked the House of Lords to concur with them in such an address, that body has regularly refused to do so while the impeachment was pending. The course of proceeding is manifest in the case of the trial of Lord Bacon while lord high chancellor. After he had been impeached, and had confessed his crime, we are told by historians that a difficulty remained in proceeding further while he retained the great seal, for by the rules of the House of Lords acting as a court of impeachment a defendant produced before them is to receive sentence on his knees at the bar, and the lord chancellor, if present, must preside on the woolsack and render sentence. This rule made it necessary that Lord Bacon should pronounce sentence on himself. This embarrassment was only removed by the Lords entreating the king, after Bacon's confession, on Apr. 30, 1621, to sequester the great seal. (*Lords' Journals*, Apr. 30, 1621.) The king requested its surrender, and received it on May 1. This course of proceeding is a very potent argument against the existence in the impeaching tribunal of any power of suspension or removal. In fact, it is contrary to all judicial theories that a court while a proceeding is pending should do any act savoring of punishment or deprivation of rights. Such an act is executive in its nature; and though it might be allowed by statute in England or by constitutional provision in this country, it would not be tolerated as an ordinary branch of judicial procedure. Reference may also be made to the case of the worthless and incapable Scroggs, chief-justice of the king's bench in the reign of Charles II. The House of Lords absolutely refused to join the Commons in addressing the king to suspend him from office. It was understood by the Commons to be a positive decision upon the point that while an officeholder was uncondemned he should not be suspended from the administration of his office. Their leaders complained in their places that the "Lords would not address to sequester Scroggs from his place, but would leave it to his modesty whether he would exercise it or no." (8 *Howell's State Trials*, 213, 214; 13 *Journals House of Lords*, 73; *Foss's Lives of Judges*, 170.)

In the second class of cases, where the tenure of office is permanent, the argument is still stronger. Even the Commons have not insisted on suspension or sequestration in this class of cases. That house has drawn a distinction between the two cases, refusing in a well-known instance to address the king to remove the duke of Buckingham from an office of a permanent nature, though it asked for his dismissal from an office held at the royal pleasure. (6 *Howell's State Trials*, 1061.)

According to these principles, what rule should be applied in the case of the impeachment of the President of the U. S.? Undoubtedly, the people have a right to his continuous services, of which they cannot be deprived by either branch of Congress acting in an impeachment before his conviction, unless by some constitutional provision, either express or implied. There is certainly no express clause in the Constitution, nor, according to what has been seen, are there any implications to be drawn from English practice. It may be added that there is evidence to be derived from the debates of the framers of the Constitution that their opinion coincided with the English view, though great stress should not be laid on discussions of this kind. (See 2 *Madison Papers*, 1134; 3 *ib.*, 1372, 1373.) It seems quite plain that an implied power to suspend the President from office, beginning to operate at the very moment of his impeachment by the House of Representatives, would be of a highly dangerous character, as a majority adverse to that functionary might seize upon this mode of removing a President obnoxious to them, and by dilatory processes might prolong the trial so as substantially to remove him from office without any real cause. In this way, a mode of trial for grave crimes which was only intended to be used in extreme cases when the majesty of the people was offended, might be resorted to on frivolous and absurd pretexts, and as a method of scourging or frightening a political opponent; or an impatient legislature might resort to this process to grasp at executive authority or to overcome executive vetoes.

Assuming that articles of impeachment have been prepared, and an answer received and reply made if necessary, a day is fixed for the trial of the cause. The court in England is organized with much pomp and solemnity. A graphic description of it will be found in the case of the trial of the earl of Stafford (7 *Howell's State Trials*, 1194), as well as in the essay of Lord Macaulay upon the life and career of Warren Hastings. The proceedings on the part of the House of Commons are conducted by a committee, called "managers." An opening speech having been made, the trial proceeds much in the same way as in ordinary



criminal proceedings, counsel representing the accused, and evidence being adduced in a formal and regular way. The proceedings are frequently dilatory, and a prorogation or dissolution of Parliament may intervene. It has been decided that such an event does not vitiate the proceedings so that it will be necessary to commence again, but that they will continue until a conclusion is reached. (1 May's *Const. Hist.*, 437, and authorities cited.)

The rules attending judgment are special. Questions which are considered to involve the merits of the case having been agreed upon, each member of the court is interrogated by the presiding officer as to his opinion in the presence of the accused and the House of Commons. The peers, commencing with the one lowest in rank, as the questions are put to them rise successively in their places, and standing uncovered and placing their right hands upon their breasts, say, as the case may be, "Guilty" or "Not guilty, upon my honor." If the accused is found guilty, the next step is for the Commons to demand judgment. Impeachments in England have within the last one hundred years been very rare, only two being known to have taken place—that of Warren Hastings and that of Lord Melville. (1 May, *Const. Hist.*, 435.)

Under the U. S. Constitution the House of Representatives presents the impeachment. The trial is had before the Senate, except that when the President of the U. S. is tried the chief-justice of the Supreme Court presides, the Vice-President in that case not sitting. The Senators acting as a court of impeachment are required to take an oath or affirmation. There is less formality in rendering judgment. Each member, rising in his place, votes guilty or not guilty upon the respective "articles of impeachment" presented by the House of Representatives. Two-thirds of the members present must concur to ensure a conviction. Under the English law a pardon by the king cannot be pleaded in bar of an impeachment. The effect of this provision is that the king cannot prevent the trial and conviction of the accused. After judgment the ordinary rule is understood to apply, and the king may pardon. Under the U. S. Constitution the President is deprived altogether of the power to pardon. There seems to be a good reason for the distinction in the two countries, as under the English law the jurisdiction of the court is both criminal and political in its nature, while in the U. S. it is political, having only to do with officers and their administration of office.

In the various States of the Union it is the common practice to provide in their respective constitutions for the organization of a court of impeachment to try State officers. In the main, the general outlines of the clauses of the U. S. Constitution are followed. The more popular branch of the legislature presents the impeachment, while the upper house or senate tries it. In New York the judges of the court of appeals and the lieutenant-governor are joined with the senate, though the latter officer does not sit when the governor is impeached. Some of the States provide expressly in their constitutions for the suspension of officers from office when on trial. In some there is a requirement that the chief-justice of the supreme or other high court shall preside when the governor is tried. The details must be sought in the respective State constitutions.

Reference is made below to some of the more prominent cases of impeachment in England and in this country: Trial of Lord Latimer, A. D. 1376; ib. of the duke of Suffolk, A. D. 1469; ib. of Mompesson and associates, temp. James I.; ib. of Lord Bacon, do.; trial of Lord Danby in the reign of Charles II.; trial of earl of Macclesfield, 1725; trial of Warren Hastings, 1788; ib. of Lord Melville, 1806. Many of these and other cases are found in Howell's *State Trials*, Hatsell's *Works*, and the journals of the two houses should be referred to. Recent impeachments in the U. S. are that of Andrew Johnson, President of the U. S., 1868, published in 3 vols.; also that of George G. Barnard, judge in New York, 1872, published in 3 vols. Earlier cases were the impeachment of William Blount, a Senator of the U. S., 1797, published in Wharton's *State Trials*, 200; that of Samuel Chase, associate justice Supreme Court U. S., 1804, published by Smith & Lloyd, 2 vols.; and that of John Pickering, district judge of New Hampshire, 1803 (see 2 Hildreth's *Hist. U. S.*, 415). See also 2 Story's *Comm. on the Constitution*; Cushing's *Law and Practice of Legislative Assemblies*. T. W. DWIGHT.

**Impenetrability** [Lat. *impenetrabilis*, "not to be penetrated"], one of the essential properties of matter, implying that no two bodies can occupy the same portion of space in the same instant of time. If a nail be driven into a piece of wood, it does not, properly speaking, penetrate the wood, for the fibres are driven aside before the nail can enter. With regard to liquids, the property may be proved by very simple experiments. Let a vessel be filled to the brim with water, and a solid incapable of solu-

tion in water be plunged into it: a portion of the water will overflow, exactly equal in bulk to the body immersed. If a cork be rammed hard into the neck of a phial full of water, the phial will burst, while its neck remains entire. The disposition of air to resist penetration may be illustrated in the following manner: Let a tall glass vessel be nearly filled with water, on the surface of which a lighted taper is set to float. If over this glass a smaller cylindrical vessel, likewise of glass, be inverted and pressed downward, the contained air maintaining its place, the internal body of the water will descend, while the rest will rise up at the sides, and the taper will continue to burn for some seconds encompassed by the whole mass of liquid. (Leslie's *Elements of Natural Philosophy*.) The lightest gases are really as impenetrable as the densest solid, although, owing to their compressibility, it is not readily made apparent.

Strictly speaking, this property applies only to the atoms of a body. In many phenomena, bodies appear to penetrate each other; thus, the volume of a compound body is always less than the sum of the volumes of its constituents; for instance, the volume of a mixture of water and sulphuric acid, or of water and alcohol, is less than the sum of the volumes before mixture. In all these cases, however, the penetration is merely apparent, and arises from the fact that in every body there are interstices or spaces unoccupied by matter. (Ganot's *Physics*, ed. Atkinson, New York, 1872.)

**Impennates**, or **Impennies** [Lat. *in*, and *penna*, "a wing"], the name of a tribe of swimming birds having short wings covered with feathers resembling scales; the penguin (*Aptenodytes*) and the great auk (*Alca impennis*) are examples of this group, which, however, is not a natural one.

**Imperador', Villa do** [Port., "city of the emperor"], large town in Brazil, province of Parahiba, 95 miles N. W. of Pernambuco. It has a considerable traffic in sugar, cotton, coffee, Brazil wood, drugs, and timber.

**Imper'ative, Categorical or Moral**. In the terminology of the Kantian school of psychological ethics, this expression denotes the idea of Duty. "Man, in the consciousness of his moral liberty, recognizes two great laws regulating his will; the first prompts him to seek his own well-being; the second commands him to be virtuous, even at the sacrifice of happiness. From this opposition in his moral nature between Desire and Conscience springs up the Idea of Duty," otherwise the Moral Imperative, to which term Kant added the epithet *categorical* to indicate that its commands are absolute and unconditional.

**Imperative Mood** [Lat. *impero*, "I command"], in grammar, the form of the verb which denotes command, entreaty, or, in general, desire.

**Impera'to** (FERRANTE), b. in Naples, Italy, about 1565; became a druggist; made a fine collection of minerals; founded a botanical garden at Naples, and devoted himself with great enthusiasm to natural history, on which subject he published a folio volume, *Della Istoria Naturale Libri XXVIII.* (Naples, 1599), which was reprinted at Venice in 1672, and translated into Latin (Cologne, 1695). It is not so much a treatise upon natural history as a descriptive catalogue of plants, minerals, and precious stones, having no great scientific value. It was, however, the occasion of a curious literary controversy, it having been vigorously asserted and denied that the work was written by one Nicolas Stelliola, who sold it to Imperato for 100 ducats. The authority of Tiraboschi is unfavorable to the claims of Imperato, who was, however, on terms of intimacy and correspondence with several eminent naturalists. He lived far into the seventeenth century.

**Impera'tor** [Lat., "commander"]. During the entire existence of the Roman republic, of which the forms were preserved for hundreds of years after the republican spirit had disappeared before the encroachment of centralization combined with universal dominion, the title *imperator* had a meaning very different from that of the Byzantine, the mediæval, or the modern term "emperor." Originally of purely military application, it meant nearly the same as "captain" or "general," and the soldiers who on the battle-field acclaimed their leader *imperator* meant only to express their belief that he was worthy to exercise command. The concentration of power in the hands of Augustus and his successors, with which their title of *imperator* is popularly associated, was exercised not by virtue of that title, but by accumulating in the hands of a single individual the additional offices of consul, proconsul, tribune, pontifex maximus, and censor; the attribution of all these powers to an *imperator* is a later idea.

**Imperatriz', Villa da** [Port., "city of the empress"], town of Brazil, province of Ceará, on the Serra Umburê-lama. Medicinal plants are abundant in the *monte* forest, and gold, silver, iron, copper, and salt are all found in greater or less quantities in the adjacent mountains.



**Imperfect**, in music, a term indicating deficiency or a want of completeness or finality. An *imperfect interval* is one which is a semitone less than the perfect. Thus, the interval B—F is an imperfect fifth; but by the addition of a semitone to either the higher or lower term—i. e. by flattening B or sharpening F—the interval becomes perfect. Thirds and sixths are commonly regarded as imperfect intervals, because they may be readily changed from major to minor, or from minor to major, by the use of a flat, sharp, or natural. An *imperfect chord* is one in which some of its intervals are wanting; as when, in a chord of the seventh, we occasionally omit the third, the fifth, or even the root. In some cases two of these intervals are omitted. The *imperfect cadence* (or half cadence) is that in which the harmony of the triad is followed by that of the dominant, being the exact contrary of the *perfect cadence*. By some writers several other cadences, not final, are termed imperfect.

WILLIAM STANTON.

**Impetigo** [Lat. an "attack," from *impeto*, to "rush upon"], a skin disease, resembling eczema in being more or less diffuse inflammation, but resulting, unlike eczema, in pus-formation. The *crusta lactea* of young infants is one of its forms, which are rather numerous. True impetigo is not contagious. It frequently is cured by time alone, but if persistent should be treated with oxide-of-zinc ointment or some other mild stimulant. The so-called *impetigo figurata* is a distinct disease, depending on the presence of *Trichophyton tonsurans*, a parasitic vegetation. Epilation of the part with irritant washes, as of corrosive sublimate, will cure the disease, which is truly contagious.

**Impey** (Sir ELIJAH), chief-justice of Bengal in 1774, became infamous in history by his atrocious perversion of law. He sentenced the celebrated Nuncomar to death for the assumed crime of forgery in 1775, was recalled in 1782, impeached in 1788, and d. Feb. 1, 1812. (See Macaulay's *Essay on Warren Hastings*.)

**Im'peyan Pheas'ant**, the *Lophophanes impeyanus*, a fine large pheasant from the Himalayas, is nearly as large as a turkey, splendidly colored, and has been domesticated. It is a native of the high, cold regions of the Himalaya.

**Imp'lements, Agricultural.** Of these, the more important are noticed under their alphabetical heads. The manufacture of this class of goods is a very extensive industry in the U. S. In 1870 there were reported 2076 establishments, employing 25,239 persons, a capital of \$34,834,600, paying \$12,151,504 as wages, and producing goods worth \$21,473,925.

**Imports.** See COMMERCE, by J. S. GIBBONS.

**Impos'tors, The Three** (*De tribus Impostoribus*), a supposed work attacking the Jewish, Christian, and Mohammedan religions, which at various times since the tenth century has been written of by theologians and others. The most diverse statements have been made as to its authorship and character, and it is very doubtful if a genuine work of this title ever existed. But in later times there have been many spurious works written, pretending to be the real *De tribus Impostoribus*. Not one of them is of any great antiquity or of any possible value.

**Impress'ment**, in English law, is defined as the forcible levying of mariners in time of war for the king's service at sea. It was formerly the usual method of manning the British navy, and a similar procedure was employed by other maritime powers. The power of impressment was a branch of the royal prerogative, first mentioned in the statute 2 Richard II. c. 4 as a recognized usage. Many acts of Parliament from the time of Queen Mary down to George III. regulated the system of impressment and exempted certain classes of mariners. The mariners were seized by an officer acting under an impress-warrant, and having under his orders an armed party of picked men (the press-gang), with which he visited the usual haunts of seamen and violently seized the most robust men, not without frequent and bloody struggles. A merchant-vessel or a privateer was also liable to be so depleted of sailors by any man-of-war as to be crippled for all practical purposes. The laws sanctioning impressment are still unrepealed, but the system of bounties has practically taken its place. The impressment of American sailors was an abuse practised for several years by Great Britain during the great continental war against the French empire, notwithstanding the constant and earnest protest of the U. S. government; and this finally became the immediate cause of the war of 1812 between the two countries. It has been often noted that in the treaty of peace signed at Ghent in 1814 nothing was stipulated regarding this original cause of the war; nevertheless, the American doctrine achieved a practical victory, and impressment has not since been employed by Great Britain, not even during the Crimean war. It will probably never be revived.

PORTER C. BLISS.

**Impris'onment.** In the most comprehensive sense of the term, imprisonment denotes any deprivation of personal liberty, whether by actual confinement or simply by forcible restraint or detention against a person's will. Detaining a man in a public street or taking him into custody, either by the exercise of actual force or by the exhibition of such real or assumed authority as secures his submission, would, in this view, be a sufficient imprisonment. When no actual force is employed the imprisonment is termed constructive; in other cases, actual. When the restraint upon a man's person is unlawful it is called "false imprisonment," and this is a violation of personal rights for which an action at law may be instituted and damages recovered. (See FALSE IMPRISONMENT.) In its narrower signification, however, and according to more popular usage, imprisonment denotes an actual confinement of the person under legal process in some prison or jail which is specifically employed for such a purpose in accordance with provisions of law. The power to imprison, using the word in this narrower sense, is either inherent in courts or magistrates as one of their essential prerogatives, or is conferred upon them by statute. Imprisonment is employed in both civil and criminal proceedings. It may be used as a form of civil remedy, as when a debtor is arrested and held in custody for the purpose of securing the satisfaction of some debt which he is under obligation to pay; or it may be adopted as a means of obtaining testimony, as where, in criminal cases, witnesses are kept in confinement that they may be forthcoming at the trial of a cause; or it may be employed as a mode of punishment, as where persons guilty of contempt of court or convicted of a criminal offence are sentenced to be kept in prison for particular periods. These are the most important purposes for which imprisonment under authority of law is employed, though particular classes of persons may be placed in legal confinement for still different reasons, as, for instance, where lunatics are confined in asylums; but places of this kind are not usually known as prisons, and this kind of imprisonment will not therefore be considered in this connection. (See INSANITY.) Imprisonment for debt was at common law in former times generally allowed at the suit of a creditor as a matter of course, and became the regular practice. But in recent times the tendency has been to abolish it by statute, except in relation to particular classes of debts, among which are usually included those founded upon fraud or misfeasance, fines and penalties, etc. In England the first statute of this kind was passed in 1838, but the act which at present (1875) regulates this subject was enacted in 1869 (32 and 33 Viet. ch. 62). This provides that no person shall be imprisoned for making default in the payment of a sum of money except in cases of penalties not arising upon contract, of default by trustees in making payments directed by a court of equity, of default in payment of a sum recoverable summarily before a justice, and in a few other cases of less importance. In these excepted cases the imprisonment cannot continue longer than a year. There are also some further qualifications of the general rule in special instances. Thus, when a person makes default in the payment of any debt due in pursuance of the order or judgment of a competent court, and is proved to have had the means to pay since the order or judgment was rendered, he may be committed to prison for a term not exceeding six weeks, or until payment is made. Arrest and imprisonment upon mesne process is abolished entirely, with the single exception that where the suit is for £50 or more, and there is reason to apprehend that the defendant will leave England, he may, on proper evidence under oath of these and a few other necessary facts, be imprisoned for a term not exceeding six months, or held to bail. In New York an act to abolish imprisonment for debt was passed in 1831, and is still in force. This provides that no person shall be imprisoned on civil process at law or on execution in equity founded on contract except in the following cases: in proceedings as for contempt to enforce civil remedies, in actions for fines and penalties, or on promises to marry, or for moneys collected by any public officer, and in actions for any misconduct or neglect in office or in any professional employment. Moreover, in cases of debt claimed in any suit or founded upon any judgment or decree of a court of record, the defendant may be arrested upon an affidavit of the plaintiff stating the sum due to be more than \$50, and charging the commission of certain fraudulent acts; as, that the defendant is about to remove any of his property out of the jurisdiction of the court to defraud his creditors, that he fraudulently conceals property, or has assigned, removed, or disposed of it with like intent, or that the debt was fraudulently contracted. The defendant is thereupon committed to prison, unless he either pays the debt and costs of the suit or gives security to pay them within a certain time, or unless he makes an assignment of his property for



the benefit of his creditors, or gives security that he will make such an assignment or that he will not dispose of any of his property until the demand against him is satisfied. If he makes such an assignment of his property, there are provisions in the act by which he may be discharged from his indebtedness. Further provisions of an analogous nature to those contained in this act were embodied in the New York code, adopted in 1818. The debtor may be arrested and imprisoned either on mesne or on final process. The principal grounds of arrest are, with a few exceptions, the same as those enumerated in the previous act. The defendant, when arrested upon mesne process, may be admitted to bail. The imprisonment upon final process is for the same causes, and is applicable when the execution against the debtor's property has been returned unsatisfied, in whole or in part. The most important difference between these provisions and those of the earlier statute is that in the later act means only are provided for securing the payment of the debt of an individual creditor, and there is no assignment provided for in behalf of all the creditors, or any means afforded of obtaining a discharge of the debtor from all his obligations. A large number of the States of the Union have adopted similar statutes. (A comprehensive summary of these may be found in Kent's *Commentaries*, vol. ii. pp. 398, 399. For the rules regulating the subject of arrest on civil process, see ARREST.)

In criminal proceedings, imprisonment is employed as a means of detaining alleged offenders in custody, in certain cases, to ensure their appearance at the time of trial, and also as a common form of punishment to which a convicted prisoner may be sentenced. It is the ordinary penalty both in cases of felony and of misdemeanor, and the classes of offences in which a sentence of this kind may be given, and the terms of imprisonment which may be imposed, are generally determined by specific statutory provisions. A minimum and a maximum period are usually declared as appropriate to any particular crime, and the magistrate may impose a greater or less term within these limits according to his discretion. Fines are frequently imposed in connection with imprisonment as an additional penalty. (See FINE.) The means of adequately adapting the severity of the penalty to the degree of heinousness in the offence, which is afforded by the facility with which longer or shorter terms of imprisonment may be meted out, and the opportunity which is given for the reformation of offenders when they are confined in prisons, render this one of the most salutary modes of punishment which the law provides. (See PUNISHMENT. For the methods of prison management and discipline, see PRISONS, PRISON DISCIPLINE.)

Imprisonment in cases of contempt of court is discussed under the topic CONTEMPT. In regard to the imprisonment of witnesses to secure their testimony, see WITNESS.

The remedies which the law affords in cases of unlawful imprisonment are of various kinds. Thus, the person who has wrongfully caused or procured the confinement of another may, as has been stated, be sued by the latter in a civil action for false imprisonment, or he may be subjected to a criminal prosecution. When the prisoner desires to obtain a release or discharge, a petition upon *habeas corpus* may be made by him or in his behalf to the proper court. And a petition of this kind may even be resorted to when the imprisonment is not unlawful, as in cases where a person confined under legal process desires to be admitted to bail, or to have the reasons for his detention investigated and its validity determined. (The rules upon this subject are stated under the topic HABEAS CORPUS.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Improvisation** is the art of composing poetry extemporaneously. Although the term embraces every rhythmic form of impromptu song or recitation, and is sometimes even applied to unpremeditated prose declamation, especially to that of a highly figurative and impassioned character, yet it is restricted in popular use not merely to metrical compositions, but to those which please by syllabic consonance or correspondence of sound. The modern ear, in the countries and classes where improvisation is most practised, has been trained to demand not only a regular recurrence of metrical feet or accentual longs and shorts, but full or half rhyme, assonance, or at least alliteration, as an indispensable condition of this species of intellectual entertainment. But even in Italy and Spain, especially in the more elevated and refined exercise of the art, that satiety of rhyme which led Trissino to invent modern blank verse—first employed in his *Sophonisba* in 1524—sometimes induces improvisators to dispense with this ornament, and to content themselves with a simple iambic or trochaic arrangement of syllables in verses of a determinate length. There are, too, nations in whose extemporaneous poetry parallelisms in sense or imagery, coupled with metre, supply the place of consonance. Readers familiar with *Kalevala* and *Hiawatha* will readily perceive that this varied

repetition of thought and illustration may be used with very happy effect in improvised as well as in deliberate composition. Improvisation is doubtless the most primitive and universal mode of expressing poetic feeling, and it appears to have always existed among semi-barbarous races sufficiently advanced in intellectual development to derive pleasure from any form of poetry. The early poets of Greece and of many other ancient countries were minstrels, and chanted their compositions, which were in a great degree extemporaneous in detail and expression, though probably not often in subject and general treatment, to a musical accompaniment, which we must suppose too simple to have served much other purpose than to mark the time or metre. The improvisators of recent ages have not generally availed themselves of this expedient. The most genial examples of modern improvisation are found among peoples and in classes possessing a considerable amount of traditional, though not of scholastic, culture. With the diffusion of instruction, and of printed, and especially of periodical literature, and above all, with a wider participation of the higher and middle ranks in active business and political life, it gradually ceases to enjoy favor, and the power of improvisation diminishes with the social demand for it. The rhetorical character of improvised poetry depends less on the material condition and mode of life than on the moral, intellectual, and social training and habits of the composer and his audience; its special forms, as indeed those of all poetry, are determined, or at least greatly influenced, by the orthoepical system and the grammatical structure of the language employed by the bard. It is noticeable that the physical characteristics of the scene of the poem are less frequently reflected in unpremeditated verse than the actions and passions of the bard and his personages. Real nature is too familiarly known to the nomad, the shepherd, and the rustic cultivator as a hard and niggard landlord to be an attractive feature in his imaginative recreations, and his spontaneous lyrics teach us much more of the man himself than of his surroundings. This consideration furnishes an argument against the authenticity of the pretended poems of Ossian. They have too much material *couleur locale* to be accepted as genuine specimens of bardic song. The most untrained ear readily seizes and soon learns to enjoy accented rhythm, and a frequency of corresponding sounds in a given language almost mechanically prompts a disposition to employ them as a means of giving a melodious expression to feeling and to thought. A strongly marked syllabic accent and an abundance of rhymes, therefore, are circumstances favorable to the invention and free and ready employment of poetical forms; and it is chiefly in languages marked by these characteristics that improvisation is most general. The modern languages of the Latin stock—with the exception of French, which is scarcely Latin otherwise than in vocabulary—have a very distinctly accented pronunciation; they abound in rhymed endings, and they accordingly present great material facilities for the construction of verse. All inflected languages to a certain extent supply rhymes, because words of the same class and in the same grammatical category have generally the same final syllable or syllables. But, on the other hand, the very fact that like endings occur only in like categories makes words disparate which in uninflected tongues might freely be paired in rhymes under almost any circumstances. To exemplify: the Italian *anno* is radically the same word as the Latin *annus*; the Italian *panno* the same as the Latin *pannus*. Now, *anno* and *panno* have each but one change of form, the plurals *anni* and *panni*; *annus* and *pannus*, in their different cases and numbers, have each eight variations of ending. The Italian words, then, in their respective singulars and plurals, rhyme with each other in all syntactical combinations; the Latin, with the exception of the coincidence between the genitive singular and nominative plural, can be employed as rhymes only when they happen to be in the same case. Besides this, the regular diminutive and augmentative uninflected forms, in which Italian is so rich, are a great resource to the rhymers. A comparison between Italian and the Gothic languages would furnish analogous illustrations, and there is one peculiarity of the inflectional system of the Icelandic which merits notice as having probably influenced the poetic forms of its literature in a curious way. Strong inflections, or those where etymological variations consist in vowel-change, are more common in Icelandic than in the other Gothic languages, and were so in a still higher degree at an earlier stage of the language. For example, the nominative singular *hánd* has the genitive *hándar*, the dative singular *hendi*. *Land* singular has the nominative and accusative plural *land*. It is doubtless to this fact that we are to ascribe the adoption of *lǫt-rhymes*, which, as well as alliteration, is now generally an indispensable feature of Icelandic verse, even when ordinary end-rhymes also are



employed. *Half rhymes* are syllables containing the same final consonants with different vowels, and both they and full rhymes are introduced according to certain rules, generally not at the close, but in the body of the verse. Thus, while *hönd* singular and *lönd* plural are full rhymes, both those forms are good half rhymes with the singular *land* and with the genitive and dative *handar* and *hendi*. A vowel-change, therefore, which destroys a full rhyme often makes amends by supplying several half rhymes. But notwithstanding this and peculiar prosodical advantages of other Gothic languages, there is no doubt that in facility of versification Italian surpasses not only these, but the Spanish also. The Spanish, indeed, gains in this respect by allowing *assonance*, or the correspondence of vowels while the final consonants differ; but its consonances appear to be fewer than in Italian, and the rigor of its rules in the employment of rhyme renders it less tractable as a metrical medium than the sister speech. Reasoning from analogy, we should expect to find improvisation in all not absolutely savage races whose languages exhibit uncommon orthoepical facilities for melodious or harmonious expression. Hence the Cherokees—whose remarkable speech has but eighty-five possible syllabic combinations of elementary sounds, and therefore superabounds in rhymes, and who, like the other North American Indians, have great readiness in extemporaneous prose harangue—ought, in their present partially civilized condition, to excel in improvised verse. But we do not know that any species of native poetry is cultivated among them.

Our knowledge of the extemporaneous poetry of unlettered peoples amounts to little more than we have already stated. Such races, of course, cannot commit their own effusions to writing, and strangers rarely know enough of any unwritten language to be able to seize and record its poetic accents. Ancient compositions of this sort have indeed been handed down and long preserved by tradition, but in this mode of transmission the diction, thoughts, and imagery change with changing generations, and after a longer or shorter time the poem ceases to be identifiable with the original. Probably the most authentic specimens we possess of primitive improvised poetry are those which occur in the sagas or narrative literature of Iceland. These usually extend to but a few couplets, and, rhetorically speaking, are little more than ejaculatory expressions of thought or feeling. But, though they are generally frigid in tone and destitute of real poetical merit, they are, to the last degree, artificial and complicated in structure and figurative in diction. We can scarcely suppose that such *nugæ difficiles* could have been truly extemporaneous, and we cannot help suspecting that most of them, like the sudden inspirations of many professional modern orators, belong to the class of premeditated impromptus, deliberately composed and stored up for use when the occasion should present itself, or that they have been much elaborated by the historians who quote them.

There have been *improvisatori* in almost all European peoples, but in none of the Gothic or Latin countries, except in Italy and perhaps Spain, have they been numerous enough and gifted enough to have had any real literary importance. Some of the Italian improvisatori of the sixteenth century composed in Latin as well as in their native language, and many of those of the seventeenth and eighteenth, as well as of the present century, were persons almost as remarkable for learning as for dexterity in the production of unpremeditated verse. Perfetti in the seventeenth century, Corilla in the eighteenth, Sgricci in the early part of the nineteenth, were all persons of high culture, and in our own times Regaldi and Giannina Milli combine with a surprisingly ready command of varied versification a range of thought and of illustration which shows a wide acquaintance with history, with life, and with literature. Some of the published works of Italian improvisatori are of unequivocal merit, and few of them are without more or less frequent flashes of genius, but as a general rule we admire the art rather than the product, the loom rather than the tissue. As we have already hinted, improvisation is now much less common than formerly as an entertainment of highly cultivated circles in Italy. Though still occasionally practised in fashionable society, it is, so far as such society is concerned, substantially a thing of the past, but it subsists with almost unabated vitality among the peasantry of many provinces. Tigri's *Canti Popolari* and Giuliani's *Lingaggio Vivente della Toscana*, which contain many specimens of impromptu verse taken down as faithfully as possible from the lips of peasant reciters, are well worth the attention of the reader. The astonishing quickness of intellect of the Italian people shows itself as brilliantly in the unpremeditated lays of the rustic as in animated discussion and action in the educated classes. Improvisators of both sexes, who are what the Italians call *analfabeti*, or unable to read or write, extemporize, like their

brethren of higher culture and social condition, in every metre, every structure of verse, couplet, and stanza, every style of poetic composition, lyric, narrative, didactic, dialogue between two rival bards, *arcades ambo*, and dramatic; and it is worth noticing that at many of the popular theatres the playwright only furnishes the characters—which indeed are usually regular stock rôles—and the skeleton of the drama, leaving the personages to extemporize the dialogue, which is often most genial and spirited, as the action proceeds. The rustic bard has an important advantage in the childlike simplicity of his hearers, who, like real children, are never tired of iteration. The child never objects to a tale that is "twice told." The peasant extemporizer, in his narrow range of thoughts, words, and imagery, may use the same maxim or proverb, the same epithets, the same similes, the same pairs of rhymes, indefinitely, and his audience are as little wearied with his repetitions as was the old German with hearing Giselher always called "the youthful" through a narrative which extends from his boyhood to his old age, or the Finlander with the ever-repeated epithet of "old and truthful," which Kalevala constantly applies to Väinämöinen, even when he is lying. The educated improvisatore, with his more multifarious culture, has of course a larger and more diversified stock of material, and, like the preacher and the popular speaker, he habitually prepares at leisure new verbal combinations, happy turns of expression, similes, and illustrations, to be introduced into his recitations as occasion serves. But these stores cannot be inexhaustible, and when the stock grows thin and inspiration flags, he cannot repeat himself to his exacting audience, as the humble bard may do in his rustic circle, and he usually retires from the field after a short though, it may be, a brilliant career.

GEORGE P. MARSH.

**Imputation** of sin, guilt, and merit. This word is the English equivalent of the Hebrew *חָשַׁב*, *haskar*, which is represented in the Septuagint and the New Testament by the Greek word *λογίζομαι*. These words are of very frequent occurrence in the Scriptures, and are variously translated in our version; e. g., *to think* (Job xxxv. 2 and Rom. ii. 3); *to regard* (Isa. xxxiii. 8); *to esteem* (Isa. xxix. 16, 17 and Rom. xiv. 11); *to reckon* (2 Sam. iv. 2); *to be reckoned for or among* (Rom. iv. 4; Luke xxii. 37); *to impute* (Lev. vii. 18 and Rom. iv. 6-8); *to lay to one's charge* (2 Tim. iv. 16), etc. Liddell and Scott define the general meaning of *λογίζομαι* to be "to count, deem, consider, that anything is." Cremer (*Bib. Theo. Lex. of N. Test. Greek*) says *λογίζομαι τί τινα*, "to reckon anything to a person, to put to his account, either in his favor or as what he must be answerable for." In Christian theology this word is used in connection with the terms "sin," "guilt," "merit," "righteousness," etc.

*Sin* includes two essential elements: (1) *Macula*, moral pollution or defilement, as sin stands opposed to holiness; (2) *reatus*, guilt, as it stands opposed to justice. Again, *reatus* or guilt must be distinguished as (1) *reatus culpe*, desert of blame, and (2) *reatus pœnæ*, just obligation to punishment. It is agreed by all parties that neither the *macula*, pollution, nor the *reatus culpe*, desert of blame, can be separated from the person sinning, and imputed or charged to the account of another person. But the whole Christian Church, Roman, Lutheran, and Reformed, is agreed that the *reatus pœnæ*, or just liability to punishment, may be charged to the account of other persons than the actual transgressor when those other persons stand in such a relation to the actual transgressor as, for any reason, to be justly responsible for his action. "To impute sin or guilt," therefore, is to charge the legal responsibility for transgression upon any one as the ground of judicial process. "Not to impute sin" is to "cover it," remit its punishment, and so refuse to make it the substance of a penal indictment (Rom. iv. 6-8). Thus, though for very different reasons, was the guilt (*reatus pœnæ*) of Adam's act of apostasy imputed or charged to the account of all his natural descendants, who are punished together with him; and the "many offences" of all his people were "laid upon" or charged to the account of the Lord Jesus, and he suffered their punishment vicariously—i. e. in their stead and behalf. "The Lord hath laid on him the iniquities of us all" (Isa. liii. 6-12; Gal. iii. 13; 1 Pet. ii. 24); "Therefore as by the offence of one, judgment came upon all men to condemnation" (Rom. v. 18).

*Merit* must also be distinguished (1) as worthiness of praise, which is inseparable from the person, and (2) worthiness of reward, which may be "imputed" or credited to all who by previous union or stipulation may have rights involved in the action of the meritorious agent. *Righteousness* means "that which satisfies law" (Cremer), all that constitutes the condition of acceptance or of reward—i. e. of forensic justification. This righteousness may be wrought out personally in behalf of one's self, or vicariously in behalf of another. Thus by the rewardableness



of Christ's obedience, or his vicarious righteousness imputed to all who believe, as the ground of their sins being pardoned and their persons accepted and treated as those with regard to whom all the demands of the law have been fulfilled. "Even so by the righteousness of one the free gift came upon all men unto justification of life." "So by the obedience of one shall many be made righteous" (Rom. v. 18, 19 and iv. 3, 9).

The entire Church agrees as to the fact, though different theories exist as to the grounds, of the imputation of Adam's first sin. The imputation of Christ's merits is clearly held by the Lutheran and Reformed churches, but is obscured in the Roman Church by their doctrine of works, subjective justification, etc. Bellarmine, *Amias. grat.*, v. 17: "The first sin) was imputed to all who were born from Adam." *Form. of Concord*, p. 639, Hase: "We all, on account of the disobedience of Adam and Eve, are by nature children of wrath." James Arminius (1560-1609): "Whatever punishment therefore was inflicted on our first parents . . . now rests on all their posterity." *Form. of Concord*, p. 684, Hase: "We believe that a sinner is justified before God . . . only on account of the single merit, the perfect obedience and severe suffering, death, and resurrection of our Lord Jesus Christ, whose obedience is imputed to us for righteousness." To the same effect see *Heidelberg Catechism*, ques. 60, and *Westminster Conf. of Faith*, ch. ii. § 1, and all other Protestant symbols.

A. A. HODGE.

**In'achus**, in Grecian mythology, the god of the river Inachus in Argos, who in the dispute between Poseidon and Here about the possession of Argos decided in favor of the latter, and hence was deprived of his water by Poseidon and made dry except in the rainy season. In other places Inachus is referred to as the first king of Argos, who after the flood of Deucalion led the Argives from the mountains down into the plains; hence Argos is often called Inachian.

**Inarching.** See ARGUMENT.

**In'ca** [a Quichua word, signifying "chief"], in its strictest sense, designates the absolute monarch of the ancient Peruvian empire, who was also chief priest and the recipient of divine honors. He was the descendant, by unimixed blood, of Manco Capac and of the sun. The inca must, if possible, be the child of his predecessor by his own sister—a custom which also prevailed in ancient Egypt, in Persia, and in many other lands. In a larger sense, the whole ruling and sacerdotal caste of ancient Peru were called incas. They also received a superstitious reverence from the lower ranks, and possessed many social and political privileges. It is claimed by certain South American Indians that the old blood-royal is still preserved.

**Incanta'tion** [from *in*, "upon," "over," and *canto*, to "chant"] was a form of magic which was much believed in during the Middle Ages by all Germanic and many other nations, and of which some remnants are still extant in certain popular superstitions in England, Scandinavia, and Germany. It consisted in the chanting or solemn recitation or mystical murmuring of certain phrases, generally of no meaning, but of a striking rhythm. In the mouths of certain persons these phrases had the power of killing or curing a man, of blessing or blasting a field, of raising or laying a storm; or they could compel the spirits of the elements, or even the spirits of the dead, to appear and make revelations. Most often, however, incantation was applied only as an accompaniment to other witchcraft, as, for instance, to the preparation of love-potions or similar magical drugs; and remnants of this form are still existing among the European peasantry. In many places the first use of a new tool, a new dress, etc. is invariably accompanied by the pronunciation of certain phrases; and now and then some old hag may be met with in Scotland, Norway, Jutland, and certain parts of Germany who acknowledges that she can cure fever, aches, rheumatism, consumption, heart disease, etc. by means of a formula she has received in some mysterious way from another old hag. The incantations in *Macbeth* and *Faust* give a very vivid picture of this kind of magic.

**Incar'nate Word, Ladies of the**, a congregation of nuns founded 1625 by Jeanne Marie Chézard de Matel (1596-1679), approved by the pope in 1633. Their work was at first one of instruction, but in 1866 they assumed the care of hospitals. They have (1875) eight houses in Texas.

**Incarna'tion** [Lat. *in*, and *caro, carnis*, "flesh"], a term applied generally to the presence of deity in a mortal form; theologically, to the union of God and man in the person of Christ. "The motives for the incarnation were—God's love for man, and will to save him from the worst consequences of sin (John iii. 16), his desire to raise human nature by joining the divine nature to it, and to show man-

kind "a perfect and exalted model of human excellence." That Christ might be given to the world two principles were united—the Holy Ghost from heaven, the Virgin Mary on earth (Luke i. 35). Through his conception by the Spirit he was entirely holy, "perfect God;" through his human birth he had capability for all human infirmities except sin, was "perfect man," possessing a "reasonable soul." (See NICENE and ATHANASIAN CREEDS.) No dogma has caused more dissension in the Christian Church. Among its early opposers were the Sabellians; the Samaritanes, followers of Paul of Samosata; the Origenists; the Manicheans; and, most important of all, the Arians in the fourth century. (See ARIUS.) In the fifth century arose the sect of Eutychians, who, while acknowledging Christ's Godhead, denied his assumption of humanity. In modern times the doctrine of Christ's incarnation has been rejected by the Monarchians, the Patristians, and the Unitarians. Many authors, among whom Strauss and Renan are eminent, have in our day written ably to prove the mere manhood of Christ; and the more advanced of the Broad Church party are regarded as tending towards their opinion. (See *The Incarnation*, etc., by J. Meldrum (London, 1897); Bull, *Defensio Fidei Nicene*; Whately, *Essays on some of the Peculiarities of the Christian Religion*.)

JANET TUCKER.

**In'cense** [Lat. *incendo*, to "burn"], a substance burned for the fragrance of its smoke, and used in the performance of a religious ceremony. The ancient Egyptian, the Hebrew, the Brahmanical, and other religious ceremonials made use of incense-burning. The Roman Catholics and some of the Eastern churches use incense in their services. The Catholic Apostolic (Irvingite) Church has adopted the practice. Various gums and spices are employed, but in the Roman Catholic Church olibanum is used, mixed with storax, cascarilla, and other ingredients. It is burned in a thurible or censer swung by chains.

**In'cest** [Lat. *incestum*, from *in*, "not," and *castus*, "chaste"], cohabitation or carnal intercourse between a man and a woman related to each other in any of the degrees within which marriage is prohibited by law. This was not a criminal offence at common law, but, like adultery and fornication, it was left to the cognizance of the ecclesiastical courts, which had power to annul incestuous marriages and to require the offender to perform a public penance in the parish church. Such a marriage was therefore not void, but voidable, and sentence declaring its nullity was required to be pronounced during the lifetime of both of the parties or it could not be pronounced at all. But by statute 5 and 6 William IV. ch. 51 (1835) marriages between persons within the prohibited degrees are declared absolutely null and void. What these degrees are is not stated by the statute, and this point is to be determined by the previously established rules of the canon law and older statutes. Relationship both by consanguinity and by affinity is comprehended within the prohibition in accordance with the so-called Levitical degrees. It is held that marriage with a deceased wife's sister is within these degrees, and consequently void. The disability by consanguinity applies to those who are of illegitimate as well as to those of legitimate birth. No statute has, however, been passed in England declaring incest to be a crime, so that it is not indictable at present any more than formerly. In the States of the Union incestuous marriages are generally prohibited by statute, and the degrees of relationship to which the prohibition applies are, as a rule, speedily declared. Connection by affinity is not usually made a cause of incapacity to marry. In New York, for instance, marriages between parents and children, including grandparents and grandchildren, and between brothers and sisters of the half as well as of the whole blood, are incestuous and void. This provision applies to illegitimate as well as to legitimate children. Incest is also declared to be a crime by some of the States. In New York it is made a felony, and is punishable by imprisonment in a State prison for a term not exceeding ten years.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Inch'ball** ELIZABETH SIMSON, b. Oct. 15, 1755, at Stamford, Suffolshire, England; married in 1777 the actor Inchbald, and went upon the stage the same year; acted in London and other English cities with considerable success, but retired from the stage in 1789, and devoted herself to literary pursuits. She translated a great number of dramas from the French and German, and published *The British Theatre*, a collection of 16 tracts in 2 vols. (1806-09), *The Modern Theatre*, a collection in 10 vols. (1802), and a collection of *Fables* in 7 vols. Her greatest success, however, was her version in 4 vols. of *A Simple Story*, published in 1791, and translated into several of the European languages. D. in London Aug. 1, 1824.

**Inclined Plane**, in mechanics, with the wheel and



axle, the pulley, the screw, the wedge, and the lever), one of the so-called "mechanical powers" or "simple machines," by which a small force, acting through a great length of path, is made to overcome a greater force through a short length of path, the intensity of the smaller force required to the greater being inversely as the length of path through which each acts. Thus, a heavy gun is lifted through a vertical height of say 10 feet; gravity or the weight of the gun acting vertically, and its path being thus estimated by a tractive force of  $\frac{1}{10}$ th the weight of the gun acting along an inclined plane or ramp 100 feet long from foot to summit. An inclined plane in general is an artificially-made ramp or surface inclined at a small angle to the horizon. (For inclined planes for railroads see RAILROADS; for canals, see INCLINED PLANES FOR CANALS, in APPENDIX.)

**In Cēna Dō'mini** [Lat. for "at the Lord's Supper:" its first words as at one time written, it having after 1627 been read annually for many years on Holy Thursday, the anniversary of the first eucharistic feast], a famous bull against heretics, schismatics, sacrilegious persons, pirates, forgers, and others. This bull is of very ancient and uncertain date. Opposed by several governments of Europe as an infringement upon royal privileges, this bull was declared void in 1510 by the Council of Tours; but it still was annually read at Rome, though often modified in form, until 1770, when its annual promulgation ceased, another and more modest document taking its place. Easter Monday was finally appointed for its annual promulgation.

**Income-Tax**, a form of direct tax based upon the actual annual income of individual citizens. Theoretically, it is the most equitable of all taxes, according most fully with the generally accepted maxim of Adam Smith, that "the subjects of every state ought to contribute to the support of the government as nearly as possible in proportion to their respective abilities; that is, in proportion to the revenues which they respectively enjoy under the protection of the state." It would seem fairest that a small percentage should be levied on all incomes. But most advocates of this tax insist that incomes below a certain amount should go altogether untaxed, and that the percentage should be increased on the larger incomes. Usage has adopted these two features. The chief objection to an income-tax is the difficulty, almost impossibility, of ascertaining men's real incomes; partly because many keep no accurate accounts, and partly because few, comparatively, will make truthful report of their incomes, and the inquisitorial nature of the tax is offensive. Hence the honest and conscientious bear the most of this burden.

In Great Britain an income-tax was first levied in 1798, but it was abandoned soon after the close of the Napoleonic wars. It was again instituted in 1842, and has been continued from that time to the present (1875), not without much murmuring on the part of the people. Incomes under £100 are exempt, and a lower percentage is levied on those between £100 and £150. It is estimated that nearly one-sixth of the annual revenue of the kingdom is derived from this source. In the U. S. the national government collected an income-tax for ten years, from 1863 to 1872. The first law exempted \$600, and levied 5 per cent. on all incomes above that sum to \$5000, 7 per cent. on all from \$5000 to \$10,000, and 10 per cent. on all above \$10,000. Whatever was paid for rent or repairs was deducted. Subsequent legislation increased the amount exempted—first, to \$1000, and later to \$2000. The largest amount raised in any one year from personal incomes was in 1866—about \$61,000,000, from 460,170 persons assessed. Actual experience under the law tended to relieve difficulties and objections. When most efficiently carried out, concealment and dishonesty were certainly not greater under this form of tax than under any other form affecting personal property.

A. L. CHAPIN.

**Incommensurables.** See COMMENSURABLES, by F. A. P. BARNARD.

**Incorporeal Hereditaments.** See HEREDITAMENTS INCORPOREAL, by PROF. T. W. DWIGHT, LL.D.

**Incubation.** See HATCHING.

**Incumbrance, or Encumbrance**, a burden, impediment, a hindrance; in law, a legal claim on an estate, for the discharge of which the estate is liable. The term is a general name for liabilities by which an estate in lands and hereditaments may be burdened, such as mortgages and annuities.

**Incunabula**, the name given by bibliographers to books printed before 1500, and important not only for the history of printing, but also in artistic and scientific respects. The name is derived from the Latin *incunabula*, a "cradle," hence generally "beginning."

**Indenture.** See DEED, by PROF. T. W. DWIGHT, LL.D.

**Independence, The, of the U. S. of America.** See DECLARATION OF INDEPENDENCE.

**Independence**, county in the N. E. of Arkansas, traversed by the navigable White River. Area, 1010 square miles. It is hilly and very fertile, producing grain, tobacco, cotton, wool, cattle, and hay. The county is well timbered, and contains lead and other valuable minerals. Cap. Batesville. Pop. 14,566.

**Independence**, tp. of Autauga co., Ala. Pop. 1137.

**Independence**, tp. of Marion co., Ark. Pop. 226.

**Independence**, tp. of Phillips co., Ark. Pop. 638.

**Independence**, tp. of Pope co., Ark. Pop. 240.

**Independence**, post-v., cap. of Inyo co., Cal., 275 miles N. of Los Angeles, in the fertile Owens Valley, and in a region abounding in gold, silver, and lead ores, both quartz and galena. It is 35 miles N. E. of Mt. Whitney, believed to be the highest mountain in the U. S. Its courthouse, destroyed by an earthquake in 1872, has been rebuilt in fine style. It has a weekly newspaper and important business interests. Pop. of tp. 400.

CHAFFANT & PARKER, PUBLS. "INYO INDEPENDENT."

**Independence**, tp. of Saline co., Ill. Pop. 648.

**Independence**, a v. of Madison co., Ind., in Boone tp. Pop. 40.

**Independence**, post-v. of Warren tp., Warren co., Ind., on the W. bank of White River and on the Toledo Wabash and Western R. R. Pop. 183.

**Independence**, tp. of Appanoose co., Ia. Pop. 1030.

**Independence**, city, cap. of Buchanan co., Ia., on the river Wapsipineon, and on the Illinois Central and the Burlington Cedar Rapids and Minnesota R. R., 65 miles W. of Dubuque. Its school buildings cost \$75,000; it has 2 banks, 2 newspapers, 9 churches, a public library, 3 fire companies, 3 parks, spacious fair-grounds, and very fine mills. It is a very handsome town, and is the seat of a State insane asylum, of which the buildings cost nearly \$1,000,000. It is in a rich agricultural region. Pop. 2945.

W. BARNHART, ED. "INDEPENDENCE CONSERVATIVE."

**Independence**, tp. of Jasper co., Ia. Pop. 834.

**Independence**, post-v., cap. of Montgomery co., Kan., on a branch of the Leavenworth Lawrence and Galveston R. R., 134 miles by rail S. by W. of Lawrence, and on the river Verdigris. It was founded in 1870, has 5 churches, 3 banks, 3 weekly newspapers, a fine school-building, and is an important business centre. Pop. 435; of tp. 1394; much increased since the census. W. T. YOE, ED. "TRIBUNE."

**Independence**, post-v. of Kenton co., Ky., on the Louisville and Cincinnati R. R. Pop. 134.

**Independence**, tp. of Oakland co., Mich. Pop. 1586.

**Independence**, tp. of Hennepin co., Minn. Pop. 502.

**Independence**, tp. of Dunklin co., Mo. Pop. 747.

**Independence**, city, cap. of Jackson co., Mo., 10 miles E. of Kansas City, with which it is connected by a narrow-gauge railroad. It is 3 miles from the Missouri River; is the seat of 2 colleges and other important public and private schools; is a well-built town; has 2 banks and 2 weekly newspapers. It has a historical fame as being for many years the headquarters of the overland routes to Oregon, California, New Mexico, etc. Founded 1827. Pop. 3184.

J. N. SOUTHERN, ED. "SENTINEL."

**Independence**, tp. of Macon co., Mo. Pop. 1120.

**Independence**, tp. of Nodaway co., Mo. Pop. 670.

**Independence**, tp. of Schuyler co., Mo. Pop. 1115.

**Independence**, tp. of Warren co., N. J. Pop. 1766.

**Independence**, tp. and post-v. of Allegany co., N. Y. It has considerable manufacturing interests. Pop. 1175.

**Independence**, tp. and post-v. of Cuyahoga co., O., 4 miles from Cleveland. Pop. 1761.

**Independence**, tp. of Washington co., O. Pop. 1395.

**Independence**, tp. of Beaver co., Pa. Pop. 728.

**Independence**, tp. and post-v. of Washington co., Pa., 7 miles from Wellsburg, W. Va. Pop. of v. 144; of tp. 977.

**Independence**, post-v. of Washington co., Tex., 25 miles from Hempstead on the Houston and Texas Central R. R., 12 miles from Brenham on the Austin branch of that line, and situated near the Yegua River. It is the seat of Baylor University and Baylor Female College, belonging to the Baptists, the university containing a library of 2700 volumes. It has public schools and 3 churches.

**Independence**, post-v., cap. of Grayson co., Va.

**Independence of States.** States are said, in political science, and especially in international law, to be independent when they are self-governing as far as internal



relations are concerned, and can perform towards other states all international acts. The term, denoting the negation of control, is the negative side of sovereignty when that term is taken in its strict sense. Thus, no State of the U. S. is independent, because the separate States are not absolutely self governing, and because they have properly no international character, while the quality belongs to the U. S. as really as to any simple form of monarchy. But the word does not imply the power of absolutely free action, because treaty, temporary or perpetual, may have limited such free action.

T. D. WOOLSEY.

**Independence Plantation**, a settlement in Penobscot co., Me. Pop. 185.

**Independents.** I. A politico-religious party in the time of the Commonwealth of England. The conflict which became a civil war in the reign of Charles I. was, politically, a conflict between a king who thought himself a sovereign by divine right with absolute power, and a people determined to maintain their inherited liberty and to guard it with new securities. But the political questions of the time were intimately blended with religious and ecclesiastical questions, which had been agitated for a hundred years. The English Reformation, if we regard it as proceeding from the people, was characterized by a violent antipathy against the ecclesiastical system of the Middle Ages, and therefore against all compromises with what was, in the view of the Reformers, a mischievous superstition. Regarded as proceeding from the government, it was mainly an attempt to make England independent of Rome by conferring upon the sovereign the ecclesiastical jurisdiction which had belonged to the pope. Consequently, there arose a conflict between the ideal reformation, expected but not yet attained, and the government reformation, abhorrent of radicalism and disposed to retain whatever of the ancient system was not incompatible with the supremacy of the Crown in ecclesiastical affairs. As the conflict proceeded, the Puritan or reforming party became almost identical with the political party opposed to absolutism in the state; and, on the other hand, the court party, devoted to the king, became the conservative party in the Church. At the beginning of the Long Parliament (1640) the party of law and liberty in the state, and of reformation in the Church, had no definite plan for the reconstruction of the ecclesiastical establishment, and all who were opposed to that establishment as then organized and administered could act together. But when the conflict had become a war between the king and the Parliament, and especially after "the Solemn League and Covenant" between the Puritanism of England and that of Scotland (1642) had brought a powerful Scottish influence into the southern kingdom, diversities of opinion as to the future constitution of the Church of England began to be important in their relation to public affairs. It was assumed that the desired reformation of the national Church was to be effected by the authority of the nation, as, in the preceding century, the reformation under Henry VIII. and Edward VI., and afterwards under Elizabeth, had been effected. Accordingly, the Parliament had convened, not a representative synod or convocation that might assume to be the Church and to set up an authority co-ordinate or in conflict with the authority of the state, but only an "Assembly of Divines," who were to consider such matters only as might be referred to them by the Parliament, and to give advice which the Parliament might accept or reject. The members of the Assembly were selected with the evident design that all Protestant diversities of opinion concerning the constitution and order of the Church should be fairly expressed and considered. Such diversities of opinion developed parties both in the Assembly of Divines and in the Parliament. Some had for their ideal a reduced episcopacy, with a liturgy expurgated in the interest of thorough Protestantism. Others, formidable in number and in zeal, desired to see the national Church governed by presbyterial and synodical assemblies, after the fashion of the Reformed or Calvinistic churches on the Continent and in Scotland. Still another party had heard of "the New England way," and, being in correspondence with Puritan friends who had removed to Massachusetts and Connecticut, and were there instituting what they deemed a more primitive system of ecclesiastical order, they had learned to recognize no other church government than that of voluntary churches, self-governed under Christ and mutually independent, yet bound to each other in relations of comity and mutual intercourse. Those who preferred that "New England way" to the scheme of a reformed and purified national Church were known as *Independents*.

In both Houses of the Long Parliament there were some eminent men who, while heartily agreeing with the majority in the subversion of the ecclesiastical system which had been established in the reign of Elizabeth, were not willing

to establish in its place a presbyterian discipline like that of Scotland. Among the peers, Lord Say and Seal, Lord Brooke, and a few others were in full sympathy, on religious grounds, with the "dissenting brethren," or Independents, who were a small but able and persistent minority in the Assembly of Divines. In the House of Commons a few men of eminent ability had accepted, with religious faith, the New England church polity as better than any reformed episcopate or any presbyterial and synodical government. One of them was Sir Henry Vane, the younger, who had lived a year or two in New England, where he had made his entrance into public life as governor of Massachusetts. Another was Nathaniel Fiennes, who was a son of Viscount Say and Seal, and a trusted leader, and was associated with his father in the Committee of Safety, the executive council through which Parliament governed England while in conflict with the king. Another was Oliver Cromwell, who was the kinsman and close friend of John Hampden, and had already succeeded to a large share of that illustrious patriot's influence in the House. To these may be added the name of Oliver St. John, one of the most eminent lawyers of England, who had been counsel for John Hampden in the ship-money case, who was afterwards solicitor-general, and who was no less a statesman than a lawyer. In the strictly ecclesiastical use of the name, the Independents, differing from the Presbyterians not on doctrinal points, but only on church government, were a small though able minority in the nation, as well as in the Assembly of Divines and in the Parliament. Their demand was not that their ecclesiastical system should be established by law and all others suppressed, but only that the churches which they were constituting by voluntary agreement might be tolerated. Politically, however, the Independents became a numerous and powerful party. The Baptists (or, as they were then opprobriously called, the Anabaptists) were Independents, religiously as well as politically. All the swarming "sectaries" in that age of excitement, the "sects and schisms" which so terrified those who had set their hearts on national uniformity, were counted with the same party, and the army was full of them. In the progress of inquiry and controversy about ecclesiastical reconstruction the scheme preferred by the majority of the Puritan clergy was not, on the whole, gaining favor in Parliament. An increasing number of enlightened men were determined that the Presbyterial discipline, enforcing by church courts its strict morality and its rigid dogmatism, should not, with their consent, be established in England as a system to which all Englishmen must be by law subjected. Most of the laymen in the Assembly of Divines—among whom the lawyers Selden and Whitelocke were conspicuous—seem to have favored the opinion that there ought to be no distinction between ecclesiastical government and civil, that participation in Christian sacraments should be the right of every citizen, and that there should be no excommunication or church censure but by the magistrate. These men were called *Erastians*; and two of the clergymen in the Assembly—the two, Lightfoot and Colman, who were in some respects the most learned—held the same theory. The learning and ability of the Erastians, as well as the zeal and enthusiasm of the "sectaries," went to increase the strength of the Independents as a political party in the Parliament and in the nation. What had been the great Puritan party, intent on the reformation of the national Church and the vindication of English liberty, was divided and broken up. On one side were the Presbyterians, as zealous for uniformity of doctrine and discipline in the national Church as Queen Elizabeth and her prelates had ever been for uniformity of ritual, and as abhorrent of sects as Archbishop Laud himself had been. On the other side were the Independents, including all those who thought or felt that an ecclesiastical government of England by presbyteries and synods might be as irksome as that which had been so lately abolished. The division had been, from the first, inevitable, for it was the result of principles that could not be reconciled, and that could not but come into conflict over any definite proposal for ecclesiastical reconstruction. Puritanism, looking to Scotland and relying on the "Solemn League and Covenant," had become Presbyterianism, and, the king and his party being vanquished, it found a new antagonist in the party of the Independents.

When the control of affairs in the name of the Parliament had passed from the Presbyterians to the Independents, the king, who had been for some time a prisoner, and who in his negotiations with all parties had shown himself too faithless to be trusted, was brought to trial before a commission constituted for the purpose, was condemned to death, and was beheaded Jan. 29, 1649. For that transaction the Independents as a party were responsible. In connection with it, and as preliminary to the ordinance which constituted the commission, the House of Commons, then reduced to a small remnant of its original number,



made a formal declaration that the people, under God, are the original of all just power: that the Commons House in Parliament, being chosen by and representing the people, have the supreme power; and that whatever is by them enacted has the force of law, though the consent of king and peers be not added to it. A few days after the death of Charles I. Feb. 6 it was voted in the same assembly that the House of Peers in Parliament is useless, dangerous, and ought to be abolished. The next day it was voted that the office of a king in the English nation, and to have the power in a single person, is unnecessary, burdensome, and dangerous to the liberty, safety, and public interest of the people. A council of state, to be annually appointed, was invested with the executive power. Of that body, five were peers (for though the House of Lords had been abolished, such of the peers as had not adhered to the king in his war against the Parliament were permitted to retain their estates and their titles of honor); two were sons of peers; five were baronets; two were keepers of the seal; three were the chief judges respectively of the three great courts of law: three were eminent military commanders in the service of the Parliament; five were knights, and the remaining seventeen, untitled, were, all save one, members of the body that appointed them. John Bradshaw, who had presided in the trial of the king, was chosen president of the council, and his kinsman, John Milton, was its Latin secretary, for it had determined that its correspondence with foreign governments should be only in the language which was common to Christendom.

The attempt of the Independents to convert England into a republic failed, as similar attempts have failed in other countries. It was the attempt of a republican minority against the will of the anti-republican majority. Of the three parties into which the English nation was at that time divided, the Independents, though strong in the ability and enthusiasm of their leaders and in their control of a veteran and victorious army, were numerically the weakest. The most numerous party, when the residuary Parliament decreed the abolition of monarchy, was the Presbyterian, animated with zeal for a national Church and for religious uniformity, but abhorrent of that religious liberty which the republic was to establish, and which to the average Englishman of that age seemed almost identical with irreligion. But only less numerous was the party which, having adhered to the king, retained its sympathy with the lost cause, and which favored an episcopal rather than a presbyterian government over the national Church, and the beauty of a venerable liturgy rather than the fervor of extemporaneous prayers in the worshipping assembly. These two parties together were in truth the body of the English people; and as they were agreed in desiring a national Church, together with the old government by king, lords, and commons, they were also agreed in hating and fearing the victorious Independents. In a true republic the majority must rule, but the founders of "the Commonwealth of England" attempted to establish a republican government over an anti-republican people. Conscious of being sustained by only a small minority, the Parliament, a mere residuum of the great body which met in 1640, dared not appeal to the people by dissolving itself and calling for a new election. All the ability with which it governed through its council of state could not win for it the confidence of the nation. It aimed at the establishment of liberty and justice, but by the great majority of Englishmen it was felt to be a usurpation supported by military power.

In the fifth year of the Commonwealth the republican Parliament, derisively called "the Rump," was working at a bill for its own dissolution, and was endeavoring to provide such arrangements for the election of its successor as would secure the ascendancy of its own party, when it was dissolved and dispersed (1653) by the military power which had made it what it was. Then followed the Protectorate of OLIVER CROMWELL (which see), who attempted in another way what the statesmen of the Rump were unable to do. He was in fact a "king by the grace of God," though without the crown or the name of king; and had his reign been prolonged, the vigor and splendor of his government might have reconciled the English people to that principle of government which first made the Independents a political party; which was so abhorred by the Presbyterians that to escape from it they aided in the restoration of Charles II.; which was only imperfectly recognized in the "Act of Toleration" (1689); and which is now triumphantly marching toward the disestablishment of the national Church in England—the principle of religious toleration. On that principle the Independents were united, though it is not to be supposed that all of them—perhaps not that any of them—saw clearly the reach, or consented to all the legitimate applications, of the principle. (See the histories of England, especially Godwin's *Commonwealth of England*.)

LEONARD BACON.

II. A religious body in England holding that every stated congregation of Christian believers associated under a voluntary agreement, formal or informal, for Christian worship and for mutual watchfulness and helpfulness in the Christian life, is a complete Church, invested with every prerogative which Christ has conferred on any Church, and dependent for the exercise of ecclesiastical functions on no authority exterior to itself, whether secular or hierarchical. (See CONGREGATIONALISM.) The most considerable difference between Independency in England and Congregationalism in the U. S. is that in the former the principle of the fellowship and mutual responsibility of churches, though recognized, is not so fully developed and made practical as in the latter. The ecclesiastical history of England gives no definite trace of a Church constituted on the platform of Independency earlier than 1567. More than ten years later, Robert Browne, a clergyman of the Established Church, began to preach against all national churches, and to urge the duty of falling back upon the original constitution of Christian societies as deduced by him from the New Testament. Compelled by persecution to take refuge in the Netherlands, he printed there (1582), for circulation in England, two books, in which he propounded his new idea and method of church reformation—a method as unwelcome to the Puritans, who were working and suffering for a reformation by act of Parliament, as it was to the bitterest enemies of Puritanism. His idea was "reformation without tarrying for any," or separation from the national Church as an essentially anti-Christian institution, and the formation of independent churches. It was impossible to suppress the idea, for, notwithstanding the prison and the gallows, the early "separatists" would not attend the parish churches, would hold their conventicles, would propagate their revolutionary opinions, and persecution exacerbated their enthusiasm into fanaticism. They were called "Brownists," though Browne had deserted them. They were also called "Barrowists," from Henry Barrowe, another of their champions, who was one of their martyrs. At a later date (in the time of the Long Parliament) they began to be called Independents, and they accepted the name. By that name their successors have ordinarily been designated till the present century, though now they prefer to call themselves Congregationalists.

The Independents or Congregationalists in Great Britain and the British colonies are a numerous and enterprising body of Christians. They have more than 3000 churches, and the number is constantly increasing. The London Missionary Society, though not exclusively theirs, is the organization through which they conduct their foreign missions. They have a home missionary society for their work in England, and a colonial missionary society to aid their churches in the colonies. Excluded till within a few years past from the universities, they have established colleges of their own for the classical and theological education of their ministers; and their colleges in England are now affiliated with the London University. Several journals, weekly and monthly, are conducted in their interest, and the *British Quarterly Review* may be regarded as representing, unofficially, their principles. (See *Sketches of the History of the Free Churches of England*.)

LEONARD BACON.

**Indeterminate.** A mathematical quantity is said to be indeterminate when it admits of an infinite number of values. An equation is said to be indeterminate when the unknown quantities that enter it admit of an infinite number of values. Thus, the equation of a straight line  $y = ax + b$  is indeterminate; for, if we give to  $x$  any value, we can find from the equation a corresponding value of  $y$  such that the assumed and deduced values will satisfy the equation; that is, there are infinite sets of values of  $x$  and  $y$  that will satisfy the given equation. In like manner, it may be shown that any equation which contains more than one unknown quantity is indeterminate; it is obvious that any group of simultaneous equations is indeterminate when the group contains fewer equations than there are unknown quantities; hence, the equations of lines and surfaces used in analytical geometry are indeterminate. For this reason analytical geometry is often called indeterminate geometry. A problem is said to be indeterminate when it admits of an infinite number of solutions. A problem will be indeterminate when the number of independent conditions is less than the number of required parts, for in that case the number of equations that express the imposed conditions will be less than the number of unknown quantities; the equations of the problem will therefore be indeterminate, and consequently the problem itself will be indeterminate. Thus, the problem in which it is required to find a point from which the tangents to two given circles shall be equal is indeterminate; the solution of the problem shows that there are an infinite number of such points,



which, taken together, make up a straight line called the radical axis of the two circles.

W. G. PECK.

**Indeterminate Analysis** is that branch of analysis which treats of the solution of indeterminate problems. In most practical cases the given conditions limit the number of solutions, without affecting the mode of treatment. The method of treating indeterminate problems will be best illustrated by means of a problem of this character.

Let it be required to find what year of the current Julian period corresponds to 1875 *v. c.*, that year being the eighth of the current *solar cycle*, the fourteenth of the current *lunar cycle*, and the third of the current *cycle of indiction*. The statement of this problem depends on the following definitions: the *solar cycle* is a period of 28 years; the *lunar cycle* is a period of 19 years; the *cycle of indiction* is a period of 15 years; the *Dionysian period* is a period of  $28 \times 19$ , or 532 years, whose first year is the first year of a solar and also of a lunar cycle; and the *Julian period* is a period of  $28 \times 19 \times 15$ , or 7980 years, whose first year is the first year of a solar cycle, of a lunar cycle, and also of a cycle of indiction.

*First.* To find the year of the current Dionysian period, let  $x$  denote the number of complete solar cycles that have elapsed since the beginning of this period, and  $y$  the number of complete lunar cycles that have elapsed; from the conditions of the problem we have

$$19y + 14 = 28x + 8, \text{ or } 19y = 28x - 6, \quad (1)$$

It is required to find the least entire values of  $x$  and  $y$  that will satisfy equation (1); dividing by 19, we have

$$y = x + \frac{9x - 6}{19}, \quad (2)$$

in which the last term must be a whole number; placing this equal to  $t$ , we have

$$9x - 6 = 19t, \text{ or } x = 2t + \frac{t - 6}{9}, \quad (3)$$

in which the last term must be a whole number; the least value of  $t$  that will satisfy this condition is 3; this value of  $t$  in (3) gives  $x = 7$ , and this in (2) gives  $y = 10$ ; hence, the year 1875 is the 204th year of the current Dionysian period.

*Secondly.* To find the year of the current Julian period, let  $z$  denote the number of complete Dionysian periods that have elapsed since the beginning of the current Julian period, and  $u$  the number of complete cycles of indiction; we shall have, as before,

$$15z + 3 = 532u + 204, \text{ or } z = 35u + 13 + \frac{7u + 6}{15}; \quad (4)$$

placing the fractional term equal to  $s$ , we have

$$7u + 6 = 15s, \text{ or } u = 2s + \frac{s - 6}{7}. \quad (5)$$

The least entire value of  $s$  that will satisfy (5) is  $s = 6$ , which gives  $u = 12$  and  $z = 439$ . Hence, the year 1875 is the 6588th year of the current Julian period. We also find that since the beginning of this period 235 complete solar cycles have elapsed, and 439 complete lunar cycles.

W. G. PECK.

**Indeterminate Coefficients.** An *identical equation* is an equation that is true for all values of the unknown quantity or quantities that enter it. In every such equation the unknown quantity or quantities are indeterminate, and the coefficients of the different powers and combinations of powers of these quantities are called *indeterminate coefficients*. If an identical equation containing any number of unknown quantities is cleared of fractions, the coefficients of the like powers and combinations of powers in the two members are respectively equal to each other. This is the *principle of indeterminate coefficients*; it is much used in developing quantities into series and in resolving fractions into partial fractions.

W. G. PECK.

**Index, Concordance, Digest, Table of Contents.** In bibliography, an index is an alphabetical list or table of the principal subjects, facts, words, or names discussed, employed, or noticed in the work to which it is appended, with references to the chapter, page, or paragraph in which they occur. Indexes are usually printed at the end of the last or sometimes of each separate volume of the book. An index may be general or special, comprising in the latter case subjects, *real index*: words, *verbal index*; or personal or geographical names. The title "index" is also applied to independent lists of books—*e. g.* the *Index Expurgatorius* or *Index Librorum Prohibitorum* of the Romish Church; or to catalogues of subjects, as the manuscript tables in some libraries, which refer the student to all the works in the library in which a given subject is treated of. Indexes separately printed sometimes embrace the contents of more than one work, as Wöhler's valuable index to J. Grimm's *Deutsche Grammatik* and to his *Geschichte der Deutschen Sprache*.

A concordance is an alphabetical list of words occurring in a particular work or collection of works. It differs from a verbal index by being somewhat more full, as it usually cites enough of the passage where the word occurs to show its grammatical relations to the period. (See *CONCORDANCE*.) To the list there given may be added Engel's *Concordance to the Koran*, H. H. Furness's *Concordance to the Poems of Shakespeare*, and that of Prendergast to the *Poems of Milton* (Madras, 1857).

A digest is an alphabetical table of subjects, differing from a real index or index of subjects by being sufficiently copious to give a summary of the doctrines of the book on each topic referred to. The word is most frequently applied to tabular abstracts of points judiciously decided in books of legal reports. Digests are often published separately, and comprise the contents of voluminous series of reports.

A table of contents is a list of the subjects or important facts discussed in the work or volume to which it belongs, arranged in the order in which they occur in the text. It is usually printed after the preface or introduction. In some degree serves the purpose of an index, but its general use is rather to give a conspectus or comprehensive view of the matter and method of the work than to aid the student to find particular passages. Tables of contents are doubtless older than indexes with references to folios or pages. The preparation of an index is a work of too much labor to be ordinarily performed for a single copy. The manuscript copies of any work would not usually correspond in column or page, and therefore a page-reference index prepared for one copy would not serve for another, while a table of contents, following the method of the book, would answer equally well for all, however differently paged. The most familiarly known ancient table of contents is that which forms the first book of the *Natural History* of Pliny the Elder. This table, as Pliny says in the dedication, he prepared in order that "as any man is desirous to know this or that, he may seek and readily find in what place to meet with the same." He adds: "This learned I of Valerius Soranus, one of our own Latin writers, who hath done the like before me." Pliny therefore intended this table to serve the purpose of an index, and as the catalogue of precious stones in chapter x. book xxxvii. of the *Natural History* shows that he was acquainted with the value of an alphabetical arrangement, it is singular that he should not have employed it in his table, referring to books instead of pages. We should infer from Pliny's language that he knew no other example of a table of contents than that of Soranus, but Cicero, Varro, Seneca, and Quintilian use the word index in a way which shows that something like tabular summaries or digests of the matter of philosophical and other writings existed in their times. The *Lactantius* of 1465 (the first book printed in Italy with a date) has a table of contents following the order of the chapters, but it refers also to the folios on which the chapters commence. These numeral references are *printed*, but the numeration of the folios, as well as the headings of the chapters, is manuscript. At the end of the second volume of the Latin Bible printed by Pannartz at Rome in 1471 is a copious alphabetical list of Hebrew proper names occurring in the Scriptures, with interpretations of the etymological meaning. The early editions of ancient classics are very commonly provided with tables of contents and with registers of the signatures, but alphabetical reference indexes were hardly known until the practice of numbering the folios or pages became general. The tables of contents in fifteenth-century editions often refer to the folios by printed numerals, but in books of that age the folios themselves are rarely numbered typographically, and Aldus Manutius in one of his prefaces advises students to number them by hand. The *Aulus Gellius* published at the press of Aldus after his death in 1515 has its folios numbered, and is one of the earliest examples of completeness in indexes. It is provided with an *index eorum que notata desunt, etc.* in sixteen folios, containing not only subjects, but single words, arranged in nearly exact alphabetical order, and with printed references to the folios; also with an *index librorum, etc.* or table of matters, *que ad grammaticam et ad alia studia pertinent*, in fifteen folios, arranged under chapters in the order in which the subjects occur, and with references to the number of the folios. These two tables precede the text. After the text follow a list of the titles of the chapters in the same order as in the volume, in twenty-three folios, without references to the numbered folios, and another list, in twenty-eight folios, of the Greek quotations employed by Aulus Gellius, with Latin translations, and with references to the *signatures* of the sheets. In this book, then, we find nearly all the forms of index known to modern bibliography. It is probable that verbal indexes—and, we may add, glossaries and dictionaries—originated in the practice of making glosses or notes explanatory of particular



lar words on the margin of manuscripts. When a scholiast had thus annotated a volume it would be an easy step to collect the notes into a table. An alphabetical arrangement would naturally suggest itself as the most convenient, and the collection of glosses would grow until it embraced all the obscure or otherwise noticeable words employed by the author, and finally answer the purpose not only of a glossary or special dictionary of the vocabulary or stock of words of the writer, but also of an index.

Verbal indexes and concordances are most useful, not to say indispensable, aids in philology and criticism, and real indexes are not less so in the study of works of science, and even of general literature, especially history. If such works conformed strictly to philosophical method, real indexes would be less needed, and tables of contents would sufficiently answer the general purpose of a guide to the matter of a volume. But, unfortunately, French writers alone seem to possess the science of method, and English as well as German literature is conspicuous for the want of this excellence. Besides this, the encyclopædic learning of German (and in late years of English) scholars both tempts and facilitates the accumulation of an immense mass of subsidiary, illustrative, and documentary material in their works which it is impossible so to arrange that any perfection of method could conduct the student to it. It is perhaps to a consciousness of the want of a power of orderly arrangement that we owe the English habit of supplying all books of serious scientific or philosophical pretensions with full indexes; and the absence of these conveniences is one of the greatest annoyances a foreigner experiences in the study of the graver literature and science of Germany. The German editions of classical authors, on the other hand, are generally furnished with complete indexes, and we can hardly point to any more satisfactory labor of this sort than the invaluable real and nominal word-lists in the fourth volume of Groskur's German translation of Strabo. By the force of a habit which seems almost like a conspiracy among authors the books which perhaps above all others require verbal indexes are almost always without them. We refer to grammars, especially of foreign languages, among which it would be hard to find one provided with such an index as the student needs as a help in the actual use of the tongue he is acquiring. Undoubtedly, the habit of desultory reading, which is encouraged by copious indexes, is an evil, but in the present enormous multiplication of works which claim the attention of the scholar it is a necessary evil. Life is not long enough, nor is the action of eye and mind swift enough, to put us in complete possession of the literature of any important subject. The old rule, *multum non multa*, is no longer practicable for men of the comprehensive scholarship required by our age; and those who aspire to the possession of what is called "general knowledge" must content themselves with little more than gleanings from the works of special inquirers. For such persons—and they must always be the vast majority—indexes are an indispensable guide to literature and science. Nor is it merely dilettanti and persons in pursuit of general intelligence alone who need such helps. The most tenacious memory of the most philosophic scholar can retain but a relatively small proportion of what he reads, and for refreshing his recollection, as well as for the use of his learning in his own compositions—for we all build more or less on the labors of our predecessors—he needs indexes almost as much as the mere amateur. Authors ought, as a general rule, to be required to furnish these facilities for the study of their works. Public opinion can do something to enforce the performance of this duty; and in all cases when an index is worth making critics should always stigmatize the want of it as not only a serious defect, but as a grave literary offence. Of course in works of ephemeral literature the result would not be worth the labor, but in books which aspire to a sufficiently wide and permanent circulation to need the protection of copyright it would be neither unjust nor unwise to make good indexes a legal requisite for securing a monopoly to authors or publishers.

GEORGE P. MARSH.

**Index**, tp. of Cass co., Mo. Pop. 795.

**Index Librorum Prohibitorum.** This title is applied to official lists issued from time to time, under papal authority, by the Congregation of the Index at Rome, enumerating books, single sheets, engravings, and other printed matter the use or even possession of which is forbidden by the Church. The proscription of books deemed heretical in religion, treasonable or seditious in politics, or corrupt in morals, is a practice of very ancient date. Not to speak of examples under heathen and modern civil governments, we find that as early as the fifth century the works of Arius were denounced and publicly burnt by the authorities of the Church, and the writings of other heretics often met with the same fate at different periods in the

course of the Middle Ages. The right of prohibiting the use of such books is a necessary incident of the general authority claimed by the Romish Church over the consciences of the faithful, and not only popes and councils, but inferior spiritual directors and confessors, have exercised it at all times as a regular part of the discipline of the Catholic Church. These prohibitions were naturally at first special, and it does not appear that any general list of condemned books was promulgated before the year 1540, when the emperor Charles V. published a list of forbidden works, which was followed in 1546 and 1550 by new imperial edicts prohibiting to his subjects the use of all books contained in a catalogue drawn up by his order by the doctors of the University of Louvain. Lists of books condemned by the theological faculty of the University of Paris were issued by royal authority in 1545 and 1551, and similar catalogues appeared about the same time under the sanction of the theologians of other great European schools of learning. The first formal pontifical index is said to be that issued in 1557 by Paul IV., and this, as revised and enlarged in conformity with certain canons of the Council of Trent, by the Congregation of the Index established and charged with the censorship of books by Pius IV., was reissued under his authority in 1564. New and more comprehensive lists appeared under Gregory XIII., Sixtus V., Clement VIII., and Alexander VII., and many more or less modified editions, supplemented from year to year by the Congregation, have been published since. In the earliest indexes the prohibition of the works enumerated was absolute, but Sixtus V. organized a board of censure for the preparation of a list of books which might be used after due expurgation; and this seems to have been printed under the title of *Index Librorum Expurgatorius*, or *Expurgatorius*, but we believe that the same Congregation now exercises the functions of both condemnation and expurgation. The *Regule Indicis* prescribed by the Council of Trent, together with additional rules by Clement VIII. and Alexander VII., are contained in many editions of the *Index*. They forbid all books condemned by popes or ecumenical councils before the year 1515; all the works of heresiarchs, as Luther, Zuinglius, Calvin, Friedenberg, Schwenkfeld, and *his similes*, whatever may be their titles or subjects; the writings of all other heretics on religious topics; books of immoral tendency, except the works of ancient heathen authors, which are permitted *propter sermonis elegantiam et proprietatem*, though not to boys; and books on the various arts of divination, auguries, omens, sorcery, and magic. They also contain provisions authorizing the bishop and confessor to allow to learned and pious men the use of modern translations of the Old Testament, not made by heretics, by way of illustration of the Vulgate text, though not as authoritative, as well as for the permission of various other classes of books and for the censure and expurgation of literary works. In modern editions of the *Index* some of the publications are noted as prohibited absolutely, others until corrected or expurgated by new editions, erasure or obliteration of condemned passages, or substitution of cartons for the leaves containing such passages. The *Index* and supplements down to 1754 embrace about 20,000 titles, including flying sheets and engravings. Many of these are repetitions, but, on the other hand, in hundreds of cases these titles include all the works of voluminous authors, so that, upon the whole, the condemned publications greatly exceed the number we have stated. The *Index* is not designed for the common use of lay believers, but rather for the guidance of confessors; and as the vast multiplication of printed books now renders a universal censorship of the literature of the world impossible, spiritual directors are often obliged to avail themselves of the more comprehensive clauses of the rules, some of which admit considerable latitude of interpretation. In the recent supplements to the *Index* the condemnation is generally confined to publications (for the most part by professedly Catholic writers) conspicuous as dangerous attacks upon the doctrines, discipline, prerogatives, or privileges of the Church, and as at the same time likely to acquire a wide popular circulation.

The earlier *Indexes* furnish some interesting contributions to literary history by fixing the date of the original publication of books condemned, and by giving titles of works no copies of which are now known to exist. At the same time they illustrate, by what they insert and what they omit, the fluctuations of religious tendency in the Catholic Church itself; but the value of all this information is diminished by the vagueness of the indications, which are frequently so bald that we cannot now identify the book intended. In earlier centuries the prohibitions of the *Index* controlled the intellectual culture of the Catholic world, and they incidentally caused the destruction of great numbers of works of more or less importance in ecclesiastical literature. Confessors deny absolution to penitents



who refuse to deliver up books expressly or impliedly for bidden, and these, when surrendered, are generally burnt or so mutilated as to be illegible. This explains the rarity of many of the books formerly widely read; as an illustration of which we may refer to the treatise on the *Benefits of the Death of Christ*, ascribed to Aonio Palærio, of which only two or three copies are known to survive, though not less than 10,000 or 20,000 were sold within a very few years after its publication in 1543. In the present state of public opinion in many Catholic countries the condemnation of a book by the *Index* discourages few from reading it, but, on the contrary, it often serves as a recommendation which increases instead of diminishing its popularity and circulation.

GEORGE P. MARSH.

**India: ITS GEOGRAPHY AND ETHNOLOGY, AND ITS LANGUAGES AND LITERATURE OTHER THAN SANSKRIT.** India, a large peninsula of Southern Asia, otherwise called "The East Indies," and "Hindustan." The meaning of these terms has frequently been strangely misconceived. Hindustan does not mean "the land of blacks," but "the country of the river Indus—the fertilizer." The river's name, *Sindhu*, is derived from the root *syand*, to "flow," "irrigate," "fertilize." The manner in which the letter *s* has dropped out of its place, and the letter *h* substituted, in *Hindustan*, opens up a strange leaf in the earliest history of India. The old Persians, speaking Zend (see PARSSES), many centuries before the Christian era, crossing over from Persia to India, were met by the broad waters of one of the most magnificent rivers in the world. They asked its name, and were told it was the *Sindhu*, the "irrigator" or the "fertilizer." But, very curious to say, they could not pronounce *s*, nor is that letter to be found in their alphabet. The Zend-speaking people thus called the river the *Hind*. *Stan* being the Persian for "land," we thus have "Hindustan," "the land of the fertilizing river." But there was still to ensue another strange change. The Greeks with Alexander crossed over to India, and also came to the river and asked its name. Upon being told that it was *Hind*, they naturally added the *os*, making *Hindus*. But the Greek alphabet itself is deficient of a letter, and that is *h*. So *Indus* remained for the name of the river, and *India* or the *Indies* for that of the country. The fact is a very strange one, therefore, that were it not for a people living in ancient times close to the north-western frontier of India being unable to pronounce the letter *s*, we should now be talking and writing of the river *Sindus* and the country *Sindia*.

**Geography.**—The India of the present day extends from Peshawar, a frontier town in the N. W. of the Peninsula (33° 57' N. lat., 71° 40' E. lon.), to the banks of the Burmese river Salwin in the E., and from the long chain of the Himalayas in the N. to Cape Comorin in the S. (lat. N. 8° 4', lon. E. 77° 30'). It is divided commonly into two great divisions, *Hither* and *Further India*—namely, that portion to the W. and that portion to the E. of the Ganges. *Hither India*—that is, India within the Ganges, otherwise called *Hindustan*—is that portion which must almost wholly monopolize our attention. The rest consists of the Indo-Chinese peninsula and the islands of the Indian Archipelago; and it is a pity—though it was perhaps unavoidable—that the geography of this portion of the British dominions in the East should have been in any way mixed up with that of so distinct a country as *Hindustan*. Including *Further India*, geographers inform us that the extent of India from W. to E. is about 1600 miles, and that from N. to S. it falls little short of 2000 miles. India contains about 1,600,000 square miles. Of British India the entire population, as returned by the census of 1871–72, is about 283,000,000. (See INDIA: HISTORY.) Leaving aside the Aryan and Kolarian inhabitants of India, the population of the Dravidian peoples has been minutely and accurately ascertained by the labor of the writer, Mr. R. V. Dr. Caldwell, author of the *Comparative Grammar of the Dravidian Languages*. The list is especially interesting, as it gives a clue to the relative numerical strength at the present time of the chief sections of the aboriginal Indian races to that of *Hindus* of later origin. The Tamil-speaking community numbers 14,500,000; the Telugu, 15,500,000; Canarese, 9,250,000; Malayalam, 3,750,000; Tulu, 500,000; Gôza, 1,00,000; Tulu, 752; Kota, 1112; Gônd, 1,134,458; Kon, 267,000; Rajmahal, 11,089; and Oriss, 265,000. Thus the total number of persons speaking the Dravidian dialects is estimated at 49,660,032. However, a subtraction must be made in this sum-total, as the Tamils are an enterprising and migratory people, and many of them are to be found scattered over the globe. The numerical strength of the ethnological family of Indian Kolarians is much smaller still than that of the Dravidiens. The Aryans are everywhere in enormous majority.

British *Hindustan* is made up, first, of districts wholly under the sway of British authority, of a few scattered ports and townships belonging to other European nations;

thirdly, of protected states; and fourthly, of allied independent states. The whole country is formally divided into three presidencies—that of Bengal, capital Calcutta; that of Madras, capital Madras; that of Bombay, capital Bombay. Bengal is under a lieutenant-governor, but his powers are limited, in that he has only control over that portion of the presidency which comprises North and South Behar, Orissa, Assam, and Bengal proper. The North-west Provinces, capital Alahabad, are also under a lieutenant-governor. The Panjab has also its lieutenant-governor. Oude is under a chief commissioner, as is also Mysore. Indore, in Central India, is under an agency. The Central Provinces are under commissioners. Rajputana is governed by a political agent. Commissioners, political residents, and high officials deputed by the governments of the various presidencies overlook the interests of Travancore, Cochin, Poodoocottah, Baroda, Kolapore, Cutch, Vizianagram, Jeypur, the states of Guzerat and Kattiawar, etc. The following are the titles of the rulers of the twelve principal feudatory states in India: the nizâm of Hyderabad, maharajah scindiah of Gwalior, the guikwar of Baroda, maharajah of Jeypur, maharajah of Travancore, maharajah of Cashmeer, maharajah of Joodpoor, the holkar, the begum of Bhopal, maharajah of Puttala, maharajah of Oodeypore, and maharajah of Bhurtpoor. The island of Gon, with a small scrap of the adjoining mainland, belongs to the Portuguese. The inhabitants do not exceed 400,000. The French still possess five small settlements in India, and the population of all of them put together does not amount to 250,000 inhabitants. They are (1) Pondicherry, on the Coromandel or eastern coast; (2) Karikal, close to Pondicherry; (3) Yanam, in Orissa; (4) Chandanagore, in Bengal; and (5) Mahé, on the Malabar or western coast. The physical characteristics of the Indian Peninsula are remarkably striking and simple for so large a tract of country. *Hindustan* is especially remarkable for the height of its mountains, the breadth of its plains, and the size of its rivers. Whilst other countries, however, can show plains of vaster extent and rivers of greater volume, the Himalayas stand supreme amongst the mountains of the world. The highest peak in them (Mount Everest, in Nepaul) reaches 31,000 feet; and the Himalayan chain possesses thirty-nine other peaks taller than Chimborazo, the height of which is reckoned to be 21,424 feet. The other principal mountain-ranges in *Hindustan* are the Vindhya, which extend through Behar and the North-west Provinces, along the N. bank of the Nerbudda River, to Erach; the Eastern and Western Ghats, which, running southward, meet at the Neilgherry Hills in the Madras presidency, and then continue their united course to Cape Comorin; the Suleiman and Hala Mountains, on the N. W. frontier; the Satipoora Hills; the Rajmahal Hills; and the Garrows, to the E. of Bengal. Most of these great ranges are called "hills" in common Indian parlance. For instance, the Neilgherry Hills, not Mountains, are spoken of, and yet one of these "hills" rises to the height of 8760 feet. The river-system of *Hindustan* is very extensive and ramified. The great rivers are the Indus, the Ganges, the Brahmaputra, the Nerbudda, the Taptee, the Mahanuddee, the Godavery, the Kistna, the Pennâr, the Pââr, and the Cauvery. The tributary rivers of the first two of these are such large and important streams in themselves that mention must be made of them. The tributaries of the Indus are the Cabool and the five rivers which irrigate and give its name to the Panjab—namely, the Jhelum, the Chumb, the Ravi, the Beas, and the Sutlej. The tributaries of the Ganges are, first and foremost, the Jumna; then no less than fifteen other rivers, each of large size, and in the rainy seasons, or "monsoons," of great volume.

The vast peninsula of India is crowded with cities of great size, fertile plains irrigated and cultivated, deserts such as that of Rajputana, and wild, inaccessible mountains. Roughly speaking, in all India there is only one European to 3,000 natives, and the standing wonder is how European can keep its footing in the East. One explanation of this is to be found in the fact that the *Hindus* are, as a nation, the most disunited on the face of the globe. Not only are they separated amongst themselves by natural ethnological distinctions, but by greater barriers of their own raising. Their innumerable religious divisions, and especially their combats excited thence, prevent them from becoming a united people capable of governing themselves. If *Hindus* were to leave India to-morrow, the Peninsula could only find safety from utter anarchy, and especially from bloody internecine wars between Mohammedan and Hindu, by seeking the protection of some other civilized power.

A few scattered ports and townships, besides those passing from this epitome of India, are worthy of notice. The western coast of the Peninsula, washed by the Indian Ocean, is called the Malabar coast, and the Indian sea, washed by the Bay of Bengal, is called the Coromandel coast. All kinds



of climate prevail in different localities in India, according to their different situation and elevation. The line of greatest heat is said to pass through the city of Madras. The heat of certain districts, such as Bengal proper and the southern parts of the Malabar coast, where there is a heavy rainfall, and consequently a natural exuberance of tropical vegetation, is moist and enervating, and the climate often malarious; the climate, however, of many other parts of India is dry and exhilarating. Then, again, as the peninsula of India narrows southward, it becomes more open to and affected by the sea-breezes, and its climate consequently becomes more equable. All through India, in the hill-ranges, are delightful sites for stations, cantonments, and retreats, where the climate is balmy and temperate. Tennyson writes of "the sweet half-English Neilgherry air;" and his description is thoroughly true to nature. In these hill-ranges—from the Himalayas and mountains of Assam to the southernmost spurs of the Ghauts, overlooking the triple line of the breakers of Cape Comorin—tea, coffee, and cinchona cultivation is rapidly extending. Everywhere throughout India a network of roads is being spread, and great attention is being paid to the lining of these with avenue trees, to protect wayfarers as much as possible against the tropical sun. Canals and railways, too, are opening up the country in every direction. One can now travel by rail from Negapatam to Calcutta, and shortly one will be able to pass from the roots of the Himalayas, at Darjeeling, to Tuticorin, in Tinnevely, only a few miles from Cape Comorin. The government has been taking up public works of every kind, and in a short time several of the great irrigation works now in progress are expected to alter the face of large tracts in India, where water means wealth. Change is rapidly following change, and we can only dimly guess what the India of a few years hence may be.

**ETHNOLOGY.**—The ethnology of India may be treated of under three heads—namely, the Aryan, the Kolarian, and the Dravidian. But before we enter upon a critical examination of the existing races and languages of India, the question naturally arises, What do we know of the people of Hindustan in the very earliest times? It is a very little indeed that we do know, but that little is extremely interesting, as it carries us back—just as in the case of Egyptian antiquities—to the extreme youth of the world. Long before the Aryans came into India the Peninsula appears to have been peopled by aborigines, and in parts, in all probability, even densely. But when did the Aryans first enter Hindustan? It is impossible to tell, and all we know is that there appears to have been a succession of Aryan invasions, and that the Aryans did not come over in one vast flood at once. In all probability they were pouring in, little by little, wave after wave, even while the Pyramids were being built. Yet when they did arrive in India they undoubtedly found there those two great classes of aboriginal inhabitants which still survive in the Peninsula—namely, the Kolarians and the Dravidians. This is capable of clear proof. But setting this matter for a while aside, let us turn to a still more ancient phase of the subject. How did the Dravidians and Kolarians themselves get into India? or were they really from the first aborigines? Here we come to questions affecting a time not long subsequent to the building of the Tower of Babel. All kinds of theories have been advanced, but some are at least plausible, and appear to be borne out by evidence of considerable weight. It has, for instance, been clearly ascertained that the Dravidian dialects are of the same stock, and intimately connected with the Sythic, etc.; whereas the Kolarian dialects are distinctly Indo-Chinese. It is probable, then, that the Dravidian was introduced into India from the N. W., and that the Kolarian entered from the N. E. But if they so entered, what did they find before them in the land? It has been suggested that the Negrito element evidently observable in some of their tribes can only be explained by supposing that the Dravidians and Kolarians, on entering India, found installed there already a black race, with thick lips, no beards, high cheekbones, and woolly hair, and that to some extent they became commingled with them. In the case of the Kolarians some Orientalists insist on this theory very strongly. In them the distinct Mongolian type of face is apparent, yet frequently the Negrito type appears just as prominently; indeed, many of them appear to be simply Africans with almond shaped eyes. But, taken as a whole, the Negrito theory is more ingenious than reliable. The Negrito type of physique, if observable in Hindustan, must be a corrupt one, for it is characterized by diminutiveness, and many African races are strong and powerful of build. However, the Negrito facial angle, the fatness of the nose, the woolly head, the absence of beard, etc. are quite strikingly observable in many of the Indian aboriginal tribes. Col. Dalton remarks them in the Orôns. The African temper-

ament, too, is to some extent observable in many of the least civilized Indian races—love for music, light-heartedness, impulsiveness, and the rest. When examining into the ethnology of any country, six considerations should prevail with the student—namely, (1) physical and (2) mental characteristics, (3) religions, (4) languages, (5) laws, and (6) habits and customs. Whatever may have been the origin of the Kolarians and Dravidians, by each one of the above six points we can see clearly that they are distinctly non-Aryan classes of the Indian people. Notwithstanding the theories to which allusion has been made, the Kolarians and Dravidians may, speaking generally, be termed without hesitation Indian aborigines, and Aryans the invaders and civilizers. We know nothing of the state of India before the Aryan invasion. In every probability society was in the rudest and most patriarchal state. The earliest word for "monarch" in Southern India is *gon* (i. e. a "cowherd," or a man of the shepherd caste); and this evidently points to a time when the possession of cattle was considered to confer a dignity which is now attained by the possession of an illustrious ancestry and gold and cities and fortresses and armies and fleets. The changes which followed upon the Aryan invasions from the N. W. have left clear traces behind them, and thus we can speak with some certainty concerning this part of the subject. The invaders, not only by their numbers but by their civilization, appear to have driven the aborigines everywhere before them, especially in a southward direction. Not so, however, with the Kolarians, as a whole, was this exactly the case; the advancing Aryan tide seems rather to have gradually surrounded them, cut them off and islanded them, so to speak. This appears also to have been the case with one or two Dravidian tribes, such as that of Rajmahal. Yet one more point must be noticed. Not only did the Aryans push the aborigines southward, but to a considerable extent followed with them and intermingled with them. At a very early age Cape Comorin was as well known to Brahmins as to the aboriginal Shânars of Tinnevely and Travancore. Let us now take up the threefold division of this part of our subject, first speaking of the languages and literature of the Kolarians (as this may be dismissed very briefly); then, secondly, of the Prakrits of Northern India and the peoples speaking them; and then, thirdly, of the languages and literature of Southern India.

**I. The Kolarians.**—Under this general head may be classed the Couours of Ellichpoor; the Korewahs of Sirgojah and Juspore; the Moondahs of Chutia Nagpur, also the Keriaks of that district; the Hos of Singhbhum; the Bhoonij of Manbhoom and Dulbhoom; the Nakales, the Kodas; the Sonthals of Manbhoom, Singhbhum, Cuttack, the tributary Mehals, Hazreelbagh, and the Sonthal Pergunnahs; the Juangs or Puttoons of Cuttack, Keonjur, Pal Lehra, Dhenkanal, and Hindole; Ghatwals; Bendkurrs, Birhoes, Boyars; Kharwars and Rajwars in South Behar; Kaurs near Oodeypore; and the Kooloes and Beels of Guzerat and Rajpûlâna. All these are undoubtedly Indian aborigines, not of the Dravidian stock. Their languages are of the rudest description. Literature they have none. Many of the more civilized of these scattered tribes speak Hindi and other Aryan dialects. As a rule they practice most degraded customs, some living almost entirely naked. "Puttoons," for instance, mean "the leaf-clad." (The reader who is curious to know more of these tribes should consult Dalton's magnificent work on the *Ethnology of Bengal*; Sir George Campbell's interesting but inaccurate contributions to *Indian Ethnology* (*Journal of the Bengal Asiatic Society*, vol. xxxv., part ii., etc.)) Col. Dalton's list of the Bengal Kolarians is as follows: the Juangs, Kharrias, Mundahs, Hos, Bhumij, Ho or Larka Kols, Santals, Birhors, Korwars, Kurs, and Kurkus or Muasis. The particulars of the habits and customs of these tribes given by the gallant author are very curious and interesting. He also furnishes a vocabulary of familiar words in the Kolarian dialects, and photographs carefully depicting the typical characteristics of the various tribes which speak those and other Bengal vernaculars.

**II.** We have now to turn our attention to the languages and literature, other than Sanskrit, of the Aryan inhabitants of Hindustan. This is one of the most interesting philological fields in the world, and is one which has recently been wonderfully opened up by Mr. Beames in his *Comparative Grammar of the Modern Aryan Languages of India*. These languages are seven in number—namely, Sindhi, Panjaubi, Marathi, Gujarati, Hindi, Oriya, and Bengali. Sindhi is spoken in the extreme N. W. of India, and next to it Panjaubi, in the land of the five rivers. In the Bombay presidency Gujarati and Marathi prevail. Hindi holds the great central position amongst the Aryan languages of Hindustan. At the very outset it should be remembered that Hindustani, or Urdu, is simply Hindi



place a great deal of Persian. There is no doubt that Hindustani has a great hold on India, in that it is the *lingua franca*, so to speak, of Hindustan; it is the language which is chiefly used everywhere in the Peninsula as a medium of general communication; but when treating of the languages and literatures of Hindu Aryans it must merely be considered as a dialect of Hindi. Oriya is the language of Odissa, and Bengali of Bengal. Each one of these seven vernaculars is based on the Prakrits of the Sanskrit. First, let us glance at them as a whole, noting their origin from the grand parent stem. It has been said that the Aryans did not come over to India all at once. There were successive waves of immigration, and the immigrants, in every probability, spoke various dialects of the common language. As Mr. Beames says, "One only of these dialects, however, became at an early period the vehicle of religious sentiment, and the hymns called the Vêdas were transmitted orally for centuries, in all probability with the strictest accuracy. After a time the Brahmins, consciously and intentionally, set themselves to the task of constructing a sacred language by preserving and reducing to rule the grammatical elements of this Vêdic tongue. We cannot tell whether in carrying out this task they availed themselves of the stores of one dialect alone—probably they did not—but with that rare power of analysis for which they have ever been distinguished they seized on the salient features of Aryan speech as contained in all the dialects, and moulded them into one harmonious whole; thus, for the first time in their history, giving to the Aryan tribes one common language, designed to be used as the instrument for expressing thoughts of such a nature as should be deemed worthy of preservation to all time." All this was before the art of writing, but when that art was discovered, it was chiefly used to reproduce works in Sanskrit, that sacred queen of all Aryan languages. But all this time, whilst Panini and others were engaged in fossilizing, polishing, and perfecting Sanskrit, the local dialects continued to exist. As they had been anterior, in their rude shapes, to the perfected sacred tongue, so after Sanskrit ceased to be spoken—save perhaps by a few of the holiest and most learned of the Brahmins—they continued to be generally spoken by the common people, and were being continually developed into new vernacular forms. These forms of Aryan speech, other than Sanskrit, and spoken by the masses, are the Prakrits. They were all of the same stock as the Sanskrit, but they went on changing like clouds, whilst Sanskrit remained within its own fixed limits like the sea. So holy was the language of the Vêdas that many of the formulae went to be repeated by Brahmins were regarded by them to be composed of letters each one of which was a divinity. The Prakrits, on the other hand, were constantly being changed as they came in contact with foreign tongues or with each other. At one time they are said to have numbered no less than twenty-two. However, in the earliest records we find that they are generally classed under five distinct heads. First, there was Mahārāshtri, the chief of the five, mainly spoken in Southern Rajputāna and the northern portions of that part of India which we roughly term now "Maharatta country." The second was the Samāsani, which was spoken near Mathura. The third was the Magadhi, the oldest which was spoken in Behar, and which is the parent of Ceylonese Pali. Fourthly, there was the Pārsīchi; and fifthly, there was the Apbhṛansā, or "corrupt" Prakrit, of Sindhi and Western Rajputāna. Beames remarks: "In the Sanskrit dramas a still more artificial distinction prevails, a different dialect being attributed to each class of characters. Thus, kings and Brahmins speak Sanskrit, ladies of high rank Mahārāshtri, whilst servants, soldiers, buffoons, and the like, use one or other of the inferior dialects." But one of the Prakrits has come down to us unaltered in a more noteworthy way. Magadhi will not be forgotten as long as the literatures of the East remain unobliterated. It was used in the sixth century before Christ to preserve the teaching of Sakyamuni, "Gotama Buddha," the founder of a religious system which overran all India and crushed nearly all the life out of Brahmanism for ten centuries. Magadhi is simply Pali, the sacred "written" language of Ceylon. Sakyamuni died in 543 B.C., in Gya in Southern Behar, and his teachings, preserved to us in Magadhi, give us a clear insight into that Prakrit in its form in those days. But this, even at that early time, produced many and voluminous works, and Jains to a great extent copied them, for we have many Jaina sacred writings in the Mahārāshtri prakrit. The last point which need be mentioned about the prakrits is that they are "syncretical or inflectional languages." Out of these prakrits sprang the modern seven Aryan vernaculars of India. In the composition of each of these dialects we have three elements: (1) words the same as Sanskrit words; (2) words like Sanskrit; (3) a number of non-Aryan words. The difference between the

non-Aryan vernaculars of India seems mainly to consist in the different apportionment amongst each of these three different classes of words—words which are severally called by the felicitous Sanskrit appellations of *Tatsama*, *Tadbhava*, and *Desaja*. Of the modern Aryan vernaculars it may be said—

"These languages  
Are one at root. Their natures are alike;  
But, being reared into diverse soils,  
In shape of lady boughs dissimilar seem,  
Differ in hue and fragrance of their flow'rs,  
And vary in taste of their abundant fruit."

Let us take each of them in turn. First, Sindhi, the most north-westerly of the modern Aryan dialects of India, and perhaps the roughest and least Sanskritized. The first province in India which was conquered by invaders from the N. W. was undoubtedly Sindhi, and next the Panjaub. It was in these provinces that Mohammedanism was rooted the earliest. Brahmins, from the earliest times, appear to have avoided these two provinces to a considerable extent. So we learn that the earliest Prakrits spoken in Sindhi were noted for their corruptness. The country seems to have been left by the Brahmins to pastoral tribes, such as the Abhir, the Gujars, and afterwards to the excommunicated Kshatriya Jats. The whole land from the earliest times appears to have been in a state of chronic convulsion. Towns were constantly pillaged, cultivated tracts desolated, cattle slaughtered, tribes broken up, and the population seems to have carried on a stormy and precarious existence under the shadow of perennial wars. It was but natural that in such a case little time could be devoted by local pundits to the improvement of the language, by correcting it from time to time, and by introducing into it, to give it fresh vitality, new blood from the old and yet vigorously healthy language of the Vêdic hymns and great dramas. So Sindhi is still a rough and in many ways an anomalous language. For instance, whilst Hindi is content with only three forms of the genitive particle, Sindhi demands no less than twenty. (See D. Trumpp's *Sindhi Grammar*.) But there is something charming about the roughness of Sindhi to some scholars, just as some wine-tasters revel in the roughness of some wines. Beames, for instance, speaks of Sindhi as having "somewhat the charm of wild flowers in a hedge, whose untamed luxuriance pleases more than the regular splendor of the parterre. . . . There is a flavor of wheaten flour and a reek of cottage smoke about Panjaubi and Sindhi, which is infinitely more natural and captivating than anything which the hide-bound, pundit-ridden languages of the eastern parts of India can show us." But this is, perhaps, more prettily put than true, just as some poets imagine that there is more real soul-music in the prattle of a child than in the trained voice of a prima donna. Sindhi has three dialects—the Sirai, in the N. of Sindhi; Vicholai, in the central parts; and Lari, in the S. and along the sea-coast. There are many other dialects, but only the above need be mentioned. It remains to be mentioned that Sindhi has very little literature and no fixed system of writing. We must now pass on to Panjaubi, but a great deal of what has been said of Sindhi applies to it. It must be borne in mind that the Mohammedan power was in a measure consolidated in the Panjaub 400 years before such was the case in the lands where Hindi is spoken. Thus, the Prakrit had less time in its infancy to become trained and guided, and the Mussulman invaders found a more virgin soil to plant their own idioms. They brought numbers of their own words with them, which became engrafted into Panjaubi before the Sanskrit equivalents had time to spring up in the language. Yet it has been truly said that the Panjaubi of the present day is, after all, an old Hindi dialect. In Panjaubi, for reasons already referred to, there is a great admixture of Arabic and Persian, and but little "Tatsama" Sanskrit terms, such as are to be found in Bengali and Oriya. Panjaubi is similar to Hindi in regard to the nouns in the language, which have the same simplicity of declension. The verbs too are alike, with only faint dialectic differences. The pronouns also are nearly the same in both languages. The claims of Panjaubi to be considered an independent language rest upon its phonetic system and upon its peculiarities of phraseology. The character in which Panjaubi is written is called *Gurmukhi*. It employs thirty-five letters. As for its literature, it is very scanty. Nanak, the religious reformer and founder of the Sikh creed, is the earliest author in the language, yet nothing of his is extant which is distinctly Panjaubi. The dialects of Panjaubi are almost innumerable, but are hardly distinguishable one from the other. But on the borders of the Panjaub speaking country, on all sides, the language almost imperceptibly dovetails with other vernaculars. This has given great trouble to superficial linguists, and has led to many mistakes. We now come to Marathi. It must not be too hastily concluded that Marathi is the direct lineal descendant of the Mahārāshtri Pra-



krit. Indeed, these two have little in common save the name. Magadhi and Sauraseni Prakrits mainly lie at the base of Marathi. It is on the whole an elegant and cultured tongue. Maharashtra Brahmans took great care of the language in its somewhat rude infancy, and the wave of Mohammedan invasion was somewhat late in sweeping over the country where it had its central hold. Marathi contains a good many "Tatsama" Sanskrit words, and is a pleasing fluent tongue. The language is a playful one: it delights in assonances and harmonious phrases and "jingling formations." In structure it is comparatively complicated. Its phraseology is copious and beautiful. Grammatically considered, Marathi is as much the German of the Aryan vernaculars of India as Hindi is the English. It possesses a great array of terminations and inflections. It is just as difficult to determine the gender of a noun in Marathi as in German. In every part the language shows the effects of the labors of learned pundits who worked for centuries to beautify and polish it. The Marathi pronoun is nearly the pure Prakrit. The verb is participial in its formation. The literature of the language is copious. The following may be taken as a brief yet fair summary of it: "Namadeva, the first poet, whose date is uncertain, but probably about 1290 A. D., drew his inspiration, as was the case with so many poets of his time, from the writings of Kabir and other reformers. Contemporary with him was the famous Dynânadeva, who wrote a poem called *Dyân-eshwari*. Then follows a long string of more or less obscure poets, among whom Sridhar deserves notice on account of his voluminous Pauranic paraphrases. Tukaram, the most celebrated Marathi author, was (A. D. 1609) a contemporary of the illustrious Sivaji. (See INDIA: ITS HISTORY.) An admirably printed edition of Tukaram's poems has been produced at Bombay recently by two pundits. The poems are called *Abhangas*, or 'Unbroken'; probably from their being of indefinite length and strung together in a loose flowing metre. Tukaram was a half-crazed devotee, such as we see so commonly in India, who began life as a petty shopkeeper, but, being unsuccessful, devoted himself to the worship of the idol Vitoba, whose chief shrine is at Pandharpur. At the temple of this idol at Dehu, near Poona, Tukaram spent the greater part of his life in improvising these endless *Abhangas*, which were collected by his disciples. He eventually started off on a pilgrimage, and, as he never returned, he probably died on the road, but his followers chose to believe that he had ascended to heaven." There is nothing very original or striking in Tukaram's poems. They are like the ordinary run of Indian religious poems. Here is a specimen:

"Torches, umbrellas, horses—these are of no value.  
Why now, O Lord of Pandhari, dost thou entangle me in them?  
Honor, pomp, show—these are in reality the excrement of swine.  
Tukaram says, O Lord, hasten thou to deliver me!"

The reader will see that all this is rank commonplace, but in Marathi the mellifluous diction atones for much, and Tukaram's poems are household words in the Bombay presidency. Next to Tukaram came Moropant (A. D. 1720), and his poems are preferred by some to those of Tukaram. There is also a wide Anacreontic literature in Marathi, which may be styled "Rabelaisian without the wit, and with twice the amount of impurity." The chief prose works in Marathi are the *Bakhshis*, or "Chronicles of Kings," much of which is legendary and impossible. We must now pass on to speak of Gujarati. This language has a greater admixture of Arabic and Persian in it than Marathi has. It is avowedly a dialect of the Sauraseni Prakrit, and as a language is only partially developed. It retains three genders, whereas Hindi and Panjabi have only two. The pronouns are almost identical with those in Hindi. According to some grammarians, the Gujarati verb rejoices in five presents, seventeen preterites, and four futures, but these, in practice, can be greatly reduced and simplified. Of late days Gujarati is becoming more and more employed as a commercial language, especially by the Parsees of Bombay, and thus it is becoming rapidly impregnated with foreign phrases and idioms, to the detriment of the purity of the language. The first Gujarati author of note is Narsingh Mehta, who flourished in 1457 A. D. His writings are religious, and are cast in the form of short poems somewhat resembling sonnets. After him the chief Gujarati writers are Vishnu Das, Shiv Das, and Samal Bhatt. It is a remarkable fact that the Gujarati of the present day is strikingly similar to that language when it was first written. We now come to Hindi. This language is justly regarded as the first of the modern Aryan languages of India. It is spoken in the great valley of the Ganges from the source of the Jumna to Rajmahal. In a word, Hindi holds the central position of all of the Aryan languages of India, and the country in which it is spoken has ever been the centre of Aryan Hinduism. We have already mentioned the close relationship which exists be-

tween Hindi and Urdu or Hindustani. It has been truly said that Hindi is to modern India what Sanskrit was to the ancient. The central seat of Hindi itself has ever been Delhi. Mr. Beames says: "In respect of *Tadbhavas*, Hindi stands pre-eminent, whether it be that form of Hindi which relies principally on indigenous sources for its words, or that other widely employed form which has incorporated the flower and grace of Persian and Arabic nouns, and which is sometimes called Urdu, sometimes Hindustani." The multifarious strength of Hindi is in a measure owing to the fact that the great central area of India in which that language is spoken has always been occupied by Hindus and Mussulmans, in tolerably equal proportions; thus, whilst Sanskrit has not been forgotten, Arabic and Persian words have been allowed, in due measure, to enrich the vernacular. Of the seven modern Aryan languages, Hindi is the most advanced, as it shows the most marked rise from the synthetical to the analytical state. In its verbs Hindi has greatly rejected the Sanskrit inflectional system. Only one Hindi tense is synthetical—namely, the indefinite present, which has been corrupted from the present indicative of the Sanskrit. The date of the earliest Hindi poem is A. D. 1200. It is a famous one—namely, the *Prithirâja Rasan* of Chand Bardâi. This Chand was a native of Lahore. He was a professional bhât or minstrel, and was attached to the court of the Rajput king Prithiraj, the last Hindu monarch of Delhi. The poem is the record of the ancestry, birth, life, heroic deeds, and final overthrow of Prithiraj; but upon the history which thus forms the basis of the work Chand Bardâi builds a fantastic structure of religion and mythology. The gods come down to earth; celestial garlands descend on the brows of heroes; Siva follows the war-path and drinks the blood of the wounded; the power obtained by sacrifice and penance, even over deities, is magical; and birds and beasts converse like men. Subsequent to Chand Bardâi, Hindi literature became crowded with long, verbose, dull, religious poems. Tulsi Das adapted from the Sanskrit the *Râmâyana* of Valmiki. Behâri Lal was a correct and elegant Hindi writer, whose poems are concise, pretty, graceful, and sometimes meritoriously thoughtful. We now come to the Oriya language. This language, like the Bengali, is highly impregnated with Sanskrit, and overflows with *Tatsama* words. But it is a neglected tongue, and retains to the present day many rude archaic forms. The mountainous character of the country of Orissa, stretching along a lonely shore-line, peopled by men accustomed to a solitary life in great measure, often decimated by famine and disease or devastated by periodical cyclones, itself furnishes a reason for the very partial cultivation and polish of the language spoken there. The literature of Oriya commences with Upendro Bhanj, who composed a large number of religious poems which are held of high account. The poet was the brother of the rajah of Gumsar, a small hill-state, which has always maintained its reputation for preserving the Oriya language within its borders in the most perfect and pure state. Upendro Bhanj did not live more than 300 years ago. He composed two rhyming dictionaries, the *Sabd-mâlâ* and the *Ghritâbhidânô*. Many of his minor poems are superlatively indecent, and withal filled with puerile verbal quibbles. Nearly contemporaneously with Upendro Bhanj flourished another Oriya poet, named Dinkrishno Dâs, who wrote the *Rasakallola*, the most famous poem in the language. The poem owes its celebrity to its mellifluous and harmonious versification; as for the rest, it is simply a farrago of obscenity. The *Bhagavadgita*, *Râmâyana*, *Purana Parana*, and *Lakshmi Parana* are all represented in Oriya by adaptations more or less felicitous. In conclusion, it should be mentioned that the Oriya character is the clumsiest of Indian alphabets. We have now to refer, briefly, to the last of the seven modern Aryan languages of India—namely, Bengali. Occupying the most easterly position of these languages, it possesses the largest share of the purely Sanskrit element in its composition. The origin of the language was a very obscure one, and for centuries it was extremely rude. It is only lately that Bengali literature has, with marvellous success, sprung up. Four centuries ago Bengali was unwritten. Then it closely resembled Hindi, but since that time a marked change has crept over it. The poverty of the language began to be so clearly, from the first, apparent to Bengali pundits that they had to have recourse to an enormous number of *Tatsama* words to patch up their difficulties. The Bengali noun has a purely inflectional genitive. There is no preparation of the base. Gender is practically neglected. The verb is simple and constructed on the participial system. The pronouns are almost the same as in the Prakrit. The singular of the pronoun and of the verb has been banished from use, the plural being used for politeness' sake, and two new plurals being added for convenience' sake. The alphabet of the Bengali is very elegant and facile; the typography of a



Bengali book is simply charming to look at and read. The alphabet may be described as "very little changed from the Kutla brought down from Kanauj by the Brahmans whom King Ashur invited to Bengal in the latter part of the eleventh century." The literature of Bengali, as it is at present, is far ahead of all other portions of Aryan India. The reformer Chaitanya must have given it its impetus in the fifteenth century. The *Kirtans* or lyrics which he collected soon became popular. But the first Bengali poet was probably Vidyapati. Some writers have ascribed to him a date as early as A. D. 1320, but he probably flourished considerably later. Another famous Bengali writer of the earliest period of its literature is Kabi Kankan. The adapters of the *Rāmāyana* and *Mahābhārata* in Bengali were the poets Kasidas and Kritibas. Another Bengali poet of note is Bhārat Chandra Rai. *Kabi*, or satirical poems, have much popularity in Bengal, and have been composed by different authors at different times. Iswar Chandra Gupta, the Bengali Rabelais, was famous half a century ago for his sparkling wit. Three great modern Bengali writers may be mentioned. The first is Babu Piri Chandra Mittra, who is the author of *Alāl Chhara Dūlāl* ("The Spoil (child of the House of Alāl)"), a clever novel, which is by far the best fiction in the language, and abounds in wit and humor. The second is Michael Madhusūdan Dutt, a native Christian, whose voluminous works have gained for him a very high rank in Bengali. And the third is Kali Prasauna Singh, a clever but sometimes coarse writer, who has the art of depicting in the most felicitous way the main characteristics and foibles of his countrymen. The most modern developments of Aryan literature may be spoken of, together with the latest phases of Dravidian letters, after we have glanced at the South Indian family of languages, which constitute the third great division of Indian tongues.

III. *Dravidian Languages and Literature*.—This family of languages consists of the following members: Tamil, Telugu, Canarese, Malayalam, Tulu, Gōrg, Tuda, Gōnd, Ku, Rajmahal, and Oraon. In this brief epitome the last seven of these dialects need only be mentioned. They have no literature, and the interest which attaches to the four dialects mentioned first wholly eclipses any these seven might possess were they the only representatives of Dravidian speech in India. For the same reason we only need make a passing allusion to Brahui, a language which has a strong Dravidian element in it, though not Dravidian, nor spoken on the Indian side of the north-western frontier, but which, however, somewhat attracts attention, as it forms an important link in the chain which binds the Dravidian proper to the Seythian group of tongues. With this group all the Dravidian languages of India are radically connected, and the Seythian family to which they are the most intimately allied is the Finnish or Ugrian. (See the introduction to the Rev. Dr. Caldwell's *Comparative Grammar of the Dravidian Languages*.) The most important of the four principal Dravidian languages is undoubtedly Tamil. Next to Sanskrit, it stands supreme as an Indian language, both in regard to its structure, its genius, and its varied, ancient, and original literature. However, our notice of Tamil will at present be very cursory, as particular mention of it is made elsewhere. (See *TAMIL*.) Speaking generally, Dravidian India is the whole of that portion of the Peninsula which lies to the S. of the Nerbudda River and the Vindhya Mountains. There are, of course, offshoots from this broad base, and we find Dravidian words in use amongst the mountain-fastnesses of Beloochistan, in the northernmost jungles of the Rajmahal hills, and in parts of Ceylon. The term "Dravidian" is of Sanskrit origin. It means "belonging to the country of the Dravidas." The country of the Dravidas properly means Tamil land. The Dravidas are described in Sanskrit dictionaries as "men of an out-cast tribe, descended from degraded Kshatriyas." Of course this simply exemplifies the low opinion which was at first entertained by the Aryan invaders of the aboriginal inhabitants of India. Indeed, as represented in great Brahman poems, the Dravidians were uncouth, savage, given to horrible rites, eaters of raw meat, cannibals, disturbers of holy hermits engaged in contemplation, and grant or apes in form. Even in the famous *Rāmāyana*, in which poem the Dravidian chief, Hanuman, is represented as Rama's most devoted and useful ally, that South Indian hero is ridiculed at the same time that he is praised by being portrayed as a monkey-god. The Tamils, of all the Dravidas, first experienced the dawn of Dravidian civilization; and with this epoch the name of Agastya, the "sage," the "Canopus" of Southern India, is inseparably connected. The date of this epoch may be fixed at about the sixth century B. C. But notwithstanding the comparative antiquity of this date, it was not till more than twelve centuries subsequently that, in all probability, Tamil literature began to spring up, and of all Dravidian literature the Tamil is the oldest

as well as most important. In the case of Tamil, just as in the case of Telugu and Canarese, the period of the domination of the Jains was that in which the vernacular literature sprang up and flourished. Malayalam literature is not more than three centuries and a half old. That language has in its composition a very large admixture of Sanskrit, and its literature mainly consists in translations and adaptations from the Sanskrit. This must also be affirmed of Telugu and Canarese, only the literature of these languages dates from several centuries previous to the rise of Malayalam literature. The first Telugu grammar is said to have been written by Kanva, in the days of Andhraya, the king in whose reign Sanskrit was first introduced into the Telugu country. But his work is not extant, and the oldest which exists is by a Brahman called Nannappa; but this grammar, though about Telugu, is written in Sanskrit. Nannappa translated the *Mahābhārata* into Telugu; and this is the earliest work extant in the language. Its date is probably the twelfth century. Telugu is a sweet and sonorous language, but has not the logical precision, sturdiness, and great copiousness of Tamil. Mr. C. P. Brown's admirable *Grammar and Dictionary of Telugu* should be consulted by every student of that language. Canarese uses a character identical with that of Telugu, but differs very widely in most other particulars. It lacks the wonderful richness of Tamil, a language remarkably full of synonyms and exact in its grammatical structure. The Jaina period, during which literature flourished most conspicuously in Tamil-land, extended from the end of the seventh to the thirteenth century of the Christian era. The oldest work extant in the language is the *Tol-Kāppiyam* ("The Old Composition"). This is a grammar of the language, and was probably written in the close of the seventh century, but in it are to be found quotations from poems of a still earlier date, though these have not come down to us intact. The *Kural* of Tiruvalluvar, the greatest work in the Tamil language in the opinion of many, was probably written before the close of the eighth century. It is a great storehouse of polished distichs on all subjects connected with morals and political economy. The *Chintāmani*, a great Tamil epic poem, containing some 15,000 lines, was probably written not a century later; and shortly afterwards the *Nannāḷ*, a High Tamil grammar, appears to have been composed. By this time, too, several of the works ascribed to Auvvai ("the matron"), a distinguished Tamil poetess, were probably written. (For further particulars regarding Tamil and its literature see *TAMIL*.)

In conclusion, we must make several general remarks concerning Hindu literature as a whole. First, the greater part of it is incontestably poetical in form. That is, Hindus from time immemorial have been accustomed to throw their thoughts—no matter on what subject, and no matter whether using an Aryan or Dravidian language—into verse instead of prose. If, for instance, in the N., Chand Bardāi wishes to perpetuate in writing the history of the glories and sorrows of the heroic Prithviraj, he does so in Hindi verse; and if in the S., Tiruvalluvar desires to teach the priests and sages of Madura the principles of political economy, he does so in Tamil verse. Thus, Hindu literature is chiefly poetical. We have poems on astronomy, and poems on medicine, and poems on grammar. This, after all, was but to be expected, for, just as children are imaginative, nations in their infancy are naturally poetical. But now, everywhere in India, a sound sturdy prose literature is springing up. This is especially the case in Bengali and Tamil. Tricks of style, assonances, mimetic words, flowery metaphors and similes, jingling rhymes, and vaporous expletives,—all these are being gradually exchanged for a sober, robust diction, and simple, straightforward language which clearly expresses the thoughts meant to be conveyed by it. Secondly, Indian poetry, as a whole, is poor. Hindu poets constantly aim more at writing beautifully than at thinking deeply. There is a great deal of glitter, but little intrinsic value. Of course there are some exceptions. I should place Tamil poetry, with that of Sanskrit, wholly outside of this category; that is, taking Tamil poetry as a whole. The thoughtful couplets of Tiruvalluvar, the descriptive power of Kambar's *gōrgōn-vase*, Berchi's stately and splendid periods, Auvvaiyar's chaste and elegant stanzas, Tāyūmōzvar's pure and solemn strains of meditative poetry, the exuberant fancy displayed in the *Chintāmani*, the roughly-expressed home-truths of the Sittars or poetical quacks of Tamil land, the earnest sadness of Pattengiriyar, and the passionate volubility of Sivayakkiar, bated of later, by Buddhist and superstitions, —all these and many more are placed in Tamil poetry which raise it as a whole, if we could only forget the beauty and majesty of the Sanskrit, —higher not only than the poetry of any other Dravidian or modern Aryan language, but also than Sanskrit itself. In the last place, any notice, however brief, of Indian literature would be in-



complete if no allusion were made to two effects which have been produced by the introduction of English civilization into Hindustan. Translations in the various vernaculars are everywhere appearing of the works of the leading thinkers of Christendom, and the native press has become an established fact. It is quite true that many of these translations are in wretched taste, and are worse than merely worthless; it is quite true that many of the translators are foreigners, and barbarize the language into which they translate by flooding it with unnatural idioms and terms; and it is quite true that, in Bengal especially, the vernacular press is in too great a hurry, and works of a trashy nature are being flung in cartloads upon the public. But notwithstanding all this the benefit is incalculably greater than the mischief. The effect now being produced upon the languages and literature of India resembles that wonderful quickening power which began suddenly to exert itself in Europe immediately after the art of printing was discovered; and though much evil may have resulted from the discovery of this art, who can think of that when the untold good it has effected is taken into consideration? The vernacular journalistic literature of India is daily assuming wider proportions, and in Calcutta and Bombay, and to a very slight extent in Madras, the newspaper press is already a power. In Calcutta the Bengalis have what we should call a farthing daily paper, and in Bombay the Parsees have their *Punch*. The number of daily, weekly, and monthly native periodicals throughout India, already very great, is rapidly increasing. The statistics, if given to-day, would have to be added to to-morrow. The publication of tracts, books, and Bibles by missionary societies forms a large item in the modern literary activity of India. The schoolbook and vernacular literary societies of India, patronized by the English government, are also aiding in the work of civilization. Attempts have from time to time been made to adapt the Roman character to the vernaculars, many of which employ cumbrous and clumsy alphabets, but as yet such attempts have failed in gaining the approval of Hindus themselves. Many Hindu books were of old written on palmyra-palm leaves; paper, now becoming plentiful, is being widely employed instead. The knowledge of English is rapidly extending, and there has been much discussion as to the ultimate effect of this. French is used in the French settlements, and Portuguese is spoken at Goa. In conclusion, it may be mentioned that a small but very interesting colony of Jews at Cochin on the Malabar use Hebrew much in the same way that modern Brahmans in India use Sanskrit.

R. C. CALDWELL.

**India: its History.** There can be little doubt that the population of the whole of the Indian empire must be estimated as, at present, not under 300,000,000. This remarkable fact is made obvious by the results of the Indian census of 1871-72. These results (at the time of the penning of this paper) have not yet been published, but it is known that the number of inhabitants in British India has been computed at 283,000,000, and that in this number the inhabitants of all of the independent provinces, of several Indian protected states, of remote hill and forest tribes, and of the tribes peopling the north-eastern frontier of India have unavoidably not been included. India is the most thickly populated country in the world to which the census has yet been applied; and now that it has been applied, the startling question arises if it be not, after all, the most populous country in the globe, not excepting China itself. The population of China was some time ago supposed to be 500,000,000; now it is computed at 400,000,000. But there has been no census of China, and geographers and ethnologists will begin to ask themselves the question, "On what grounds do we give the pre-eminence in the matter of population to China over India?" In writing a brief epitome of the history of India, we advisedly draw attention thus prominently to the present state of the population of that country. India has never been so thickly populated as it now is, and there are clear signs that its present population is daily increasing at a swift rate. From this fact, as from a pinnacle, we look down on the past. Here is a country which from the earliest ages has been the scene of national convulsions. It has been the prey of successive invasions and the victim of constant intestine strife. Then a civilized power from Europe set its foot on the soil. After a brief and necessary struggle the reign of order began. What is the result? The country is protected from foreign raids, and internal warfare is gradually and thoroughly repressed. Trade and commerce spring up and flourish; wealth and education spread more among the masses; the weak and outcast begin to enjoy safety and peace. Canals fertilize the country they open up. Everywhere sanitary measures are adopted for the security of the people from the ravages of pestilence. Rewards are given for the destruction of snakes and tigers. A terrible famine appears, and it is promptly relieved and loss of life

prevented. Is it a wonder, then, that such a change in the history of a country should be followed by a marked increase in its population, and that this increase should be pointed to as one of the evidences of the beneficial nature of that change? The past of India, though writers may describe its glory in some things, has been, after all, only a glorious night. Even now we have only a dawn. The day is yet to come when the full effects of the present civilized government of India will be realized.

In tracing the history of India from the earliest times, we are necessarily led to speak of its ethnology. It may be premised that the conglomerate character of the inhabitants of India is only less remarkable than their number. (With regard to Indian ethnological questions not touched upon in this article, see *INDIA: ITS GEOGRAPHY, ETHNOLOGY, LANGUAGES, AND LITERATURE*.)

The history of India may best be written of under ten distinct heads: I. The history of ancient India till the time of Mahmud of Ghazni, A. D. 1001. II. The history of India from this first Mohammedan invasion to the date of the first battle of Panipat, A. D. 1526. III. The history of the Mogul empire from the first battle of Panipat to the death of the last Mogul emperor, in 1859. IV. The history of the Mahrattas from the birth of Sivaji (A. D. 1627) to the present time. V. The history of the Carnatic from the date of the Mohammedan invasion of 1294 A. D. VI. The history of the Portuguese in India since the landing of Vasco da Gama in 1498 A. D. VII. The history of the European companies which vied with each other in the struggle to get a share in Indian trade before 1744 A. D. VIII. The history of the English and French in India till the surrender of Pondicherry, A. D. 1761. IX. The history of the British power in India, leading up to the appointment of the first governor-general. X. The history of the British power in India, as marked out by the successive régimes of different governors-general, since the days of Warren Hastings to the present day.

I. *The Ancient History of India.*—The earliest history of India is involved in the deepest obscurity. No date of a public event can be fixed before B. C. 327, and no connected narrative of Indian national transactions can be attempted till 1300 years after. We have only traditions and legends to guide us, and the very heterogeneous character of the races which from time immemorial have peopled India adds another obstacle to research. However, everything is not guesswork, and authorities who have entered deeply into the subject arrive at a number of conclusions which may be regarded as at least approximately accurate. (1) The *Vedas*, which are the oldest sacred hymns of the Aryan Hindus, were probably arranged in their present form as early as 1400 B. C. Their actual antiquity is much greater, but cannot be decided on, even approximately. (See *SANSKRIT*.) (2) Even before the time of Moses (b. 1574 B. C.) India and Europe were in active communication by sea. Vessels used to ply between India and the ports of the Red Sea and Persian Gulf, and the Sabæan and the Phœnician commerce of those old days with Hindustan was probably the most lucrative in the whole world at that time. (3) In the days of Solomon we read of the ships of Tarshish trading with Ophir, and bringing from thence to Jerusalem "gold and ivory, apes and peacocks." Sir Emerson Tennent, in his admirable work on Ceylon, considers that the port of Galle in Ceylon is Ophir. In the earliest days Galle was one of the greatest of Eastern emporiums. But wherever Ophir may have been situated, one thing is certain—namely, that the Hebrew equivalent for "peacock," which appears in the Bible, is simply the Tamil word *tōkei*. (4) The history of the Solar and Lunar dynasties of India is in a great measure founded on fact, as clear traces of the invasions recorded in connection with them now remain. The magnificent Hindu epic, the *Rāmāyana*, records the adventures of Rāmā, the hero of the Solar race, who conquered Ceylon, probably in the year 1200 B. C. The *Mahabharata* is the great record of the Lunar dynasty. It describes the wars of the Pandus and Kurus, which were probably fought between 1400 and 1300 B. C. The great battle was fought at Taneshwar, 30 miles W. of Delhi. (5) Gotama Buddha, the founder of Buddhism, d. at Gya, in South Behar, about 543 B. C. (6) The conquest of India by Bacchus and the expeditions of Semiramis are merely romantic fictions. Diodorus Siculus gives us accounts of the Oriental conquests of Sesostris, who was king of Egypt in 1308 B. C., but it is difficult to credit them implicitly. (7) The Persian monarch Darius, the son of Hystaspes (B. C. 518-485), conquered the Punjab and Seinde, and made it a satrapy. The tribute paid to him by this satrapy is said to have been wholly in gold, and to have amounted to 1,200,000 pounds sterling. (8) Alexander the Great, having defeated Darius and conquered Persia, proceeded to India. In B. C. 330 he founded the city of Herat on the frontier. Three years later he crossed the Khyber Pass and the Indus at



Attack. He fought and overcame Porus at Gajârât on the Jelma, assisted by Taxiles, a prince of the country between the Jelma and Indus. Thence he advanced to the Sutlej, but had to return because his soldiers, alarmed at his rapid progress into such unknown countries, superstitiously refused to advance. We know this much of the India of Alexander, that the Hindus at that time were considered to be wonderfully civilized. Their cities were most opulent and arts and sciences flourished. (9) About this time in Bengal there were dynasties of Pala and Sêna kings. Other little-known dynasties reigned at Delhi, Ajmeer, Mewar, and Gujerat. The latter, in the second century A. D., had a Rajput dynasty called Balabhi. The Persians, under Nushirvan, are supposed to have conquered and driven these princes out of Newar, where they had emigrated in the sixth century A. D.

Concerning ancient India few other particulars are known, but we have yet to touch on an important subject connected with the general colonization of the peninsula of Hindostan from the earliest times. In the very earliest ages, long before the writing of the *Vedas* or the entry of the Aryan races into India, there appears to have existed in the country an aboriginal people, thoroughly non-Aryan in their characteristics, and who were possibly of the same family as the Mongols and other tribes of Central Asia. Invasion after invasion poured down like successive tides into India, and always from the N. W., and the aboriginal inhabitants were either pushed down southward or left, here and there, in isolated districts of hill and forest land, like islands, surrounded by the advancing wave of colonization. The first invasion we know of is the Aryan, and this may have taken place in the times of the Hebrew patriarchs. Then came the Mohammedan and mixed invasions, also from the N. W., pushing the Indian aborigines still farther southward, or isolating them still more completely in the impenetrable jungles and mountainous regions of the Peninsula. Here we have one great clue to the ethnological puzzles which India of the present day places before the student. But the whole of this subject will be found fully entered into in INDIA: ITS GEOGRAPHY, ETHNOLOGY, LANGUAGE, AND LITERATURE.

II. *The History of the Mohammedan Power in India from its First Establishment in 1001, by Mahmud of Ghazni, to its Overthrow and the Establishment of the Mogul Empire in 1526.*—The period of Indian history we now enter upon is certainly one of the ghastliest epochs which could be presented to the reader's mind. For more than 500 years, India, or at least the northern, and especially the north-western, portions of the Peninsula, literally reeked with blood. One sovereign overthrown another, one dynasty supplanted another, and again and again recurred the same old story. The first act of a monarch on ascending his throne was to murder his relatives, spoil a city, desolate a province, and slaughter, immolate, or impale certain given thousands—men, women, and children—of his predecessor's adherents. Except in rare instances mercy was not known. The glory of the Mohammedan dynasties which preceded the establishment of the Moguls—*Mongols*, as they ought to be termed—consisted in the sacking of cities, in the plunder of temples, and in a series of bloody victories. Nearly all the Mohammedan invaders of India at this time were Afghans or Pathans. Originally fire-worshippers, they were converted to Islam, and in bigotry soon surpassed those who converted them. They first, for several centuries, contented themselves with feeble raids into India. But Mahmud of Ghazni was more fortunate, and after ten raids succeeded in annexing Lahore and its fertile territories. His standard was black, fit emblem of his crimes. He stormed Batinda, a fortress of enormous strength, whereupon Jeipal, king of Lahore, abdicated and committed suicide. After this he engaged in nine more bloody raids before making Lahore his residence, and thus finally laying the foundation of Mohammedan power in India. During this period he gained many victories, and still farther did he subsequently signalize himself. He attacked Somnath in Guzerat. This was the most ancient and opulent shrine of the Rajputs. A terrible battle was fought. All the Rajput princes banded together, and opposed, with desperate bravery, the iconoclast of Ghazni. But their efforts were unavailing. Somnath was captured, and the booty obtained in gold and precious stones was simply incalculable. For more than 100 years subsequently the desolation of Somnath remained as a monument to the desperate and fratricidal course of Mahmud. He d. in 1020. His son, Mas'ud, succeeded him, after having blinded his twin brother, but Mas'ud was afterwards deposed, and the blind prince rose to the throne. In a few years all was in confusion again, and there was a rapid series of assassinations in the royal household. In 1118, Beirâm ascended the throne. He was an estimable prince, as things then went, but could not resist murdering his

own son-in-law, because of which he himself was assassinated, and his assassin, named the "Burner of the World," introduced the Ghorian dynasty and reigned in his stead. A Turki slave, Kutb-ud-Deen, succeeded him, and founded the first Indian slave dynasty. His son, Aram, succeeded him, and was in a year deposed by Altamish. When Altamish in his turn died, his son succeeded him, but in seven months was deposed by his beautiful and clever sister, Rezia, who is known to have been the only female who has ever ruled personally in Delhi. Her Britannic Majesty, Queen Victoria, is "empress of India," but Queen Rezia is the only female potentate who has ruled, as the head of all Indian sovereigns, in the capital of Hindostan, for such Delhi was then reckoned. It is narrated of her that she adopted a very ultra-Bloomer costume, and went about administering justice amongst men as if she herself were a man. A Turki chief, Altunia, rebelled against her. There was a severe battle, and she was defeated; but she soon conquered her conqueror—by marrying him. Shortly afterwards she and her husband fell victims to a rising of nobles. Beirâm, her brother, ascended the throne of Delhi after her, but was soon quietly assassinated. His successor, Mas'ud, was deposed. Nasir-ud-din-Mahmud and Balin followed after him, and were themselves succeeded by Kei Kohad. With him ended the dynasty of the slaves of the sultan of Ghor. Kohad's life appears not to have been remarkable for anything but vice. He poisoned his prime minister, plunged into the wildest debaucheries, and ended his life miserably after an attack of palsy. He was followed by Feroz Shah, who inaugurated a new dynasty of these Pathan kings of India in the year 1288. He was followed by a prince of great ability, who reigned for twenty-one years, and on the whole successfully and gloriously, but was rightly termed, by Mohammedan historians, "the Sanguinary." Alla-ud-din Khilji—such was his name—began his reign by murdering his aged uncle just as the old man was patting him affectionately on his cheek and assuring him of his friendship. He next distinguished himself by killing the two sons of Feroz Shah, his predecessor. Constantly, at this time, the Moguls were attempting to establish themselves in India. Alla-ud-din sent out his able general, Zafar Khan, against them, and was completely victorious. But the "sanguinary" potentate was jealous, and allowed the valiant soldier who had saved his kingdom to be sacrificed, just in such a manner as we are informed in the Holy Scriptures Uriah was. He then conquered Rajputana. When the Rajputs found his army at the gates of Chitor, the queen and all the women of the city, with their children, hung themselves on an immense pyre that had been previously prepared, and died in the flames they themselves kindled, whilst the Rajput men, fighting to the last, allowed themselves to be slain, one by one, outside the walls, rather than yield. Padmani, the queen, was a woman of rare beauty, and the Rajputs still remember her name with devotion. Alla-ud-din captured, during the course of his wars, a young, handsome eunuch named Malik Kafur, whom he appointed his prime minister, field-marshal, and viceroy. Malik subsequently poisoned his master and rose to his throne. Malik Kafur next blinded the two sons of Alla-ud-din, but the third escaped, raised the army, and killed the treacherous eunuch. The name of this son of Alla-ud-din was Mubarak. The very first thing this sovereign did was to murder those who forewarned him of Malik Kafur's purpose and protected him, and the second thing he did was to put out his infant brother's eyes. The rest of his life Mubarak spent in debaucheries and slaying his enemies alive. Khusrû Khan, whom he made his vizier, was a Gujerat Parvary slave. After ably conducting his master's affairs, he assassinated him and reigned in his stead, but was soon himself assassinated, and in 1321, Ghiaz-ud-deen-Tughlak, his murderer, sat himself on the vacant throne and began the dynasty of the Tughlaks, which is commonly known as the fifth Afghan dynasty. Juna Khan, the son of Ghiaz, contrived to kill his father by the fall of a gorgeous pavilion into which the unsuspecting king was induced to enter. Juna Khan was a very learned but inefficient ruler; his state grew insolvent and everywhere rebellious in 1327. We need not refer to the remaining kings of this miserable dynasty. The seventh dynasty was inaugurated still under the weak sway of the tenth Syod. The last dynasty of the Mohammedan power, before the Mogul empire absorbed all, was that of the three Lâlis. The last of these, Ibrahim, fought Sultan Babur, the first Mogul emperor of Hindostan. The latter sacked and burnt Delhi, and overthrew Ibrahim at the famous battle of Panipat. Ibrahim was killed, Delhi and Agra were taken, and from this time (1526) must be dated the rise and progress of the Mogul empire in India.

III. *The History of the Mogul Empire.*—The Mogul empire was one of the most splendid dominions India has



ever known. In its palmiest days it was a source of real and wide good to Hindustan. According to Mohammedan authorities there were fifteen emperors of this dynasty; some later authorities say seventeen, for as the tenth and eleventh rulers of this line they include two Rafis, whose combined rule only extended over a period of three months in 1719. Omitting these, we have the following emperors: Baber, who ruled from 1526 to 1530; Humāyūn, 1530-56; Akbar, 1556-1605; Jehangir, 1605-28; Shah Jehan, 1628-58; Aurungzeeb, 1658-1707; Shah Alam I., 1707-12; Jehandar Shah, 1712-13; Farukshir, 1713-19; Mohammed Shah, 1719-48; Ahmed Shah, 1748-54; Alamgir, 1754-59; Shah Alam II., 1759-1806; Akbar II., 1806-37; Mohammed Bahadur, 1837-57. Baber, the founder of this noble race of kings, was descended from the Tartar Tamerlane, his mother being a Mongol. He hated the Mongols, yet his dynasty obtained the name of that race under the corrupt form of "Mogul." His life was one long battle. Panipat secured his footing in India. The plunder of Agra and Delhi in 1526 at once raised him to a position of immense power, for opulence means power in the East, as a rule. In 1529 he conquered Behar and Bengal. His death (in 1530) was a romance in itself. His eldest son, Humāyūn, was mortally sick. Baber prayed that his own life might be accepted for that of his son. Strange to say, from that hour the son recovered and the father's health declined. A beautiful tomb in Cabul covers his remains. Humāyūn now ascended the throne, but in stormy times. He was defeated by his enemies, and during his flight from India his son, the famous Akbar, the glory of the Mogul dynasty, was born. After many years of exile and suffering, during which time India was convulsed under unsettled governments, he returned, invaded India, took Lahore, and shortly afterwards met with a fatal accident in his palace. His son, Akbar, was now only thirteen years old. Under the able generalship of Beiram Khan, a Persian, Akbar's hotly-contested position was established. In 1560, Beiram Khan, who had gradually been usurping too much power, attempted a revolt against Akbar, but was defeated, captured, and generously pardoned, but on his way to religious retirement in Mecca was assassinated in Guzerat. Akbar, then in his eighteenth year, was at length recognized as the real as well as nominal emperor of Delhi. He had been nursed in warfare from his childhood, and undergone a wonderfully successful training for his difficult position. He entered upon a number of campaigns immediately after Beiram's death, proved successful in almost all his undertakings, and exhibited, in the midst of all his most exhilarating victories, an equable temper and a liberality and mercifulness quite remarkable in those savage times. The reader must not forget that all the Mogul emperors were Mohammedans. Some of them were exceedingly bigoted ones, and oppressed the Hindus in the most cruel way. But Akbar set before him a policy of conciliation which has never been paralleled in Indian history till Europe claimed India for her own. In 1592, Akbar obliterated every trace of the Afghan dynasty in India. All over India—amongst the Rajputs, in Cashmeer, Scinde, and Kandahar—the armies of Akbar were victorious. Akbar next annexed Khandeish and took Ahmednuggur in the Deccan. At length (in 1605) this wise politician, great monarch, and large-hearted man died, and was buried near Agra, and Jehangir, his son, reigned in his stead. He was intemperate, violent, and soiled his hands with blood as his father never did before him. He was a bigoted Mussulman, and alienated the Hindus by reversing his father's well-advised policy. This emperor is chiefly known as the husband of a beautiful and wise woman, Nur Jehan, or "Light of the World." The name of that mighty empress upheld the dynasty like a spell. Even when, after a terrible disaster, her unworthy husband had been captured, she rushed to share his captivity, plotted his escape, overthrew the enemy, and restored to the emperor his throne. At length he died, and Shah Jehan succeeded him. Little need be said of this emperor. He lived surrounded by battles with the Deccan in the S., decimated by pestilence and famine. Suddenly he fell dangerously sick. His sons fought for the throne while the parent was still alive. Aurungzeeb was the most successful of these, and assumed the imperial dignity in 1658, putting nearly all his opponents and relations to death, and his aged father in prison, where he died eight years after. Thus began the most superficially magnificent reign India has ever known—a reign to laud which to the utmost Mohammedan chroniclers can find no words sufficient. Aurungzeeb utterly revoked the policy of Akbar. He was a most narrow-minded Mussulman, and the slaughter of infidels was his supreme delight. Everywhere Hindus fled before his hateful power. But he was a man of immense resource, ability, self-reliance, and resolution. His armies, minutely under his personal supervision, carried all before them. Every detail of civil or

military government passed under his eye. He spared no labor himself, and enforced in certain military matters the most rigid discipline, whilst in others he gave his fanatical troops the utmost license. But it was dangerous for one of his subjects to become too successful. He was morbidly jealous, and the general who rose to too great eminence after a campaign was as a rule assassinated for his pains. Mosques, mausoleums, minarets, and palaces rose rapidly in the great centres of Mohammedanism, but works of general utility were neglected. Enormous wealth flowed into the coffers of the emperor, and flowed out as fast without doing any good, further than aggrandizing the dynasty. At length, in the eighty-ninth year of his age, Aurungzeeb died, and with him, it has been said, the Mogul empire passed away. Internal divisions rent it; a constant succession of wars between different pretenders to the throne set the whole land aflame; the Mahrattas grew up to be a mighty and warlike people, who defied the power of the kings of Delhi; the Rajputs rose and won for themselves independence; the Carnatic became the great battle-ground of India. So change succeeded change, as one Mogul emperor succeeded another, till in 1857 the last miserable ruler of the house, Mohammed Bahadur Shah, rose against Britain and abetted the mutineers. His sons and grandson were shot, and he himself transported for life to Burmah, where, in Maulmain, he died. Such was the close of the Mogul empire.

IV. *The History of the Carnatic.*—We must briefly glance at this, without entering into any detail. Hitherto, the Indian history we have gone over has related almost wholly to North-western and Northern India. Southern India now claims a word for itself. It was here that, after the first Aryan invasion thousands of years ago, the aborigines chiefly took shelter and became massed in dense communities. Then afterwards, when other invasions from the N. W. succeeded, and the Afghans and the hordes of Baber poured, in wave after wave, into India, still Southern India remained as the great refuge for the earliest inhabitants of the Peninsula. Curious references to Southern India appear in the writings of Ctesias, the Persian court-physician (B. C. 400). Several ports on the Coromandel coast of Southern India have been identified with those mentioned in the famous Ptolemaic Tables. The Carnatic, till A. D. 1294, was wholly ruled by Hindu rajahs. After that it became successively a Mohammedan, Mahratta, French, and English battle-field. The Carnatic is interesting as having been the scene of the glories of the Pāndiyan and Chōla dynasties. The capital of the Chōla dynasty was Conjevaram. The Pāndiya rajahs took Madura in the S. for their capital, and the latter city has been regarded as the Benares of the Deccan. It was the great Carnatic centre of Hindu activity from the eighth century till quite recently. It was the foster-mother of art, science, literature, and religion. From the earliest times Southern India has been one vast granary. It was boasted by the chroniclers of six centuries ago that "not a span of land in the Deccan was free from cultivation under the Chola and Pāndiya kings." Everywhere stately temples arose, and in the present day the sculptured shrines of Srirangam, Chhillambram, the Seven Pagodas, Madura, Tanjore, and Raméswarem vie, in their way, with the most famous specimens of ancient architecture in the Bombay or Calcutta presidencies—with the caves of Elephanta or the Taj at Agra. The Carnatic is the scene of Nizam-ul-Mulk's enduring successes. The famous Vizianagar Hindu kingdom, once occupying nearly the whole of the country now called the Madras presidency, has still a limited place in Southern India. The fertile provinces of Mysore and Travancore have an interesting history: and it was in the Carnatic that the English had to fight to the death—first with Hyder Ali, and then with Tipoo Sultan.

V. *The History of the Mahrattas.*—But, ere passing on, we must at least allude to the Mahrattas, without a mention of whose astonishing successes as a brave, warlike power the briefest epitome of Indian history would be imperfect. The founder of the Mahratta power was the great Sivaji, a man who was at the same time as brave and intrepid as a lion and cunning and wary as a serpent. He was born in 1627 A. D. The Mahrattas at that time were good fighters and thorough haters of the Mohammedans. Their military tactics were formed upon plans which admirably suited the country they inhabited; and these tactics Sivaji perfected. Their country is one which presents a constant succession of rocky hills and masses of boulders, rising above alluvial plains. In these elevations the people constructed their most impregnable hill-forts. The race themselves were hardy, naturally active and brave, capital skirmishers, and ready to go to the world's end, so to speak, for plunder. Their system of warfare was of the rough and impetuous kind, and the *elan* of Mahratta cavalry rendered them dreaded everywhere. Tennyson, the



poet-laureate of England, is quite felicitous when he writes—

“When in wild Mahratta battle fell my father, evil-star’d.”

Sivaji began his career at the early age of nineteen in seizing the hill fort of Tornea and then in building another. He next took in succession several other forts, and attacked the Vizianagar government, and also carried his freebooting expeditions even into Mogul territory, then under Shah Jehan. The Vizianagar power sent Afzal Khan to crush Sivaji, but the wily Mahratta entrapped the general, played Ehud to his Egion, and destroyed the whole of his army. After three years the Vizianagar government was glad to make peace with the man whose name was a terror from the Malabar to the Coromandel coast; whereupon, at once, Sivaji turned his attention to the Moguls and ravaged their territories to the very gates of Aurungabad. Then, to inspirit his troops, he performed an exploit of incredible daring. At midnight he slipped, wholly by himself, into the city, joined in some marriage festivities, surprised the Mogul viceroy and wounded him, killed his son and attendants, and escaped to his own force scot-free. For many years he carried on this war during the reign of Aurungzeb at Delhi. Sivaji attacked Surat, got together a fleet of 85 sail, and became the terror of the whole Malabar coast, and annoyed the Mussulmans by constantly chasing and destroying their Arabian pilgrim-vessels. At length, by weight of numbers, Sivaji was partially subdued, and was actually induced to join the Mogul forces as their ally. This he did, and, as he could never live without fighting, attacked the Vizianagar power and gained a series of brilliant engagements. Shortly afterwards, breaking again with the Moguls, he caused himself to be solemnly enthroned in Raighur. He weighed himself against gold, and gave the ten stone of the precious metal which represented his weight to his Brahman subjects. He next engaged in a raid in the South, and returned with great plunder to Raighur, his capital. He d. Apr. 5, 1680. Sambaji succeeded him, but he was the weak son of a great father. At length (in 1689) Aurungzeb captured him, put a red-hot iron to his eyes, had his tongue torn out by the roots, and then decapitated him. From those days to the present, though the character and fortunes of their successive chiefs have changed, the Mahrattas have still remained a warlike people. They measured swords bravely with the Portuguese and English, and were not thoroughly taken in hand till, after having been over and over again hopelessly vanquished by the British arms, the “subsidiary system” was put in force, and the land is now at peace.

VI. *The History of the Portuguese in India.*—Whilst treating of this portion of our subject, we may also speak of (VII.) the history of the various Indo-European companies; of (VIII.) the history of the French in India till their surrender of Pondicherry; and of (IX.) Anglo-Indian history till the appointment of the first governor-general. In 1497, Vasco da Gama rounded the Cape of Good Hope, procured a pilot at Melinda, struck out boldly across the Indian Ocean, and landed at Calicut on the Malabar coast, where he was received with great pomp by the rajah. Da Gama, having thus opened up the way to India, returned to Portugal, and in 1500 a second expedition was sent out to India under Alvarez Cabral. Eight friars were sent with this expedition to propagate Christianity in India, but on arrival they used the sword as freely as the gospel. War naturally followed, and the Portuguese bombarded Calicut and burnt the shipping in the harbor, and then withdrew to Cochin. In a year's time they returned to Portugal, eminently successful for the time being, as far as mere trade went, for the whole Indian Ocean was now at the command of their fleet. But their arrogant policy made them hated in India. In 1502, Vasco da Gama returned to Calicut, and some of his first acts were to burn a ship with all its crew and to cut off the hands and feet of fifty natives of various classes collected from the native vessels in Calicut harbor. He returned to Europe without accomplishing anything better. In 1505 the Portuguese sent out their first viceroy, Almeyda. In 1508, Albuquerque, the greatest name in Portuguese Indian history, succeeded Almeyda, and in the next year he captured the city and fine harbor of Goa, and at once the power of Portugal rose to importance in India. But soon was sprung up on every side, and after Albuquerque's death the Mahrattas and Mohammedans pressed the colony very sorely, and within a century the Portuguese empire in the East—in Ceylon and the Moluccas as well as at Goa—may be said to have almost utterly collapsed. With it also, fortunately, collapsed the Inquisition and other peculiar institutions which the Portuguese introduced into India for the “benefit” of Hindus. Shortly after the first appearance of the Portuguese in India four European East India companies followed them—namely, the Dutch in 1594, the English in

1600, the French in 1668, and the Danish in 1616. The Dutch settlements in India have never been very important, and have subsequently all been ceded to England. These were Negapatam, Bimbatam, Pulicat, and Sadras. The Danes established themselves at Tranquebar and Serampore, and sold these places subsequently to the English in 1845. At the present day it is most curious to notice these quaint Dutch and Danish towns in India, which have a curious Old-World air about them. In 1579 an Englishman named Thomas Stevens travelled to Goa, and published a narrative of his travels in England. The book attracted great attention. Other English travellers recounted their adventures, and some of them travelled to the court of Akbar with letters from the English queen Elizabeth; and then (in 1600) Queen Elizabeth determined on incorporating by charter the famous British East India Company. The company was to be the medium of all trade-communication between Britain and India; was to have twenty-four directors and one chairman; and in 1624 the company was formally authorized to punish, even capitally, their servants, and thus were regarded as a government as well as a trading association. In 1611 the first English factory was established at Surat, on the western coast, and five years later, besides several other factories, the company had one on the eastern coast, at Masulipatam. In 1639, Fort St. George, at Madras, was built. In 1640 the first Bengal factory was established at Hooghly. Everywhere along the sea-line factories, more or less fortified, sprung up, and did a rapidly increasing business. At length, in 1664, Sivaji attacked Surat, and the natives first learned to appreciate the bravery and aptitude for war of the English, who successfully drove the victorious Mahrattas back, and protected the town of Surat in a manner which so delighted Aurungzeb that he forthwith gave the English traders great concessions. In 1668, Bombay was made into a presidency. It had been given to England as a part of the dowry of Catharine of Braganza. In 1698 a fort was ordered to be built in Bengal; it was called Fort William. Thus begins the history of Calcutta. But before this the French had landed in India. The famous Colbert organized a company on a firm basis in 1664, under the patronage of Louis XIV. This company began rapidly to establish factories near existing British ones; for instance, in Masulipatam and Surat. In 1674 the French bought Pondicherry, on the Coromandel coast, which still belongs to their government; François Martin was the founder. In 1693, Pondicherry was attacked and taken by the Dutch, but was subsequently returned after the Peace of Ryswick. It was then more elaborately fortified by the French, and soon rose into great importance as a mart and port on the Coromandel coast. In 1688, Aurungzeb gave the French Chandanagore, in Bengal, a small settlement which they possess at the present day. In 1731, Duplex, the French Clive, was appointed director of Chandanagore. Everywhere the French factories rose and flourished, and it was not long before it was seen that the supremacy of France or that of England in India must be decided by force of arms. From the first there had been no boundaries between the rival companies, and their factories were indiscriminately dotted over the Peninsula. When war between England and France broke out in Europe, the spark would naturally fly to India and the whole country be ablaze. This was clearly anticipated, and thus French and English vied with each other to obtain influence and form alliances with these native potentates who happened to possess at the time large standing armies. At length war did break out between England and France in Europe, and the flame spread to India. Duplex and La Bourdonnais, the French admiral, attacked Madras in 1746, took it and the garrison, and compelled the English to redeem it with a ransom of four lakhs and 40,000 rupees. The English captives were sent as prisoners to Pondicherry, saving a few who escaped. Among these latter was the future hero of India, Clive. At this brilliant French success the nawab of Arcot grew jealous, and sent 10,000 men against them. But the whole of this army was overthrown by 230 Frenchmen under Duplex and Paradis, assisted by only 700 native troops. The fame of this splendid achievement spread through all India. The French were regarded as the greatest European power in India. This state of affairs continued till 1748, when by the Peace of Aix-la-Chapelle England and France were once more at unity. Duplex, meanwhile, had been obliged to deliver back Madras to the English. Peace was not long to continue between the two European powers in India. The throne of Arcot was the subject of a quarrel between the occupier, Anwar-ud-deen, and Clive, the representative of the British. The latter had the sympathy of the French, and was at first successful. Anwar-ud-deen was killed. The British then supported the claim of his son against Chanda Sahib's claim, and received 600 Englishmen, under Lawrence and Clive, together with a vast native army



(a large part of which was composed of Mahratta soldiers), towards Pondicherry. Now the tables were turned, and the English won the day. But in a short time the French, under the able and irrepressible Dupleix, suddenly murdered Nazir Jung, the viceroy of the Deccan whom the English had appointed, and in a great measure regained their prestige in Southern India. In 1751 the French were still the real rulers of the Carnatic. But now a terrible struggle commenced. The English were thoroughly aroused. Clive with 320 men and 4 cannons took Arcot, and held it for seven weeks against 10,000 of Chanda Sahib's troops. At length the garrison was relieved by Saundras after a desperate fight; Chanda Sahib fled. The prestige of England rose a few. In 1752, Clive followed up his victories. Dupleix had built a town and pillar to commemorate his successes; these Clive demolished, and thereby greatly impressed the minds of the superstitious Hindus. Next, the rock of Trincomalee, beleaguered by the French, was relieved. The French army was caught in a trap in an island between the Cauvery and Coleroon rivers, and Law, the general, 783 Frenchmen, and 2000 native troops were captured by Lawrence and Clive. Chanda Sahib fled to Tanjore, and was there soon after assassinated. After this, for several years, Dupleix did his best to retrieve the French error, but failed. In 1756 the news reached India that England and France were again at war. The French general Lally came and took the field, and unsuccessfully besieged Madras. The English commander, Eyre Coote, soon after landed, and opened the campaign against the French. The famous battle of Wandewash was fought. The French power was for ever utterly crushed in India. But two years before this the great battle of Plassey had been fought in the North, and all India was already virtually at the mercy of England. At first the English factories had been unimportant in Bengal, as compared with Madras. In 1756 a new native ruler ascended the throne of Bengal, Behar, and Orissa. This was that most infamous name in all Indian history—Nawab Surajah Dowlah. This man suddenly attacked the English in Bengal, first at Cossimbazaar, and then at Calcutta. Drake, the governor, found no means of resisting the overwhelming enemy. Sending all the women and children out of the settlement by ship, he himself followed, leaving Mr. Holwell and 145 Europeans behind to treat with Surajah Dowlah. The infuriated nawab now entered Calcutta. That evening a sultry one in the hot month of June—the entire number of the 145 English captives was crammed into a dungeon eighteen feet square, with only two small breathing-holes in it. In such a climate as that of India in the month of June, the person would have been found very oppressive for one European prisoner, but here were 146 thrust into it. The horrors of that night can scarcely be even imagined. In the morning all of the captives were dead with the exception of 23, and these were at the last gasp and presented a sad sight. Such is the memorable episode of the Black Hole of Calcutta. The news of the atrocity quickly flew to Madras, and soon Clive was in Bengal, where he carried everything before him. A hollow peace was made in 1757, but soon broken. The nawab must be deposed. In the intrigues necessary to obtain native co-operation towards this end, a wily Bengalee named Omichund was employed. The plot grew ripe, when suddenly Omichund informed Clive that he would reveal all unless he were promised, by a clause in the treaty nominating Meer Jafir to the throne of Surajah Dowlah, the sum of 3,000,000 rupees. Clive now lent his hand to the one ignoble action of his life. Two treaties were drawn up—one on red and one on white paper. The one on red was the false treaty, with the clause which Omichund required inserted in it. This was shown to the Bengalee, and he was satisfied. Clive now wrote to the Nawab Surajah Dowlah demanding instant satisfaction for all the injuries which had been incurred by the English, stating that he must answer to the British army for his crimes unless he at once satisfied each one of the claims which should be made. Of course the nawab sprang to arms, and with 50,000 infantry, 18,000 cavalry, and an immense train of artillery, poured down on the English general with his 650 European infantry, 150 gunners, 2400 Sepoys, a few Portuguese, and 10 pieces of artillery. On the evening of June 22, Clive held the only council he summoned in all his campaigns. It was a very anxious one. Thirteen of the members of it voted against attacking the immense army of Surajah. Seven—one of whom was the sagacious and intrepid Coote—voted in favor of the attack. After the council had risen Clive took a lonely walk on the river-bank. The whole scene is an historical one. The next morning was to see the vast peninsula of Hindustan, from the Himalayas to Cape Comorin, virtually won for Britain. Clive and his little army attacked the nawab with the dawn. Plassey was fought and won on June 23, 1757. The victory was terrible and com-

plete, though the English only lost 72 killed and wounded. Surajah was seized and put to death by his successor. But the English soon had occasion to dethrone Meer Jafir and to appoint Meer Kassim, his son-in-law, as nawab. But he soon rebelled, and at Patna massacred 14 English gentlemen and soldiers in cold blood. He was, however, soon vanquished. By successful wars and the natural operations of trade the English power in India went on increasing and consolidating, till (in 1774) Warren Hastings became the first governor-general of British India.

X. *The Governor-general of India.*—Warren Hastings, as he was the first, may be regarded as also undoubtedly the greatest of the governors general of India. Whatever may have been his mistakes, he was brave, honest, disinterested, and of great ability as a statesman and soldier. His governorship extended from 1774 to 1785. The chief events of this time may thus be briefly summed up. The famous Regulating Act was passed, by which the Parliament of Britain formally recognized the East India Company as a ruling body, it being agreed in the charter that the governor-general should be paid £25,000 a year and have a supreme council of four, and that India should possess a supreme court of judicature. It was at the same time stipulated that England should receive from the East India Company forty lakhs of rupees annually. It was in virtue of this act, and under the provisions of it, that Hastings became governor-general. Col. Monson, Gen. Clavering, Philip Francis, and Mr. Barwell were his council of four. The first three of these did everything they could to thwart the governor-general. Francis was their leader. He is well known to English history as that Sir Philip Francis who is supposed to have been the author of the *Letters of Junius*. An implacable hater, in social life a heartless villain and debauchee, in public life a shrewd and calculating politician, he was an unscrupulous enemy of great power; and to him must chiefly be traced Hastings' final impeachment. To proceed, Shujah-ud-Dowlah, nawab-vizier of Oude, died in 1775. His mother and widow, called begums, claimed his treasures, 2,000,000 rupees, and for a time they got possession of them. Thus, the young nawab entered upon his reign with an empty treasury, got into debt, and accused the begums of plotting against Hastings. The latter suddenly cut the knot of the difficulty by making the begums pay 6,700,000 rupees to the East India Company. Shortly before this a wily native named Nuncomar tried to crush Hastings by ascribing to the governor-general crimes of various kinds. The three members in the supreme council inimical to Hastings actually believed this accuser, and favored him in his designs against their common foe. But Hastings was equal to the occasion. The Brahmin had supported his evidence against Hastings by documents palpably forged. An eminent native merchant suddenly brought a suit against Nuncomar for forgery. The case was heard before the chief justice of Calcutta, Sir Elijah Impey. The real prosecutor of course was Hastings. Nuncomar was found guilty and sentenced to be hanged. To the horror of all Bengal, the holy Brahmin was not reprieved. The execution was not forgotten for many a day. On the part of Hastings it was a stroke as politic as it was pitiless. It at once asserted his power even against the majority of his council, and this was needed at a time when the Mysoreans, the Dutch, the French, and the Mahrattas were all fighting together against the English. At length (in 1785) Hastings retired to England. His impeachment belongs to English history. In 1786, Lord Cornwallis went out to India as the second governor-general. He had done nothing to justify his appointment, unless his delivering himself and his army in America to Washington only five years previously may have been regarded as a sign of his good sense. During his governorship he did nothing remarkable, save to give his imprimatur to an excellent system of land settlement. The third governor-general was Sir John Shore (1793-98). The fourth was the Marquis of Wellesley, whose régime extended from 1798 to 1805. The marquis was one of the ablest men who ever set foot in India. He acted with great decision of character in his dealings with native potentates, and by everywhere pursuing a wise policy of friendly intervention, using violent intervention when absolutely necessary, he aggrandized the British power and firmly consolidated it. Hyder Ali in the Carnatic had been overthrown. Under the marquis Wellesley the fourth Mysore war, against Tippoo Sultan, son of Hyder, was successfully terminated in 1799. Seringapatam was taken. It would require a history in itself to describe seriatim the struggles of the British power in India in the Carnatic with Hyder Ali and the "Tiger of the Deccan," his son. But it was in this year (1799) that the stronghold of the latter, Seringapatam, was stormed, and Tippoo himself slain under a heap of his fierce defenders. In 1801 the affairs of Oude were regulated. Shortly afterwards the second Mahratta war was successfully brought to a close.



Everywhere the British arms were victorious. Lord Cornwallis, for the second time governor-general, succeeded Marquis Wellesley in 1805. His policy was that of peace at any price. He did not live long enough to do serious mischief, and Sir George Barlow succeeded him in the same year, and governed till 1807. He was inclined to copy Lord Cornwallis, with certain laudable exceptions. On July 10, 1806, at 2 A. M., the Sepoys of the Carnatic military station of Vellore mutinied, and massacred 113 European troops. Their reasons for thus rising against the British government were stated to be that the new *puggree* sanctioned as a head-dress for the troops was really a European hat, and that the emblem of the cross had been introduced into their uniforms; by which the Sepoys understood they were to be made forcibly Christians. "So great a fire a little spark kindleth." They were quickly overcome. Earl Minto succeeded Barlow in 1807, and his governor-generalship lasted till 1813. The Travancore war broke out and was quelled during this period. The marquis of Hastings succeeded Earl Minto in 1814, and his rule lasted till 1823. He, like his predecessor, was a man of statesmanlike ability. The war of Nepal was entered into at this time, and terminated in a measure favorably for the British arms. The eighth governor-general was Lord Amherst (1823-28). His régime was first distinguished by the hazardous undertaking, yet successful termination, of the Burmese war. In 1824, Malacca and Singapore were ceded by the Dutch to the British empire in the East. Lord Bentinck was the ninth governor-general (1828-35). At this time the Thugs were repressed and the horrible practice of the self-immolation of Hindu widows (see *SURTER*) forbidden. Lord Auckland was the tenth governor-general. The fatal Afghan expedition and the Chinese war marked his régime. From 1842 to 1844, Lord Ellenborough ruled as the eleventh governor-general. During this time Sir Charles Napier conquered and quieted Scinde. His laconic despatch after taking the country will be remembered: "*Peccavi!*"—i. e. "I have sinned" (Scinde). The twelfth governor-general was Lord Hardinge (1844-47). The first Punjaub war was now fought, and four great battles were won in 54 days. The thirteenth governor-general was the earl of Dalhousie (1848-56). Oude was now annexed, the second Burmese and the second Punjaub wars fought, and the system of Indian railways and telegraphs organized. The fourteenth governor-general was Lord Canning (1856-61), and his régime is not likely to be forgotten in the annals of Hindustan, because of the great Indian Sepoy mutiny of 1857. Here again we enter upon an episode of Indian history upon which hundreds of volumes have been written. The Sepoy regiments were getting dissatisfied. They felt their numerical power. They had been furnished with new Enfield rifles. Bigoted Mussulmans among them declared that the new cartridges which had been supplied to the troops had been smeared with the fat of pigs and cows. On Mar. 19 the mutiny began at Berhampore. Everywhere throughout India fanatics, ascetics, fakirs, and moulvies rushed about spreading disaffection, and prophesying the fall of the British power and the extermination of white men from the face of India. Especially the Mohammedans considered that they were to regain their empire in the East. The last Mogul emperor headed them. The signal for war was circulated from the Himalays to Cape Comorin in the form of flat flour cakes called *chappatties*. At Meerut the first great outbreak took place. The eyes of the European officers throughout India were fatally blinded. They believed in their men, and their naturally honest Anglo-Saxon character could not fathom the depths of the treachery of the wily Asiatic. The European part of Meerut was burnt, and every English man, woman, and child massacred. At Delhi the commissioner, military commandant, the chaplain and his poor daughter first met their doom in the sight of the last Mogul emperor. Everywhere the land was in flames against the white man. The horrible massacre of Cawnpore forms one of the blackest pages of the history of the world, and was performed under the supervision of that supremest of miscreants, Nana Sahib. The garrison defended themselves, but were promised their lives if they would depart and give up the treasures of the place to the mutineers. After a long struggle they consented. When they were once in the boats which were to convey them away, Nana Sahib and the treacherous mutineers on the bank of the river opened fire. Men, women, and children were killed, mutilated, and wounded. Many were dragged back to the shore. Fair and noble European ladies were carried back to the city, suffered pollution worse than death, and were flung with their children down the now famous well of Cawnpore. Sir Henry Havelock soon avenged their death. Outram and Clyde and Lawrence and Neill are a few of the honorable names which shine in that dark and stormy time. Lucknow

and Delhi were stormed. The mutiny was quelled, but the shadow of it has not yet passed from the hearts of living men who have had anything to do with India. In 1858, the year after the mutiny, a great change was inaugurated. India was placed under the direct authority of the crown of Britain; the East India Company was done away with; the governor-general was made "viceroy;" the Indian European army, as such, was abolished; the Indian civil service was thrown open to competition. The governor-general is now responsible, not to a board of East India Company directors, but to the secretary of state for India, assisted by a council of fifteen members. Queen Victoria issued, on all this being determined, a solemn proclamation to India, which now the native princes and Hindus generally regard as the supreme charter of their liberties. After Lord Canning's régime, Lord Elgin, Sir John Lawrence, the earl of Mayo (assassinated at the Andaman Islands), and Lord Northbrook have followed as governors-general and viceroys. Lord Northbrook is now (1875) in power, and his government has been especially marked by the wisdom and thoroughness with which a fearful Indian famine in Behar and Bengal has been met and finally overcome.

R. C. CALDWELL.

**India (or China) Ink** is of two kinds: (1) the dried pigment from certain cuttle-fishes. When browned by the action of an alkali it becomes *sepia*. It is prepared in Italy, in Turkey, and in Asia. (2) A mixture of fine lamp-black with glue or size and a little camphor. It is prepared in China, and is a very useful pigment. Both of the above are used in Asia as writing inks, and both are practically indelible. (See *INK*, by PROF. B. SILLIMAN, M. D.)

**India Matting**, a material largely employed as a summer carpeting and for the covering of the floors of sleeping chambers. It is imported from Bengal, where it is woven from the stems of *Papyrus Pampore* or *cymabosus*.

**In'dian**, tp. of Plumas co., Cal. Pop. 880.

**Indian**, tp. of Washington co., Me. Pop. 14.

**Indian**, tp. of Williamsburg co., S. C. Pop. 1147.

**India'na**, one of the central States of the American Union, lying between the parallels of 37° 46' and 41° 46' N. lat., and the meridians of 84° 49' and 88° 2' W. lon.



Seal of Indiana.

Its greatest length from N. to S. is 277 miles, and its greatest breadth from E. to W. 176 miles, while its average breadth is about 140 miles. It is bounded N. by Lake Michigan and the State of Michigan, the parallel of 41° 46' being the boundary-line; E. by Ohio, its eastern limit being a line drawn due N. from the mouth of the Great Miami River; S. E. and S. by Kentucky, from which it is divided by the Ohio River; W. by Illinois, the boundary being the meridian of 87° 30' W. until that meridian reaches the Wabash River, and thence through the middle of the main channel of the Wabash River to its entrance into the Ohio. The area of the State is 33,809 square miles, or 21,637,760 acres. In 1870 it had 125,000 inhabitants to the square mile.

**Face of the Country.**—There are no mountains in Indiana, and no hills of considerable height except what are called the river-hills. The rivers which drain the State have in the progress of ages eroded valleys of considerable depth and much greater width than their present channels, and the slopes which bound these valleys give the appearance of hills varying from 200 to 400 feet in height above the river valleys, and at the highest point being about 600 feet above the level of the sea. The highest portions of the State are on its E. and W. sides, some of the river hills along the Wabash Valley attaining the altitude of



600 feet above the sea; and from these points to the Ohio below the falls near Louisville there is a gradual slope of somewhat more than 100 feet. There is, however, no marked or distinct watershed in any part of the State. About two-thirds of the State is very level, the remainder broken or rolling, but with no high elevations. But owing to this feature of river-hills an account of the river-systems of the State and their valleys is necessary to a full understanding of the face of the country. Beginning with the S., we have first the Ohio River Valley, including that of the White Water River, which occupies a tract of about 5500 square miles in the State. The Ohio River borders the State for a distance, by the course of the river, of about 380 miles. The Ohio River Valley on the Indiana side was originally covered with heavy forests. The river-hills are rugged and broken, and about a dozen streams, mostly small and not navigable—the Great Miami and the Wabash being the only exceptions—break through the river-hills on the N. side and form bold bluffs. The valleys of the E. and W. forks of White River, and the prairie-lands which they enclose, extend from the Wabash to the Ohio line, covering a little more than a degree of latitude and an area of about 9000 square miles, or somewhat more than one-fourth of the area of the State. The region is almost universally level, and the eastern part was originally heavily timbered, while the W. is prairie, with occasionally some low, broken hills. The streams are generally clear and unfailing, and there are sufficient falls to furnish abundant water-power. The soil is very rich—much better than that of the Ohio River Valley. The valley of the Wabash River and its affluents is the largest in the State, covering an area of over 12,000 square miles. It interlocks with the White River Valley, and resembles it in its fertility. The E. portion is somewhat more rolling and broken. There are considerable waterfalls in the middle portion of the valley. The Wabash has a course of 600 miles, and, though much obstructed by drift-wood and silt, might be made navigable for steamboats of light draft to Wabash in Wabash co., about 400 miles, though only by a heavy expenditure. The valley of the Maumee and its principal tributary, the St. Joseph, occupies a tract of about 2000 miles in the N. E. part of the State, and slopes gently toward Lake Erie, into which the Maumee discharges its waters. Another and larger St. Joseph's River, from Michigan, dipping down into Elkhart and St. Joseph cos. and returning to Michigan, drains those counties into Lake Michigan; while in the N. W. the Kankakee, an affluent of the Illinois, with its branches, drains eight counties into that river. The Kankakee Valley is somewhat swampy, and the river expands at several points into broad marshy lakes. The soil is generally good, though near Lake Michigan it is sandy and barren. The tributaries of the Ohio in the State are the Great Miami, which touches its S. E. border, and its main affluent, the White Water, the Laighery, Indian Kentucky, Fourteen Mile, Silver, Buck Creek, Indian Blue, Great Blue, Little Blue, Oil Creek, Anderson's, Little Pigeon, Big Pigeon, and the Wabash; of these only the first and last are navigable or of much importance. The Wabash has its sources in Ohio. Its course is N. W. to Huntington co., thence W. by S. to Amsterdam in Cass co., thence S. W. to Baltimore in Warren co., and thence S., bearing slightly W., till it enters the Ohio. Its principal tributaries are—from the S. and E., the Salamonie, Mississinewa, Deer Creek, Wildcat Creek, Sugar or Rock, Big and Little Raccoon rivers, Otter, Meroni, Patoka, and Big creeks, and White River; from the N. and W., Eel, Tippecanoe, Little, Vermilion, Embarras, and Little Wabash, the last three being mainly in Illinois. The E. and W. forks, which, uniting, form the White River, the largest affluent of the Wabash, have themselves a number of tributaries of considerable size. Among those of the E. fork are the Salt, Muscatatuck, Sand, Clifty, Flat Rock, Sugar, Lost River, and Lick Creek, while the W. fork has Fall Creek, Big Indian, Bean Blossom, Richland, and Prairie creeks, and Eel River. The St. Joseph's and the St. Mary's unite to form the Maumee in the N. E., and the Michigan St. Joseph receives the Pigeon River and the Little and Big Elkhart in the State. The Kankakee has several small feeders in the State, and its principal branch, the Iroquois, after a considerable course in Indiana, unites with it in Illinois. Deep and Calumet rivers, small streams which flow into Lake Michigan, run very near its shores. The State is well watered. There are numerous small lakes and ponds, but none of large size. Beaver Lake, the largest, is in Newton co., and covers about 10,000 acres. The southern shore has an extensive marsh. There are also several very pretty small lakes in Noble, Kosciusko, Marshal, Stark, and La Porte cos., and three or four in Knox co. in the S. W. part of the State.

**Geology.**—Indiana has not a great variety of geological formations on or near the surface. The Silurian system is

the oldest in the State, and, proceeding in a direction about S. W. by S. from both Lakes Michigan and Erie, it appears in the extreme N. W. and S. E. of the State. In both cases it dips under the Devonian rocks, which occupy with their formations about three-fifths of the surface of the State. In Benton co. the Illinois coal-field enters the State, the Devonian rocks dipping beneath it. The coal-measures extend from the Wabash River to Crawford co. on the Ohio, and crossing the Ohio enter Kentucky. Their area in Indiana is about 7700 square miles. There are many different qualities and varieties of this coal. At Cannelton and other points on the river it is found high up on the river-bluffs as cannel coal, and is in great demand for river-steamers and for domestic purposes, and at various points along the Wabash and Erie Canal, from Evansville northward, seams of free-burning bituminous coal of good quality are worked. In Spencer co., and thence N. N. W. to Clay co. and above, the block coal (so named from its occurring in quadrangular blocks of varying thickness) is abundant. It is easily mined, and is found to be superior to any other coal known, and even to charcoal, for the production of pig iron and steel. Two specimens of this block coal analyzed by Prof. Delafontaine gave the following results:

Water at 212° F.....	1.86-3.91	Fixed carbon.....	58.23-62.81
Volatile matter.....	37.11-39.84	Ash, white.....	2.50-2.44

On distillation in a closed vessel the following results were obtained:

Coke.....	63.05	Water, approximately....	15.11
Tar, approximately.....	15.39	Gas.....	5.97

The water contained ammonia and other soluble chemicals, besides a small amount of hydrosulphate of ammonia. The amount of phosphoric acid was 0.3 per cent., and of sulphuric acid, 0.0 per cent. The amount of phosphoric acid is very much less than that of the best English smelting coals, those of Pontypool, Bedwas, Eborvale, etc., and there was an entire absence of sulphur, of which there was a notable percentage in the English coals. The importance of these facts to iron-masters is very evident, as the phosphorus (or phosphoric acid) and sulphur are the two ingredients which have most seriously injured the quality of American iron. It is found, too, that there is very much less phosphorus than in charcoal, that from elm, oak, and apple tree wood yielding from 4 to 9 per cent. of phosphorus, while the block coal yielded but three-tenths of 1 per cent. This coal is said to make also the best Bessemer steel. Salt-springs are found along the borders of the coal formation. There are also many quarries of white limestone of excellent quality for building purposes, a fine sandstone like the Chemung or Portsmouth (O.) sandstone, slate, brick, and porcelain clays. Some grindstones, small deposits of gypsum, and bog-iron ore, though not sufficiently abundant to pay for working, are the other principal minerals of the State.

**Vegetation.**—The State in its earlier history was largely covered with forests, having much less open prairie than Illinois, but under the influence of settlements, the demands of its railroads, and the requirements for fuel these forests are rapidly disappearing, and less attention is given to the culture of forest trees than should be. A careful investigation by the agricultural department gives the entire average in woodland in the State at 7,541,145 acres, or 34.8 per cent. of the entire area. The forests are mainly deciduous trees, such as black walnut, white, red, burr, and black oak, hickory, sugar, and red maple, ash, beech, linden, sycamore, elm, and tulip or whitewood. There is very little native pine, spruce, or hemlock in the State. The undergrowths are principally dogwood, pawpaw, wild plum, thorn, persimmon, crab-apple, etc. The mandrake (*Podophyllum*) and some of the species of sumach are found along the streams. Wild flowers are abundant, although the number of species is not large. Wild animals, especially the Carnivora, are nearly extinct in the State. Bears are very seldom seen; the coyote or prairie-wolf is becoming rare; and occasionally the raccoon, opossum, and skunk, as well as the woodchuck or ground-hog and the gopher, are found. Hares or rabbits and squirrels abound in the forests, and the smaller rodents are sufficiently plenty. The grouse or prairie-hen has been hunted so relentlessly that it is comparatively scarce. Pigeons, partridges, and occasionally wild-turkeys are found.

**Climate.**—The climate is liable to sudden and frequent changes. The range of the thermometer each month is very great. The heat in summer is intense, and the winter's cold equally severe. These extremes are, however, greater in the northern than the southern part of the State. The following table gives the monthly and annual temperature, range of the thermometer monthly, average annual pressure of barometer, direction of winds, and annual maximum and minimum temperature in Michigan City, Logansport, Indianapolis, and New Albany—four points



nearly equidistant from each other, and fairly representing the different climates of the State—in the years 1872-73:

Observations.	MICHIGAN CITY. Lat. 41° 58' N. Long. 86° 52' W. Elev. 654 feet.	LOGANSPORT. Lat. 40° 15' N. Long. 88° 22' W. Elev. 510 feet.	INDIANAPOLIS. Lat. 39° 45' N. Long. 86° 15' W. Elev. 346 ft. 4 in.	NEW ALBANY. Lat. 38° 45' N. Long. 85° 05' W. Elev. 436 ft.
Ann'l mean pressure barom. det....	30.063	.....	30.023	30.060
Monthly range of temperature:				
October.....	54°	61°	51°	52°
November.....	61°	48°	42°	58°
December.....	60°	.....	35°	65°
January.....	67°	.....	38°	63.5°
February.....	71°	51°	56°	61.0°
March.....	72°	71°	66°	68.0°
April.....	58°	47°	48°	52.0°
May.....	52°	46°	41°	43.0°
June.....	48°	.....	40°	44.0°
July.....	43°	32°	35°	35.0°
August.....	39°	43°	41°	34.0°
September.....	47°	44°	53°	52.0°
Monthly mean temperature:				
October.....	50.8°	44.5°	50.0°	56.6°
November.....	32.7°	35.2°	33.0°	37.5°
December.....	20.3°	.....	24.4°	29.4°
January.....	20.7°	.....	25.0°	31.1°
February.....	21.6°	31.3°	30.4°	36.8°
March.....	31.6°	31.7°	38.5°	43.3°
April.....	42.3°	47.7°	50.3°	51.6°
May.....	53.9°	58.1°	61.0°	67°
June.....	70.2°	.....	77.0°	78°
July.....	71.2°	71.1°	75.5°	79°
August.....	71.7°	73.5°	75.0°	78°
September.....	62.4°	62.7°	64.0°	69.5°
Ann'l mean temperature	46.25°	53.0°	50.84°	55.23°
Monthly rainfall:				
October.....	0.65	7.12	1.07	3.92
November.....	1.06	.....	0.80	0.56
December.....	0.19	.....	2.10	2.58
January.....	2.53	12.3	1.50	2.93
February.....	0.47	.....	1.85	5.42
March.....	0.89	.....	3.43	3.39
April.....	6.12	10.5	5.91	3.05
May.....	7.20	.....	3.89	5.73
June.....	1.44	.....	3.70	3.87
July.....	4.04	12.8	11.28	2.43
August.....	1.58	.....	1.32	3.04
September.....	2.53	.....	1.76	2.50
An. rainfall.....	24.75	42.8	42.06	40.42
Prev. winds:				
Parts of days of N. wind.....	123	.....	90	96
" N. W. ".....	85	.....	117	183
" W. ".....	111	.....	142	113
" S. W. ".....	28	.....	176	110
" S. ".....	117	.....	180	192
" S. E. ".....	79	.....	78	88
" E. ".....	79	.....	64	143
" N. E. ".....	111	.....	83	140
" Calm ".....	44	.....	133	127
Max. temp.....	102°	102°	101°	95°
Minimum.....	2°	-10°	-8°	-4°

**Agricultural Products.**—Indiana belongs to the grain-growing States, and in some of the grains takes a very high rank. Its production of cereals in the year 1869-70, according to the census, was—of wheat, 27,747,222 bushels; of rye, 457,468; of Indian corn, 31,024,338; of oats, 8,200,409; of barley, 336,262; of buckwheat, 80,291. Four years later these crops were reported as follows: wheat, 20,802,000 bushels (a decided falling off); rye, 397,000; Indian corn, 67,840,000 (a gain of nearly 16,716,000 bushels); oats, 11,100,000 (a gain of 40 per cent.); barley, 368,000; buckwheat, 139,000 (or almost doubled). The crop of Irish potatoes in 1869-70 was 5,309,944 bushels; in 1873, only 2,020,000; tobacco in 1869-70, 9,325,332 pounds; in 1873, 15,000,000; hay in 1869, 1,076,768 tons; in 1873, 893,400. The value of these nine crops in 1873 was \$9,000,200, these constituting not more than one-half of all farm productions in value. The value of all farm productions in 1869-70 was \$12,914,302, and this included, besides other important items to be mentioned presently, \$2,808,986 of orchard products, \$187,449 of market garden products, \$2,640,779 of forest products, \$606,639 of home manufactures, and \$30,246,967 of animals slaughtered or sold for slaughter; nearly \$37,000,000 in all. In 1869-70, according to the census, Indiana produced 3,029,023 pounds of wool, 35,326 bushels of peat and beans, 150,705 bushels of sweet potatoes, 19,479 gallons of wine, 22,915,385 pounds of butter, 283,807 pounds of cheese; and sold 936,983 gallons of milk. The establishment of butter and cheese factories since that time in the State, nearly 100 being now in operation, has doubled the pro-

duction of butter and cheese. Among the other agricultural products of 1869 were 61,168 bushels of clover seed, 17,377 bushels of other grass-seed, 63,884 pounds of hops, 22 tons of hemp, 37,771 pounds of flax, 401,931 bushels of flaxseed, 1,332,532 pounds of maple-sugar, 227,880 gallons of maple-molasses, 2,026,212 gallons of sorghum molasses, 12,049 pounds of beeswax, and 395,278 pounds of honey. In 1870 there were in the State 197,885 horses, 14,200 mules and asses, 393,736 milch cows, 14,088 working oxen, 618,360 other cattle, 1,612,680 sheep, and 1,872,230 hogs. The value of all the live-stock was estimated to be \$83,786,782. In 1874 the numbers of each were as follows: Horses, 649,500; mules and asses, 58,000; milch cows, 448,400; oxen and other cattle, 780,300; sheep, 1,722,500; hogs, 2,496,700. The value of this live-stock was estimated at \$91,401,474.

**Manufactures.**—Manufacturing industry has been of slow growth in Indiana, but has now attained to a considerable magnitude, and is rapidly increasing. The largest branches of manufacture are flour and flouring-mill products, lumber, woollen goods, machinery, cars and carriages, iron and iron goods (now rapidly increasing), furniture, boots and shoes, clothing, agricultural implements, packed meats, and saddlery and harness. In 1870 there were 11,847 manufactories in the State, in running which there were used 2881 steam-engines of 76,851 horse-power, and 1090 water wheels of 23,518 horse-power; employing 58,852 hands, of whom 51,412 were men, 2272 women, and 2168 children; using a capital (under-estimated) of \$52,052,425; paying wages to the amount of \$18,366,780; working up raw material of the value of \$63,135,432; and producing to the amount of \$108,617,278. The largest industry was that of flouring and grist mill products, in which 962 establishments, employing 3214 persons and a capital estimated at \$8,515,627, produced goods of the value of \$25,371,322. Next came lumber, planed and sawed, and sash, doors, and blinds, which together, in 2005 mills and factories, employed 10,724 persons, and produced lumber, etc. to the value of \$14,788,263. In wool-carding and dressing and the manufacture of woollen goods there were 175 mills, employing 2469 hands, and producing goods to the value of \$4,329,711. In the way of machinery, 28 machine shops, employing 2492 hands, produced wares of the value of \$4,146,384. In the manufacture of carriages and wagons, 770 shops, employing 3325 hands, produced goods to the value of \$3,616,068, and 10 car-shops, employing 1403 hands, made cars for passengers and freight valued at \$2,577,726. In the manufacture of furniture 352 establishments, employing 3190 hands, made goods of the value of \$3,826,930. Carpentering and building, in 995 establishments, employing 2893 hands, produced houses, etc. to the value of \$3,448,959. Distilled and malt liquors were produced in 135 distilleries and breweries, with the aid of 723 men, to the amount of \$3,353,556. Iron in the various forms of manufacture was produced in 122 establishments, employing 2461 hands, to the amount of \$7,447,447; the present amount exceeds \$12,000,000. Packed meats (beef and pork) were produced in 12 establishments, employing 467 men, to the value of \$2,825,021; boots and shoes, in 988 shops, employing 2702 hands, produced goods to the value of \$2,699,114. Clothing for men and women was produced in 267 establishments, employing 1649 hands, to the value of \$2,329,787. Agricultural implements were produced in 124 establishments, employing 1268 hands, to the amount of \$2,128,794. Coopers were carried on in 337 shops, employing 1988 hands, to the amount of \$1,924,878. Saddlery and harness, in 130 establishments, employing 1833 hands, to the amount of \$1,604,341. Tin, copper, and sheet iron were, in 122 establishments, to the value of \$1,293,206. Printing and publishing, in 69 establishments, to the amount of \$1,408,142. Blacksmithing, in 1332 establishments, employing 2652 men and boys, to the amount of \$1,916,637.

**Railroads and Canals.**—Indiana is intersected with a complete network of railroads, traversing nearly every county. According to *Poor's Railroad Manual* for 1874-75, at the beginning of 1874 there were 22 railroads, partially or wholly within the State, showing that the length of railway track to be 3837.65 miles. In Jan., 1875, the number of miles of railroad in the State had increased to 13,780 miles, though the cost of rail and locomotive was represented by about the same amount as the year before. There are two canals in the State. The Wabash and Erie, from Evansville to Toledo, a part of the way by slack water navigation of the Wabash and Maumee, is 467 miles in length, 379 of which are in Indiana. It is now unused beyond Lafayette. The White Water Canal is 75 miles in length, from Lawrenceburg on the Ohio to Hagerstown. It is now in service, though, on the other, The statistics of the completed railroads in the State at the beginning of the year 1874 are presented in the table on the next page.



*Finances.*—The State debt of Indiana on Oct. 31, 1873, was \$4,895,843.31. Of this, \$994,030.12 was held abroad, and was payable on presentation, a sufficient balance being retained in the treasury to meet the bonds as fast as they are surrendered. The remainder of the debt, \$3,904,753.22, is held by the State for the school fund, and is not negotiable, the State paying the interest on it annually to the schools. The receipts of the State treasury for the year ending Oct. 31, 1873, were, including the balance on hand at the close of the preceding year, \$4,300,653.02. The bal-

ance from the previous year was \$755,024.87. The disbursements of the year, which included the redemption of the unsundered bonds of 1836, the reimbursement of over \$20,000 of illegal taxes, and the payment of a large portion of the expenses of the legislature of 1871, in addition to the ordinary expenses, amounted in all to \$4,115,457.55. The assessed valuation of real and personal estate in 1870 was \$663,650,011, of which \$160,120,974 was of real estate and \$203,529,070 of personal estate. The true valuation of that year, according to the estimates of the U. S. marshals, was \$1,268,180,345.

*Commerce.*—Indiana has no foreign commerce except that transacted through the ports of Chicago, Ill., and Miami and Sandusky, O.; the amount of this is very considerable, but not easily separable from that of the adjacent States. The inter-State commerce of the State is very large. The gross earnings of its railroads from freights in 1875 were \$16,915,744, which could hardly represent less than \$1,000,000,000 of freight shipped and received, while to this is to be added its lake and river freights. The transportation of iron ores from Lake Superior and from Missouri to the newly-established blast furnaces of the block-coal region for smelting is a branch of commerce which has made great progress within the past three years, while the moving of its vast crop of cereals, its million or more of hogs for slaughter, and its immense droves of cattle, task even the large capacity of its numerous railways. The return freights of manufactured goods, imported and domestic, add largely to the mighty aggregate. There were Nov., 1874, 104 national banks in the State, 6 of which were closing. These had an aggregate capital of \$18,278,800; \$16,575,300 of bonds on deposit, \$21,333,975 circulation issued, and an actual circulation of \$14,995,266. There were also 19 State banks, under special charters, having a capital of \$2,080,000 (savings banks' amount of deposits not stated), and 96 private banking-houses, including 2 insurance companies which did also a banking business.

*Insurance.*—There were in July, 1873, 2 fire insurance companies in the State, both at Indianapolis, one of them mutual, the other with a capital of \$250,000, and the two having assets amounting to \$606,402. There was 1 life insurance company (mutual), also at Indianapolis, with assets to the amount of \$303,159.

*Education.*—In 1870 there were, according to the census, 395,263 children and youth who attended school some portion of the year; of these, 391,524 were of native and 3,739 of foreign birth; 207,336 were males 206,333 whites, 1620 colored, and 13 Indians), 187,267 females (185,777 white, 1469 colored, and 21 Indians). In the same year there were 76,634 persons, ten years of age and over, who could not read, and 127,124 who could not write. Of the latter number, 113,185 were natives of the State and 13,939 of foreign birth; 118,761 were whites, 8248 colored, 105 Indians; 5928 males between 10 and 15 years old, and 5134 females between the same ages; 7878 males were between 15 and 21 years, and 7752 females between the same ages; 36,543 males were over 21 years of age, and 60,839 females were over 21. There were in 1870, 9073 schools of all classes in the State, with 11,652 teachers (6678 males and 4974 females) and 464,477 pupils (237,664 males and 226,813 females). The total income of these schools for the year ending June 1, 1870, was \$2,499,511, of which \$50,620 was derived from endowment, \$2,126,502 from taxation and the public funds, and \$322,389 from other sources, including tuition. Of these schools, 8871 were public, or belonging to the common school system of the State. These had 11,012 teachers (6102 males and 4640 females) and 416,074 pupils (228,189 males and 217,887 females). Their income was \$2,063,599, of which \$2,002,052 was from taxation and the public funds, and \$61,547 from other sources, including tuition. There were 50 classical, professional, or technical schools (including colleges), having 325 instructors (184 males and 141 females) and 8337 students (4936 males and 3401 females). The total income of these schools was \$366,511, of which \$30,620 was from endowment, \$118,550 from taxation or public funds, \$197,641 from other sources, including tuition; and 152 other schools, with 285 teachers (92 males and 193 females) and 10,064 scholars (4539 males and 5525 females), with an income of \$69,401, of which \$6200 was derived from taxation or the public funds, and \$63,201 from tuition. Of the public schools, there were 1 normal, with 6 teachers (3 male and 3 female) and 49 male and 54 female students; 69 high schools, with 229 teachers (106 male and 123 female) and 5228 male and 4845 female pupils; 371 grammar and graded common schools, with 171 male and 558 female teachers, and 17,578 male, 18,751 female scholars; and 8430 ungraded common schools, with 6122 male and 3956 female teachers, and 205,334 male and 194,237 female scholars. Of the schools not public, there were 6 universities (so named), with 66 male and 7 female professors or instructors, 1428 male and 239 female stu-



dents, and an income of \$32,800 from endowment, \$17,700 from the public funds, and \$17,000 from tuition, etc. There were 13 colleges, with 115 male and 28 female instructors, 2431 male and 671 female students, and an income of \$18,520 from endowment, \$17,700 from the public funds, and \$96,030 from tuition, etc. There were 16 academies, with 26 male and 99 female teachers, 1360 male and 2275 female pupils, and \$73,990 income, of which \$1000 was from endowment and \$8050 from the public funds. There were 1 law school, with 2 professors and 51 students; 1 medical school, with 5 professors and 43 students; 2 theological schools, with 3 professors and 43 students. There were 7 commercial schools or colleges, with 15 instructors, and 782 male and 33 female pupils; 1 institute for the blind, with 3 male and 4 female teachers, and 43 male and 57 female pupils, which received from the State \$32,500 annually; 1 institution for the deaf and dumb, with 8 male and 5 female teachers, 163 male and 129 female pupils, which received \$60,000 from the State annually. There were also 4 schools of art and music, with 4 male and 5 female teachers, 34 male and 218 female pupils, and an income of \$8720 from tuition. There was also 1 other technical school, with 3 teachers, 61 male and 18 female pupils, and an income of \$1720, of which \$1100 was from endowment. Of the other private schools of the State, 124 were day and boarding schools, with 58 male and 143 female teachers, and 2802 male and 3194 female pupils, and a revenue from tuition of \$47,427; 28 were parochial and charity schools, with 34 male and 50 female teachers, 1737 male and 2031 female scholars, and a revenue of \$6200 from the public funds and \$15,774 from other sources. There was considerable progress made in the next two years following the census. The State has the largest school fund (though it is not quite all productive) of any

State in the Union; it amounted in 1874 to \$8,616,931. The amount of revenue for the public schools in 1872 was \$17,174,531. The legal school age is from 6 to 21 years, and there were in the State 631,549 persons between these ages. The number enrolled in the schools was 459,451, and the average attendance 298,056. The total number of districts was 9100, and schools were taught in all but 70 of these. There were 145 graded schools; the average length of the schools in days was 116 days, or 23 school weeks and 1 day. The whole number of teachers in 1872 was 12,248 (7430 males and 4818 females). The male primary-school teachers receive an average of \$1.95 per day, the female primary-school teachers, \$1.47 per day; male high-school teachers, \$3.77 per day; female high-school teachers, \$2.46 per day. The whole number of school-houses in 1872 was 9080; of these, 88 were of stone, 877 of brick, 7568 of frame, 547 of logs. The total valuation of school property for 1872 was \$9,199,480.15. In the matter of higher education there are 19 colleges and universities, so called, and 3 collegiate institutions exclusively for the instruction of women. The State university is a university in the sense of having professional and scientific schools connected with it; and, though they have not all the professional schools attached to each, yet as having some schools of post-graduate instruction, Wabash College, Hanover College, the University of Notre Dame, the North-western Christian University, and Howard College may be reckoned as universities. Hartsville University has a United Brethren theological seminary connected with it, but Indiana Asbury University has no post-graduate schools.

**Population.**—The following table exhibits the population at each period, according to the census, since the organization of the Territory in the various relations of race, sex, and color:

Census years.	White.	Free colored.	Slaves.	Indian.	Total.	Males.	Females.	Natives.	Foreigners.
1800	5,313	163	135	.....	5,611	2,574	2,003		
1810	24,800	333	237	.....	25,370	12,570	11,320		
1820	.....	.....	.....	.....	69,074				
1830	145,758	1,230	199	.....	147,178	77,303	69,685		
1840	.....	.....	.....	.....	224,717				
1850	339,350	3,029	3	.....	345,031	177,742	165,286		
1860	678,658	7,165	3	.....	685,866	357,704	329,359		
1870	977,154	11,252	.....	.....	988,416	511,893	476,523	930,458	55,772
1874	.....	.....	.....	.....	1,143,905				
1875	1,318,710	11,428	.....	290	1,350,428	699,260	651,168	1,232,144	118,284
1876	.....	.....	.....	.....	1,531,080				
1879	1,551,857	21,530	.....	219	1,580,637	857,994	822,643	1,530,163	111,171

Of the native population in 1870, 779,009 were males and 760,154 females; of the foreign population, 78,985 were males and 62,489 females; of the white population, 845,307 were males and 810,530 were females; of the colored race, 12,585 were males and 11,975 females. Of the 567,175 persons of school age (5 to 18 years) in the State in 1870, 287,357 were males and 279,818 females; of those of native birth, 282,424 were males and 274,986 females; of those of foreign birth, 4933 were males and 4832 females; of the white population of school age, 283,486 were males and 275,921 females. There were 3830 colored males and 3842 colored females of school age, 41 Indian male children and 55 female children. Of the military age (18 to 45), there were of all classes 319,658 males; of these 274,648 were natives, 45,010 of foreign birth, 314,329 whites, 5294 colored, and 35 Indians. Of the age of citizenship (21 years and upwards), there were 388,231 males, of whom 318,055 were natives, 70,176 foreigners, 382,070 whites, 6113 colored, 48 Indians, and 376,780 actual citizens. The density of the population to the square mile was in 1850, 29.24; in 1860, 39.94; in 1870, 49.71. The number of families in the State in 1850 was 171,564; the number of dwellings, 170,178; in 1860, the number of families was 248,664, and of dwellings, 256,946; in 1870, the number of families was 320,160, and of dwellings, 318,469. The number of persons to a family at these three periods was respectively 5.76, 5.43, and 5.25. The number of persons to a dwelling, 5.81, 5.26, and 5.28.

**Misfortune, Pauperism, and Crime.**—The State has a well-conducted hospital for the insane, though overcrowded with patients; on Nov. 1, 1873, it had 474 inmates, and its expenditures for the year were \$155,470.33. In the two State prisons, at Michigan City and Jeffersonville, there were respectively 295 and 387 prisoners; these prisons are self-supporting. The house of refuge had 216 boys in charge; its expenditures for 1873 were \$56,598.96, of which \$31,900 was from the State treasury. There is also a reformatory institute for women and girls, and a home for soldiers' orphans, both supported by the State. The census reports but 3062 paupers, an estimate so far below the truth that it is of no value for statistical purposes. During the

year ending June 1, 1870, 1374 persons were convicted in the criminal courts of the State, and 907 persons were confined in the county jails on the 1st of June of that year. Of these, 691 were native whites, 64 native colored, and 152 foreigners.

**Libraries.** There were reported by the ninth census 2333 public libraries, containing 627,894 volumes, of which 1 was a State library, with 17,870 volumes; 52 town and city libraries, with 39,029 volumes; 92 court and law libraries, with 10,308 volumes; 1006 school and college libraries, with 323,391 volumes; 1075 Sabbath-school libraries, with 204,692 volumes; 87 church libraries, with 24,356 volumes; 20 circulating, with 8248 volumes; and 2968 private libraries, with 497,659 volumes.

**Newspapers and Periodicals.**—In 1870 the number of newspapers and periodicals of all classes in the State was 293, having an aggregate circulation of 363,542, and issuing annually 26,964,984 copies. Of these, 20 were dailies, with a circulation of 42,300; 3 tri-weeklies, circulation 2200; 1 semi-weekly, circulation 350; 233 weeklies, circulation 239,342; 6 semi-monthlies, circulation 9200; 28 monthlies, circulation 64,150; 2 bi-monthlies, circulation 6000. There were 6 advertising sheets, with 8700 circulation; 5 agricultural and horticultural, with a circulation of 11,500; 6 organs of benevolent or secret societies, with 7250 circulation; 4 commercial and financial, with 13,000 circulation; 16 illustrated literary or miscellaneous, with 27,350 circulation; 240, including all the dailies and most of the weeklies, political, with a circulation of 256,342; 9 religious, with 29,600 circulation; 7 technical or professional, with a circulation of 9800. There has been a considerable advance in the number of periodicals in the State since 1870, especially in the agricultural and miscellaneous class.

**Churches.**—There were in 1870, according to the census, 3698 churches of all denominations, with 3106 church edifices, 1,008,380 sittings, and \$11,942,227 of church property. Of these, there were 552 regular Baptist churches, 476 church edifices, 135,575 sittings, and \$1,047,625 of church property. In 1871, according to the *Baptist Year-Book* for 1875, there were 50 associations, 465 Baptist churches, 333 ordained ministers, and 39,352 members of



the churches; 293 Sunday schools, with 41,199 teachers and scholars; 23,843 volumes in Sunday-school libraries; and the amount expended for benevolent contributions and church purposes was \$361,763. The census of 1870 reported 68 churches of minor Baptist denominations, 45 church edifices, 16,800 sittings, \$89,700 of church property. Of the Christian Connection, which in the census includes also the Disciples, and probably to some extent the Christian Union churches, the report of 1870 gave 455 churches, 377 church edifices, 122,775 sittings, and \$810,875 of church property. In 1870 the Congregationalists in Indiana were reported as having 18 churches, 12 church edifices, 4800 sittings, and \$119,900 of church property. In 1874 they had 25 churches, 19 ordained ministers, and 1253 members. The Protestant Episcopal Church had in 1870, 49 parishes, 38 church edifices, 10,300 sittings, \$492,500 of church property. The *Protestant Episcopal Almanac* for 1875 gives but 42 parishes, 39 ordained clergymen, 3210 communicants, 3814 Sunday-school teachers and scholars, and \$117,503 of contributions for benevolent and church purposes. The Evangelical Association (Albright Methodists) had 47 churches, 40 church edifices, 10,925 sittings, and \$124,600 of church property. In 1873 they had 85 ministers, 80 churches, 5909 members. The Society of Friends in 1870 had 81 meetings, 76 meeting-houses, 29,500 sittings, \$263,800 of church property. The Jews had 5 societies, 4 synagogues, 1900 sittings, \$113,000 of church property. The Lutherans in 1870 had 195 churches, 180 church edifices, 62,285 sittings, and \$619,600 of church property. There has been a decided increase since that time, but owing to the formation of their synods it is impossible to give accurate statistics. Their membership is probably about 12,000. The Methodists of all classes had, according to the census in 1870, 1403 churches, 1121 church edifices, 346,125 sittings, and \$3,291,427 of church property. In 1873 the Methodist Episcopal Church alone had 605 travelling preachers, 1361 church edifices, 100,434 members, \$3,672,215 of church property. The Moravians in 1870 had 2 churches, 2 church edifices, 650 sittings, and \$5000 of church property. The New Jerusalem Church (Swedenborgians) had 1 church, 1 church edifice, 100 sittings, \$4000 of church property. The Presbyterians (Presbyterian General Assembly, North, and United Presbyterians) in 1870 had 333 churches, 315 church edifices, 116,560 sittings, and \$2,006,550 of church property. In 1873 the Northern General Assembly had 2 synods, 8 presbyteries, 210 ordained ministers, 297 churches, and 21,644 members. The United Presbyterians had 9 presbyteries, 72 ministers, 98 churches, and 8547 communicants. There was also a considerable number of Reformed and Cumberland Presbyterian churches. Of the minor Presbyterian bodies, the census reports 42 churches, 42 church edifices, 12,400 sittings, \$71,550 of church property. There were in 1870 two Reformed churches (late Dutch), 2 church edifices, 500 sittings, \$8200 of church property; 34 Reformed (late German) churches, 33 church edifices, 8880 sittings, \$97,300 of church property. In 1870 there were 204 Roman Catholic congregations, 201 church edifices, 86,830 sittings, \$2,511,700 of church property. In 1874 there were 2 dioceses, 2 bishops, 183 priests, 243 churches and chapels, 94 congregations and stations, and an adherent population in the two dioceses of somewhat more than 130,000. There was in 1870, 1 Unitarian society in the State. The United Brethren in Christ (German Methodists) in 1870 had 184 churches, 121 church edifices, 33,975 sittings, \$188,000 of church property. In 1874 they had 507 churches, 270 ministers, and 21,521 members. The Universalists in 1870 had 18 congregations, 15 church edifices, 6300 sittings, \$73,400 of church property. Their present numbers are (1874) 46 congregations, 24 ministers, and 2334 members. There were also in 1870, 4 union organizations, with 5 church edifices, 1200 sittings, and \$3500 of church property.

*Constitution, Courts, &c. Present offices in Congress, &c.*—The present constitution of Indiana was adopted in 1851, but has undergone some amendment from time to time. Its general provisions are similar to those of most of the Western States. The governor, lieutenant-governor, secretary of state, treasurer, auditor, attorney-general, and superintendent of public instruction are chosen by the people at elections held on the 2d of October in each alternate year. The governor and lieutenant-governor hold office for four years; the other officers for two years only. The legislature, which consists of a senate of 50 members, chosen for four years, one-half being elected every second year, and a house of representatives of 98 members, elected biennially, meets regularly in January in the odd years, 1875, 1877, etc. By an amendment to the constitution ratified in 1873, the courts of common pleas were abolished, and the judiciary now consists of a supreme court of four judges, chosen by the people for seven years, and 38 circuit courts meeting in

their several districts, the judges of which are elected for six years. There are no county courts. The divorce laws, which have been for many years a reproach to the State, were materially modified and remodelled by the legislature of 1873. Under the new apportionment of 1872, Indiana has 13 members of Congress.

*Counties.*—The State has 92 counties; the following table gives the names and population (male and female) and total of each in 1870, and the total population of each in 1860 and 1850:

Counties.	Male pop- ulation, 1870.	Female pop- ulation, 1870.	Total pop- ulation, 1870.	Total pop- ulation, 1860.	Total pop- ulation, 1850.
Adams.....	5,711	5,671	11,382	9,252	5,797
Allen.....	22,474	21,029	43,503	29,328	16,919
Bartholomew.....	10,763	10,870	21,633	17,865	12,428
Benton.....	3,113	2,592	5,705	2,809	1,144
Blackford.....	3,245	3,027	6,272	4,122	2,860
Boone.....	11,540	11,053	22,593	16,753	11,631
Brown.....	4,412	4,229	8,641	6,711	4,816
Carroll.....	8,746	7,891	16,637	13,489	11,015
Cass.....	12,472	11,721	24,193	16,811	11,021
Clarke.....	12,734	12,036	24,770	20,712	15,828
Clay.....	9,008	9,176	18,184	12,161	7,944
Clinton.....	8,818	8,542	17,360	14,507	11,869
Crawford.....	4,978	4,871	9,849	8,225	6,524
Davess.....	8,375	8,372	16,747	13,323	10,752
Dearborn.....	12,162	11,954	24,116	21,496	20,166
Decatur.....	9,698	9,355	19,053	17,294	15,107
DeKalb.....	8,805	8,332	17,137	13,880	8,251
Delaware.....	9,763	9,267	19,030	15,753	10,843
Delaware.....	6,300	6,207	12,507	10,394	6,321
Elkhart.....	13,318	12,708	26,026	20,986	12,690
Fayette.....	5,258	5,218	10,476	10,225	10,217
Floyd.....	11,439	11,861	23,300	20,183	14,875
Franklin.....	8,535	7,841	16,376	15,565	13,253
Fulton.....	10,181	10,049	20,230	19,749	17,968
Gibson.....	6,606	6,120	12,726	9,422	5,982
Grant.....	8,893	8,747	17,640	14,572	10,771
Greene.....	9,461	9,026	18,487	15,797	11,092
Hamilton.....	9,712	9,732	19,444	16,041	12,313
Hancock.....	10,706	10,176	20,882	17,310	11,641
Harrison.....	7,719	7,383	15,102	12,802	9,698
Harrison.....	10,105	9,808	19,913	18,521	15,286
Hendricks.....	10,363	9,914	20,277	16,953	14,083
Hendricks.....	11,688	11,298	22,986	20,119	17,605
Harrison.....	8,005	7,812	15,817	12,524	6,657
Howard.....	9,702	9,394	19,096	14,867	7,850
Huntington.....	9,371	9,403	18,774	16,246	11,047
Jackson.....	3,226	3,128	6,354	4,291	3,340
Jasper.....	7,626	7,374	15,000	11,799	7,047
Jay.....	15,063	14,678	29,741	25,036	23,916
Jennings.....	8,117	8,101	16,218	14,749	12,096
Johnson.....	9,357	9,069	18,426	14,854	12,101
Johnson.....	11,019	10,711	21,730	16,056	11,084
Knox.....	11,915	11,711	23,626	17,418	10,243
Kosciusko.....	7,219	6,929	14,148	11,366	8,337
La Grange.....	6,439	5,901	12,340	9,145	5,991
Lake.....	13,970	13,092	27,062	22,919	12,145
Laporte.....	7,301	7,237	14,538	13,692	12,097
Lawrence.....	11,700	11,070	22,770	16,841	11,775
Madison.....	36,920	35,019	71,939	58,854	24,103
Martin.....	10,420	9,791	20,211	12,722	5,348
Marshall.....	6,696	5,407	11,103	8,975	5,941
Martin.....	10,750	10,392	21,142	16,851	11,314
Miami.....	7,059	7,109	14,168	12,847	11,286
Monroe.....	12,291	11,464	23,755	20,888	16,641
Montgomery.....	8,925	8,603	17,528	16,110	14,576
Montgomery.....	3,109	2,720	5,829	2,360	1,615
Noble.....	10,383	10,006	20,389	14,915	7,916
Ohio.....	2,914	2,893	5,807	5,111	5,308
Owen.....	6,851	6,111	12,962	10,706	10,899
Oran.....	8,147	7,791	15,938	14,376	12,106
Owen.....	9,407	8,759	18,166	15,538	13,968
Parke.....	7,490	7,111	14,601	11,847	7,263
Perry.....	7,070	6,709	13,779	10,078	7,720
Pike.....	7,199	6,743	13,942	10,313	5,234
Porter.....	9,886	9,299	19,185	16,167	12,549
Posey.....	3,943	3,858	7,801	5,711	2,095
Pulaski.....	11,009	10,505	21,514	19,011	16,615
Putnam.....	11,618	11,244	22,862	19,011	14,725
Randolph.....	10,362	10,315	20,677	19,051	14,820
Riley.....	8,966	8,659	17,625	16,119	10,445
Rush.....	3,998	3,771	7,769	7,393	5,885
Saratoga.....	11,250	10,642	21,892	19,569	15,502
Shelby.....	9,247	8,751	17,998	14,556	8,616
Spencer.....	2,076	1,812	3,888	2,195	557
Starke.....	6,593	6,261	12,854	10,711	11,101
Steuben.....	13,061	12,261	25,322	18,455	10,954
St. Joseph.....	9,329	9,124	18,453	15,064	10,141
Sullivan.....	6,045	6,089	12,134	12,698	12,932
Switzerland.....	17,396	16,119	33,515	25,726	19,377
Tippah.....	6,176	5,836	12,012	8,170	5,332
Tipton.....	3,944	3,097	7,041	7,109	6,941
Union.....	16,797	16,348	33,145	20,552	11,414
Vanderburgh.....	5,639	5,201	10,840	9,422	6,611
Vermilion.....	17,008	16,541	33,549	22,517	15,289
Vigo.....	10,840	10,465	21,305	17,517	12,183
Wabash.....	5,309	4,895	10,204	8,111	7,387
Warren.....	9,098	8,555	17,653	13,261	8,811
Warwick.....	9,375	9,140	18,515	17,999	17,040
Washington.....	16,836	17,182	34,018	29,578	25,320
Wayne.....	6,954	6,631	13,585	10,844	6,152
Wells.....	5,319	5,035	10,354	8,111	4,761
White.....	7,438	7,051	14,489	10,730	5,190
Whitley.....	7,438	7,051	14,489	10,730	5,190
Totals.....	857,994	822,643	1,680,637	1,350,428	988,416



*Principal Towns*—Indianapolis, the capital, has over 50,000 inhabitants; Evansville, Fort Wayne, Terre Haute, and New Albany, 18,000 to 25,000; Lafayette, Madison, and Richmond, 12,000 to 18,000; Logansport, Jeffersonville, South Bend, Laporte, and Vincennes, 8,000 to 12,000;

while Michigan City, Aurora, Columbus, Crawfordsville, Elkhart, Goshen, Greencastle, Lawrenceburg, and Peru each have 4,000 to 8,000.

*Electoral and Popular Vote at Presidential Elections*.—Indiana was admitted into the Union as a State in 1816.

Elect. year.	Candidates who received the electoral vote of the State.	Elect. vote.	Popular vote.	Candidates.	Popular vote.	Candidates.	Popular vote.
1816	James Monroe P.....	3	Not rec.	Rufus King P.....	Not rec.		
	D. D. Tompkins V.-P.....			J. Marshall V.-P.....	Not rec.		
1820	James Monroe P.....	3	Not rec.	John Quincy Adams P.....	Not rec.		
	D. D. Tompkins V.-P.....						
1824	Andrew Jackson P.....	5	7,343	John Quincy Adams P.....	3,095	Henry Clay P.....	5,315
	J. C. Calhoun V.-P.....			N. Sanford V.-P.....			
1828	Andrew Jackson P.....	5	22,237	John Quincy Adams P.....	17,052		
	J. C. Calhoun V.-P.....			R. Rush V.-P.....			
1832	Andrew Jackson P.....	9	31,552	Henry Clay P.....	15,472		
	M. Van Buren V.-P.....			J. Sergeant V.-P.....			
1836	W. H. Harrison P.....	9	41,281	M. Van Buren P.....	32,178		
	F. Grant V.-P.....			R. M. Johnson V.-P.....			
1840	W. H. Harrison P.....	9	65,302	M. Van Buren P.....	51,701		
	John Tyler V.-P.....			R. M. Johnson V.-P.....			
1844	James K. Polk P.....	12	70,131	Henry Clay P.....	67,867	J. G. Birney P.....	2,106
	G. M. Dallas V.-P.....			T. Frelinghuysen V.-P.....			
1848	Lewis Cass P.....	12	74,745	Zachary Taylor P.....	69,907	M. Van Buren P.....	8,100
	W. O. Butler V.-P.....			M. Fillmore V.-P.....		C. F. Adams V.-P.....	
1852	Franklin Pierce P.....	13	95,340	Winfield Scott P.....	80,901	John P. Hale P.....	6,929
	W. R. King V.-P.....			W. A. Graham V.-P.....		G. W. Julian V.-P.....	
1856	James Buchanan P.....	13	118,670	J. C. Fremont P.....	94,375	M. Fillmore P.....	22,786
	J. C. Breckenridge V.-P.....			W. L. Dayton V.-P.....		A. J. Donelson V.-P.....	
1860	Abraham Lincoln P.....	13	139,040	S. A. Douglas P.....	115,509	{ Breckenridge and Lane.....	12,295
	H. Hamlin V.-P.....			H. V. Johnson V.-P.....		{ Bell and Everett.....	5,306
1864	Abraham Lincoln P.....	13	150,422	G. B. McClellan P.....	130,233		
	A. Johnson V.-P.....			G. H. Pendleton V.-P.....			
1868	U. S. Grant P.....	13	176,552	H. Seymour P.....	166,980		
	S. Colfax V.-P.....			F. P. Blair V.-P.....			
1872	U. S. Grant P.....	15	186,147	Horace Greeley P.....	163,632	Charles O'Connor P.....	1,407
	Henry Wilson V.-P.....			B. Gratz Brown V.-P.....			
1876	Samuel J. Tilden P.....	15	213,526	Rutherford B. Hayes P.....	208,011		
1880	James A. Garfield P.....	15	232,164	Winfield S. Hancock P.....	225,522	Weaver P. (Gbk.).....	12,986

*History*.—Indiana was originally a part of the French possessions, and probably a Canadian French colony had established one or more trading-posts within its present boundaries before the close of the seventeenth century. In 1702 there was a fresh migration of considerable numbers, who settled at Vincennes, Corydon, and other points. They speedily made friends of the Indian tribes then inhabiting the country, and so far amalgamated with them as to adopt their habits and customs. Nothing was heard of them till the cession of the territory to the English in 1763, when by the treaty their territorial rights were confirmed. By the treaty of 1783 this, as well as the whole North-west Territory, was transferred to the U. S. In 1788 there was trouble with the Indians, and a local war ensued which caused great distress among the settlers at Vincennes. The Indians were attacked at the mouth of the Tippecanoe by Gen. Wilkinson in 1791, and through his judicious management and that of Gen. Wayne several victories were gained, the Indians were compelled to submit, and a dangerous confederation of the tribes was broken up. A time of greater peace and quietness followed, very little disturbed by the raids of hostile Indians. In 1795 the U. S. obtained several eligible tracts of land by the treaty of Greenville, and a considerable number of emigrants settled in the Territory. Ohio was erected into a separate Territory May 7, 1800, and all the country W. and N. of it organized as the new government of Indiana. The same year, according to the U. S. census, there were 4875 inhabitants in the present limits of the State. Michigan Territory was set off from it in 1805, and Illinois Territory in 1809, leaving Indiana Territory with its present boundaries. In 1810, notwithstanding some Indian troubles in the five or six years preceding, the population had increased to 24,520. In 1811 the Shawnees, one of the largest tribes of Indians in the Territory, were excited to a complete frenzy by the eloquence of their prophet and leader, Tecumseh, and commenced a series of raids and outrages against the settlers. The governor of the Territory, William Henry Harrison (afterwards President of the U. S.), assembled a force of regulars and militia at Vincennes, and on Nov. 6, 1811, marched to Tippecanoe on the Wabash, the prophet's town, and demanded the restoration of the property which the Indians had taken from the settlers. After a parley the Indians proposed a delay till the next morning, and gave intimations of their readiness to enter into an amicable arrangement. During the night, however, they made a sudden and violent attack on the forces under Gov. Harrison, but, to their surprise, found them watchful and prepared. A short but sanguinary battle ensued; the Indians, under the shouts and encouragements of their prophet leader, fought with the utmost desperation; but they could not resist the steady and resolute advance of the white troops, and after a terrible slaughter they fled, sullen, but thoroughly defeated; and soon after, their town having been

burned and the surrounding country laid waste by the victorious troops, the Shawnees sued for peace. The war with Great Britain, which soon followed, gave a fresh impulse to Indian hostilities, but the tribes were again thoroughly humbled and subdued, and after the peace of 1815 never molested the Indiana settlers again. In Dec., 1815, the subject of admission into the Union as a State began to be agitated throughout the Territory; in Apr., 1816, an enabling act was passed by Congress; a convention was called, and the first constitution of Indiana adopted June 29, and on Dec. 11, 1816, Indiana was admitted into the Union. Her growth from this time onward was very rapid, the census of 1820 showing an increase of 500.2 per cent. during the preceding decade. The completion of the Erie Canal and the building of the National Road stimulated immigration into the fertile and beautiful State, and more than 3,500,000 acres of government lands were purchased within the State in the ten years ending with 1830, and the population had increased 133.1 per cent. Then commenced an era of wild speculation. Eight railroad companies were incorporated, the Wabash and Erie Canal was begun and driven forward with great rapidity, a State bank with thirteen branches organized, and numerous other great enterprises fostered by the State and its banks. When the crash came in 1837 there was general bankruptcy and a State debt of \$14,057,000, the interest of which was not paid wholly or in part till 1846. Yet in 1840 it was found that the population of the State had doubled, and that immigrants to the State had taken up 9,122,688 acres of government lands. In 1846 arrangements were made for the resumption of interest on the State debt, and prosperity began to return. In 1850 the increase of population during the previous decade was found to be 44.1 per cent. In 1851 a new constitution was adopted, and in 1853 a free-banking law passed. The decade from 1850 to 1860 was marked by the completion of its great canal from the lakes to the Ohio, as well as by the execution of other important public works, and by the great increase of its railroad facilities, from 228 miles in 1850 to 2163 miles in 1860. The financial panic of 1857 made havoc of the free banks of the State, but produced far less disaster than that of 1837. In the late civil war Indiana sent her full quota to the field, and though there was some trouble at first through the machinations of those opposed to the war, which necessitated the assumption of unusual war-powers by the governor, the general record of the State for patriotism and efficient service was in the highest degree honorable to it. In two or three instances its legislature, under the influence of unwise and partisan leaders, has attempted something in the nature of a *compromis*, but the result of these efforts has so soon returned to plague and injure their contrivers that it is hardly possible that they will ever again be attempted. Like some of its sister States, Indiana has been agitated of late on the question



of cheap transportation of produce, but it has not developed in that State so decided an antagonism between the railroad companies and the farmers as in some of the other States, mainly perhaps because her facilities for transportation are less dependent upon the railroads than some, and in part, also, because that her railroad companies have been less hostile to the producing classes from whom they derive their support. The National Congress of Agriculture, at Indianapolis in May, 1873, discussed this question very thoroughly and in an excellent spirit.

Governors.—

Territory.	Term.	Samuel Bigger .....	Term.
William H. Harrison ..	1800-11	James Whitcomb .....	1843-48
John Cass ..	1811-13	Paris C. Dunning .....	1848-49
Thomas Posey ..	1813-16	Joseph A. Wright .....	1849-57
STATE.		Asahel P. Willard .....	1857-61
Jonathan J. Bonds ..	1816-22	Oliver P. Morton .....	1861-67
William H. Edwards ..	1822-25	Conrad Baker ..	1867-73
James B. Riley ..	1825-31	Thomas A. Hendricks ..	1873-77
Noah S. ...	1831-37	James D. Williams .....	1877-81
David Wallace .....	1857-60	Albert G. Porter .....	1881-

L. P. BROCKETT.

**Indiana**, county of S. W. Central Pennsylvania. Area, 770 square miles. It is hilly, but for the most part quite fertile. Cattle, grain, and wool are staple products. Bituminous coal, iron ore, and salt-springs are found. Metallic wares, wagons, leather, lumber, furniture, castings, and farm implements are leading articles of manufacture. Its southern part is traversed by the Pennsylvania R. R. Cap. INDIAN. Pop. 55,138.

**Indiana**, tp. of Marion co., Ia. Pop. 1332.

**Indiana**, tp. of Allegheny co., Pa. Pop. 2806.

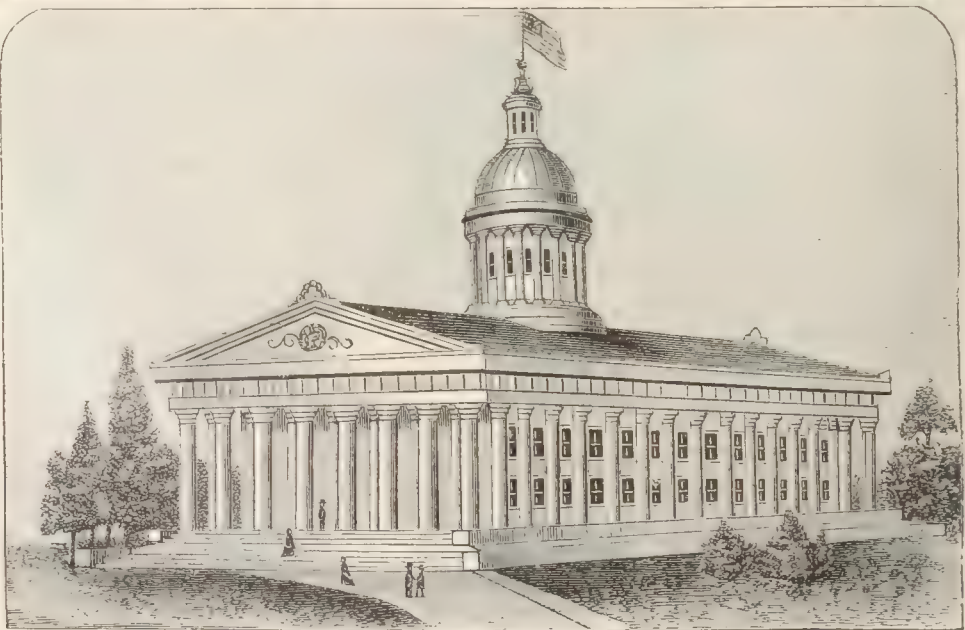
**Indiana**, post-tl. cap. of Indiana co., Pa., 72 miles N. E. of Pittsburg, at the terminus of the Indiana branch of the Pennsylvania R. R., has 2 banks, 3 planing mills, 2 foundries, 1 machine-shop, a fine court-house, 3 newspapers, a national bank, several churches, and a large trade in lumber and agricultural products. It is the seat of a State normal school erected at a cost of \$125,000. Pop. 1699.

S. A. SMITH, Ed. "MESSENGER."

**Indianapolis**, city, capital of Indiana, and seat of justice of Marion co., is situated near the geographical centre of the State, mostly on a plain, on the E. bank of White River, in 39° 33' N. lat. and 86° 03' W. lon. Its first settlement was made in 1813. It was settled as the

seat of government in 1820, laid out in 1821, and occupied as the capital in 1824. Its streets, lined with forest trees, are from 60 to 100 feet wide, crossing each other at right angles, except four broad diagonal avenues, which converge towards a circular park in the centre. Numerous railways have opened communication with every portion of the State and the great commercial cities. Its first railroad, the Madison, was built in 1847. The population then was about 4000. It now has 13 railroads in operation, and one in process of construction, with their numerous branches and connections giving direct access to all but 8 of the 92 counties of the State. These roads centre in the Union dépôt, where 82 passenger-trains and 328 passenger-cars enter and leave daily, with an average of 10,000 persons daily, and 3,000,000 yearly. The number of freight-cars for the last eight months of 1874 was 476,000, making for the year more than 700,000. These railroads traverse localities unsurpassed in agriculture and mineral resources, thus furnishing facilities for supplying the raw material to the manufacturers and for distributing the products of the city. Situated near the centre of the great corn-belt, it is the natural grain market for a vast area. There are two large grain-elevators and ten flouring-mills. There are six pork packing houses, and 1 for packing beef. The total hog product for 1874 was valued at \$8,500,000. Indianapolis possesses peculiar advantages for manufactures of iron and wood. Immense forests of timber, beds of coal, and mines of iron ore abound in the State. Five railroads in three hours' run reach coal-fields of nearly 8000 square miles. Excellent for fuel, the block coal is unrivalled for working iron and steel. Its manufacturing interests are specially represented by 2 rolling-mills, malleable-iron works, car-works, saw-factories, 18 or 20 foundries, machine shops, and shops for various branches of iron and brass work, numerous saw and planing mills, and sash, door, and blind factories, manufacturing for agricultural implements, carriages, sewing-machines, household furniture, school furniture, church and parlor organs, pianos, boots and shoes, cotton and woollen goods, glass, starch, glue, "Sarven wheels," step-ladders, and wooden ware, and many others. There are 30 incorporated manufacturing institutions. The entire manufacturing capital invested is not less than \$12,000,000. The number of buildings erected in 1874 was 2900, in value nearly \$8,000,000.

The Belt Railway now (1875) building around the city



State Capitol, Indianapolis.

will more completely connect the various lines of railroad and aid the transfer of freight, location of workshops, warehouses, stockyards, etc. The Central Canal, cutting a bend of White River, furnishes partial water-power for flouring-mills and factories. The fire department has 7 steam fire-engines, with 100 men, and an electric alarm telegraph. Water is furnished by the Holly system, having 45 miles of pipe. The street railway has 18 miles of track, 50 cars and 150 men. There are 6 national, 10 private, and 2 savings banks, with a united capital of about \$5,000,000. A manufacturers' and real estate exchange, meeting weekly; a board of trade, meeting daily, exchanging products and

securing market reports from the great marts of trade; 7 home insurance companies; 118 American and foreign companies represented here; numerous lodges of Masons and Odd Fellows and orders of secret and benevolent societies; a city hospital; free dispensary; board of health; national surgical institute; home for friendless women; 3 homes for orphans; sisters of Providence; Bible society; Y. M. C. A., etc. Here are State institutions for the deaf and dumb, the blind, and insane, and the women's prison and reformatory institute. There are 5 English and 2 German daily newspapers, 12 English and 5 German weeklies, and 12 monthly publications; 17 job printing and publish-

ing establishments: 6 libraries (the city library has 17,000 vols.); a reading-room, with the leading American and European periodicals. This and the library are supported by a State tax. They are open daily, and free to all. There are a university, law school, 2 medical colleges, a Catholic theological seminary, a German and several select and private schools. The free-school system is maintained by local and State taxation and by its share of the State school fund of \$8,000,000, which is larger, by more than \$2,000,000, than that of any other State; a city high school, training school, and 20 district schools. The number of school children enumerated is over 20,000; value of city school property, \$700,000; assessed value of taxables, \$72,000,000; rate of city tax 1874, \$1.10 on \$100, State and county tax, 71 cents on \$100. There are 70 churches—12 Presbyterian, 18 Methodist, 7 Baptist, 5 Episcopal, 5 Christian, 5 Lutheran, 4 Catholic, 2 Congregational, 2 Hebrew; all others, 19. Crown Hill Cemetery, 2 miles N. W. of the city, opened in 1864, encloses 330 acres. Among the public buildings is the State house, built in 1835, of brick, in the Grecian style, containing the legislative chamber, State library, State agricultural society and geological cabinet. It being in a decaying condition, measures have been taken to replace it. The State building, of brick, contains rooms for the State and supreme court officers. The State benevolent institutions are located in or near the city, and are monuments of the munificence of the State. The U. S. court-house and post-office is of iron and dressed stone, costing \$200,000; on an elevation just E. of the city are the U. S. arsenal buildings, four in number, in an enclosure of 76 acres, commanding and beautiful. The county court-house surpasses any building here in dimensions and tasteful design, of dressed stone and iron, 275 by 130 feet, three stories with central tower of 200 feet, high basement, and mansard roof in the Renaissance style of architecture. The immense Exposition building, built in 1873 by the State agricultural society, is of brick, 303 by 150 feet, two stories high, with elevated galleries. It is N. of the city, in the State fairgrounds, and cost \$150,000. The Union dépôt, of brick, stone and iron, although 420 by 200 feet, is too small for the local trains. The chamber of commerce building, substantial and imposing, erected last year, cost \$75,000. Among other structures worthy of note are the Odd Fellows' Hall and the Masonic Hall, the Academy of Music, many of its churches and massive business-blocks, not a few of which are models of construction and finish. The health record of Indianapolis will compare favorably with that of any city East or West. Population in 1850, 8091; in 1860, 18,000; in 1870, 48,244. CHARLES N. TODD.

**Indian Archipelago.** See EASTERN ARCHIPELAGO.

**Indian Architecture.** See ARCHITECTURE OF THE AMERICAN ABORIGINES, by HON. L. H. MORGAN, LL.D.

**Indian Bean.** See CATALPA.

**Indian Corn, or Maize** (*Zea mays*, Linn.), the most abundant of the cereals, and most important grain raised by American farmers, belongs to the tribe Phalaridæ of the natural order Gramineæ or grasses. It is indigenous to America, where it has always formed the chief food of the Indian races, from which the name is derived. Its cultivation was introduced from America to Southern Europe and Asia and to Northern Africa, where it spread with great rapidity. It is alleged that this grain was known in very ancient times to the Chinese, but if so it fell into complete oblivion. Indian corn is properly a sub-tropical grain, a native probably of the table lands of Mexico or Peru, the great height of which gives them a distinct character from the lowlands in the same latitude. It thrives best under a hot summer sun, and its rapid growth and ripening give it a peculiar value for high Northern latitudes, where the summer heat is as intense as the winter cold. In England the summer heat is not sufficiently intense to favor its production. The chemical ingredients of Indian corn are chiefly starch and oil; it yields abundance of phosphorus, and is a most nutritious and healthful diet. There are many varieties, presenting great differences and possessing very unequal value. The original type was probably the wild variety, having a separate husk to each grain; the lowest variant types appear to be the small rice-corn and pop corn, and the highest is perhaps the "Improved King Philip." The lower types hybridize very readily; not so the higher, which appear to have nearly or quite reached the limit of perfectibility. New varieties are constantly appearing, and with proper care most valuable improvements might be introduced. As food for man there is a great difference in the varieties. Tuscaraora corn contains no oil, rice-corn contains the most, pop-corn next, Canada corn ranks third, and brown corn fourth. It thus appears that the effect of careful cultivation is to augment the starch at the expense of the fatty contents. The late-

ripening kind called sweet corn furnishes when green a savory article of food for several months (say from July 15 to Oct. 15), either boiled or roasted. Indian corn in the U. S. is emphatically the poor man's crop. Being hardy and easily cultivated, it is the first grain planted by the new settler amid stumps and fallen trees, by the aid of the hoe alone. The yield ranges from 10 bushels to the acre, which is the average on the worn lands of the Gulf States, to 200 bushels, the apparent maximum yield which in a few instances has been produced under very exceptional circumstances from small and carefully-tended patches in Kentucky and Tennessee. In the Central States the average yield is from 25 to 30 bushels per acre. The price has fluctuated from 5 or 10 cents per bushel, at which it was often sold in Kentucky and Ohio early in the present century, to \$1 and more, at which it has been sold in the Eastern cities. The height of the full-grown corn varies, according to species and soil, from three to eighteen feet. The method of cultivation formerly in universal use was planting in rows of hills some five feet apart, but this has been replaced to a great extent of late years by the more advantageous system of sowing in drills, economizing manual labor by the use of improved ploughs and other implements. The yield and quality of the grain are much improved by careful selection of the best ears for seed, and by soaking the seed-corn in copperas or lime-water, which hastens the process of sprouting and protects the seed from certain insects. The average time of planting is May 20 to June 1. The total yield in the U. S. in 1870 was 760,944,549 bushels; the largest yield in a single State was that of Illinois, 129,921,395 bushels. (For further statistics see articles upon the several States.) PORTER C. BLISS.

**Indian Creek, tp. of Bullock co., Ala.** Pop. 1162.

**Indian Creek, a v. and tp. of Trinity co., Cal.** Pop. of v. 183; of tp. 783.

**Indian Creek, tp. of Cass co., Ill.** Pop. 433.

**Indian Creek, tp. of White co., Ill.** Pop. 2010.

**Indian Creek, tp. of Lawrence co., Ind.** Pop. 1348.

**Indian Creek, tp. of Monroe co., Ind.** Pop. 988.

**Indian Creek, tp. of Pulaski co., Ind.** Pop. 812.

**Indian Creek, tp. of Mills co., Ia.** Pop. 690.

**Indian Creek, tp. of Story co., Ia.** Pop. 1074.

**Indian Creek, post-tp. of Monroe co., Mo.** Pop. 654.

**Indian Creek, tp. of Pike co., Mo.** Pop. 1103.

**Indian Cress.** See TROPEOLACEÆ.

**Indian Cucumber.** See MEDICINA.

**Indian Dye.** See PTERIDÆ.

**Indian Fields, tp. of Tuscola co., Mich.** Pop. 825.

**Indian Pig.** See CATTLE.

**Indian Grove, tp. of Livingston co., Ill.** Pop. 2635.

**Indian Hemp.** See CANNABIS, HASHISH, APOCYNACEÆ.

**Indian Hill, tp. of Abbeville co., S. C.** Pop. 1920.

**Indian Lake,** post-tp. of Hamilton co., N. Y., in the Adirondac region. The tp. includes many lakes (among them Indian and the Eckford lakes). Pop. 202.

**Indian Land, tp. of Lancaster co., S. C.** Pop. 969.

**Indian Languages of America.** In a general view of the languages of the Western World their number and variety are at first more remarkable than is that approach to uniformity in plan of thought and verbal structure which establishes something like a family likeness among them all. No accurate enumeration of these languages has been or can be made. Kircher in 1675, on such information as he could gather from Jesuit missionaries, estimated the number at about 500. Garcia cited authority for reckoning more than 5000. Herrera had been told that every village in Mexico had a language of its own, and Hervas adopted a statement that the number of South American languages and dialects was between 1500 and 2000. One estimate is as good as another, since none can be based on sufficient data. Somewhat nearer approximation may be had to the number of *stocks* or families of speech in North America. In 1848, Mr. Gallatin enumerated thirty-two distinct families in N. of the U. S., not including the languages of California, which were not then—and are not even yet—sufficiently well known to justify their arrangement by families. The acquisition of New Mexico by the U. S. made a considerable addition to Mr. Gallatin's list. His classification, so far as it goes, has been generally accepted by philologists, subsequent investigations having confirmed most of his conclusions, or at least having failed (with perhaps two exceptions) to establish affinity between the linguistic groups he separated.

At least four fifths of North America E. of the Rocky Mountains and N. of Mexico was occupied by nations and



wandering tribes speaking dialects of not more than four radically distinct languages—namely, the ESKIMO, ATHABASCAN, ALGONKIN, and SIOUX or DAKOTA. The ESKIMO was spoken, in various dialects, near the shores of the Northern Ocean, from the E. coast of Greenland to Behring's Straits, a distance of not less than 5400 miles, and it extended southward on the Atlantic to the Straits of Belle Isle and the Gulf of St. Lawrence. S. of the Eskimos the territory between Hudson's Bay and the Rocky Mountains, and stretching westward, between 50° and 60° N. lat., nearly to the Pacific, was occupied by the ATHABASCAN family in numerous tribes, among which may be named the Chepewyans (see NORTHERN INDIANS), and the nearly-related "Dog Ribs," the Slave and the Beaver Indians, the Takullies, and probably the Loucheux. E. of the Rocky Mountains the most southerly of known Athabascan tribes is that of the Sussees, near the head-waters of the Saskatchewan River, about 51° N. lat.; but W. of the mountains offsets from this stock have been traced as far S. as Mexico. Small tribes and bands of Athabascans were found near the Pacific in Southern Oregon and Northern California, and Prof. W. W. Turner showed that the Apache nation of Arizona and New Mexico, including the Navajos, Pinalenos, and Jicarillas, belong to the same great family of speech. (See Dr. J. C. E. Buschmann's *Der Athabaskische Sprachstamm dargestellt*, Berlin, 1855, and his *Das Apache, mit einer system. Wortart d. Athap. Sprachstamme*, 1860-63.) E. of the Mississippi, and of a line drawn north-westerly from the head-waters of that river to those of the Mississippi (Churchill's) River, was the vast territory of the Algonkins, within the bounds of which, however, was comprehended that of two groups of Iroquois tribes, speaking a radically different language. When North America became known to Europeans the Algonkin country was bounded on the N. by the Athabascan, Hudson's Bay, and the Labrador Eskimos; E. by the Gulf of St. Lawrence and the Atlantic as far S. as at least Cape Hatteras; S. by an irregular line running westward from that cape to the confluence of the Ohio and Mississippi or its vicinity. One Algonkin tribe, the *Satsikaa* or *Blackfoot*, is found far W., between the head-waters of the Saskatchewan and the Missouri, at the foot of the Rocky Mountains, and another, the *Cheyenne* or *Shyenne*, roamed till lately the country that borders the North and South Platte rivers, to which region they seem to have strayed from the far N. "The most widely diffused and the most fertile in dialects" of all North American languages, the Algonkin, was (in the words of Mr. Bancroft) "the mother-tongue of those who greeted the colonists of Raleigh at Roanoke and of those who welcomed the Pilgrims to Plymouth. It was heard from the Bay of Gaspé to the valley of the Des Moines; from Cape Fear, and it may be from the Savannah, to the land of the Eskimos; from the Cumberland River of Kentucky to the southern bank of the Mississippi. It was spoken, though not exclusively, in a territory that extended through sixty degrees of longitude and more than twenty degrees of latitude." In some of its numerous dialects the polysynthetic type or plan of structure seems to have attained its highest expression and the grammatical apparatus its nicest adjustment. Some of its characteristic features will be noticed hereafter. The fourth great North American family, the DAKOTA, or SIOUX (the latter being an abbreviation of *Naudewessians*, itself a French corruption of the name given to the Dakotas by their rivals and enemies, the Algonkins), claimed most of the region between the Mississippi and the Rocky Mountains, from the Saskatchewan on the N. to Arkansas River at the S. A detached tribe, the *Winnebagoes*, were found (with a tradition of a removal from the W.) near Green Bay and Lake Michigan. Another Sioux tribe, the *Assiniboin*s, wandered N. along the upper Missouri and the Assiniboin rivers to the W. side of Lake Winnipeg and the Saskatchewan, and became allies of the Algonkins. Next to the Algonkin language, that of the Dakotas, perhaps, has been most thoroughly investigated, and the labors of missionaries of the American Board of Foreign Missions, liberally seconded by the Smithsonian Institution in the publication of a grammar and copious dictionary (edited by the Rev. S. R. Riggs), have brought this language prominently to the notice of American and European philologists. (See DAKOTA INDIANS.) To the tribes named in that article as speaking languages of the Dakota stock may be added the Omahas, Ponkas, Iowas, Otos, Mandans, and Minitaris or Hidatsa. The *Pawnees* and *Comanches* were included by mistake. An *Idaho Grammar*, by Rev. W. Hamilton and S. M. Irwin, was printed in 1848, and a *Grammar and Dictionary of the Hidatsa Language* by Dr. W. Matthews in 1873 (J. G. Shea, New York).

Next after these four principal families, those of the IROQUOIS, the CHIAHA-MUSKOKI, and the CHEROKEE (if the last two may not ultimately be reduced to one) were the most

considerable. The Iroquois-speaking tribes were, as has been stated, nearly enclosed within the territory of the Algonkins. Their northern group comprised the "Five Nations" living S. of Lakes Erie and Ontario and of the river St. Lawrence, and W. of the Hudson and Lake Champlain, and, farther N., the Hurons or Wyandots, the Attiwandarons ("Neutral Nation"), the Eries, and the Andastes. The southern Iroquois, separated from their congeners by intervening Algonkin tribes, were the Nottoways, and perhaps the Meherrins or Tuteloes, of Southern Virginia and North Carolina, and S. of these the Tuscaroras, who removed northward early in the eighteenth century and joined the confederated Five (thereafter known as the Six) Nations. (See IROQUOIS, and L. H. Morgan's *League of the Iroquois*.) Recent investigations by Mr. Horatio Hale have thrown doubts on the hitherto accepted affinity of the Tuteloes and Iroquois, if they have not fully established the connection of the former with the Dakota stock. Mr. Hale regards the Tutelo as a Dakota dialect, and inclines to the belief that formerly "the whole of what is now the central portion of the U. S., from the Mississippi nearly to the Atlantic, was occupied by Dakota tribes, who have been cut up and gradually exterminated by the intrusive and more energetic Algonkins and Iroquois." (See *Proceedings of Am. Philological Society*, 1871, p. 15. For a general view of the Iroquois language, see Gallatin's *Synopsis of the Indian Tribes*, pp. 232-238, and *Études philologiques sur quelques Langues Sauvages*, par N. O., Montreal, 1866.) The CHIAHA-MUSKOKI family, comprising the Choctaws and Chickasas, Muskokis or Creeks, Seminoles, Coassattis, Alabamas, and Hitchitis, occupied the territory now constituting the States of Georgia, Alabama, Mississippi, and Florida, with a portion of Louisiana E. of the Mississippi, except the shore of the Gulf from Mobile westward and the banks of the Mississippi, inhabited by various small tribes, and a tract in Northern Alabama, on both sides of the Tennessee River, which belonged to the Cherokees. The Choctaws and Chickasas speak nearly related dialects of the same language, to which probably the Hitchiti also belongs. The Creeks, Seminoles, and small tribes of Coassattis and Alabamas speak dialects of another language of the same stock. (For the Choctaw, see Byington's *Choctaw Grammar*, edited by Dr. D. G. Brinton, 1870, and his *English and Choctaw Dialect*, 1862; Rev. A. Wright's vocabulary and grammatical notes, in Gallatin's *Synopsis*. Extensive vocabularies of the Muskoki, Coassattis, Alabama, Choctaw, and Hitchiti are preparing for publication by the Smithsonian Institution.) The *Cherokees* (*Tsalagi*) lived in villages along the Tennessee River and its tributaries, their country extending over the mountainous regions of East Tennessee and the northern portions of Georgia and Alabama. In the Cherokee language every syllable ends in a vowel or a nasal, and this peculiarity, with the absence (with rare exceptions) of double consonants, inclined Mr. Gallatin to adopt Barton's suggestion of the affinity of the Cherokee and Iroquois. At present, however, such affinity cannot be considered as established. The invention of a syllabic alphabet by George Guess (or Sequoyah), a half-breed Cherokee, in 1826, has promoted the general education of that nation, but for those to whom the language is not vernacular the necessity of learning eighty-five arbitrarily-chosen characters interposes an additional obstacle to its study. (See Mr. Pickering's *Remarks on the Indian Languages of America*, from the *Encyclopædia Americana*, vol. vi.; Rev. S. A. Worcester's *Remarks on the Principles of the Cherokee*, in Schoolcraft's *Indian Tribes*, ii., 443; H. C. von Gabelentz's *Grammatik d. Tscherokeeischen Sprache*.)

The seven families which have been mentioned were spread over more than nine-tenths of the territory N. of Mexico, E. of the Rocky Mountains. Between these mountains and the Sierra Nevada the most important family is that of the SHOSHONE, occupying Utah, Nevada, the southern part of Idaho and Oregon, including the Kizh and Netela of Southern California and the Comanches of the prairies of New Mexico and Texas, with the *Shoshones* or Snake Indians, *Whinash*, and *Bannacks* in the valleys of Snake and Owyhee rivers, and the several divisions of the Ute (Utah) nation. Dr. J. C. E. Buschmann has endeavored, but as yet with questionable success, to establish the connection of this family with the *Sonora* stock of Northern Mexico. N. of the Shoshones, between 45° and 52° 30' N. lat., are two considerable families, the SAHAPTIN and the SELISH (TSIHAILI-SELISH of Hale). The former includes, besides the Sahaptins proper (*Nez Percés*), the Walla-Wallas, Yakamas, Pelouse, and Kliketats, in Northern Oregon, the south-eastern portion of Washington, and the western border of Idaho. The TSIHAILI-SELISH are distributed by Mr. Hale in four groups, represented by (1) the Shushwaps or Athnabs of British Columbia, and the "Flatheads," or Selish proper, on the upper Columbia and its tributaries,



including the Pend d'Oreilles, Cœurs d'Alène, Spokanes, and Piskous; (2) the N'skwally, on Puget Sound; (3) the Tshailish or Chhailish, between the N'skwally and the ocean, and the Kowelitsk or Cowlitz, S. of the N'skwally; and (4) the Killamuks (Tillamooks), along the coast of North-western Oregon. Of these, only the first group, the Selish and Shushwaps, are inland tribes, the other three divisions being included geographically with the Sound Indians. Little progress in classification of the languages of numerous small tribes of the Pacific coast has been made since the publication of Mr. Hale's vocabularies. (*U. S. Exploring Expedition*, vol. vi., "Ethnography and Philology.") For all that is known of their territorial divisions, past and present, see the first volume of Mr. H. H. Bancroft's *Native Races of the Pacific States*, 1874. Of the structure of the Sahaptin and Selish languages, Mr. Hale's grammatical notes to vocabularies give the best general account. See also M. C. Pandosy's *Grammar and Dictionary of the Yakama* (a Sahaptin dialect), and Mengarini's *Grammatica Lingue Selice*, both printed in J. G. Shea's series of *American Linguistics*.

Of languages spoken near the southern border of the U. S., two or three have already been mentioned as belonging to the Athabaskan and Shoshone stocks. The Caddoes (properly, Cado-hadacho), Adais, Chetimachas, and Attacapas, tribes or remnants of tribes W. of the Mississippi, on the Red River and between it and the Gulf, speak four languages, which Mr. Gallatin classes as radically distinct. To the Caddo belong the dialects of the Nandakoes, the Nabadaches, and the Inies or *Tachies*, who have given their name to the State of Texas. The YUMA language is spoken on both sides of the Colorado River, above and below the junction of the Gila. To it belong the dialects of the Coco-Maricopas, now living in a village on the N. bank of the Gila; the Cuchans, near the Colorado; the Mohaves, farther N.; the Hualapais, Yampais, in Arizona; and the Diegueños, near the Pacific in Southern California. The PIMA, with its dialects, spoken on the Gila and its southern affluents, is included by Buschmann in his SONORA family, of which the Tarahumara, Tepeguana, Cora, and Cahita of North-western Mexico constitute the first group; the Tubar, Hiaqui, Eudeve, and Opata of Sonora make the second; the Pima the third; and the Kizh, Comanche, Shoshone, etc. the fourth. (See Buschmann's *Die Spuren d. Aztekischen Sprache*, etc., Berlin, 1859, and his *Die Pima Sprache*, 1857. A grammar of the Pima or Nevome, translated by Buckingham Smith, has been printed in Shea's *American Linguistics*, vol. v.) The isolated languages of the *Pueblos* or Village Indians of New Mexico and Arizona, near the Rio Grande, and between it and the upper Colorado, present problems of special interest to ethnologists and philologists which still remain unsolved. In these scattered villages dialects are spoken of four or five distinct languages, between no two of which have genetic relations been established.

The picture-writings of the Aztecs, the incised symbols on the stones of Palenque, Copan, and Yucatan, with other evidences of a higher civilization than appears to have been attained by northern nations, impart peculiar interest to the languages of MEXICO and CENTRAL AMERICA. Since the publication in 1845 of Mr. Gallatin's *Notes on the Semi-civilized Nations of Mexico*, etc. (*Trans. Am. Ethnol. Soc.*, vol. i.), much has been done for the comparative philology of these tongues, particularly by Pimentel's *Cuadro descriptivo y comparativo de las lenguas de Mexico* (1862-65) and the *Geografía de las lenguas de Mexico* of Orozco y Berra (Mex., 1864). The most important family is that of which the Mexican proper, *Nahuatl* or *Aztec*, is the recognized type. This appears to have been spoken by the Nahuatlacs in the valley of Mexico, and in the adjacent country to the E. and S., and in numerous dialects it extended throughout the Mexican empire. Buschmann in his principal work, *Die Spuren d. Aztek. Sprache*, maintains the northern origin of the Toltecs and Nahuatlacs, and has collected the evidence of affinity of the Aztec with the languages of North-western Mexico, and of the latter with the languages of Sonora and Lower California. De Charencey, *Notice sur quelques familles de langues du Mexique* (1870), accepting Buschmann's classification, recognizes in the "Chichimecan family" two groups—the northern or "Oregon," comprising the Comanche, Kizh, Shoshone, Ute, etc.; the southern or "Mexican," including the Pima and other languages of Sonora, with the Cora and the Aztec. The Oromi or *Hia-hui*, spoken by tribes N. and W. of the valley of Mexico, differs widely from other languages of this region, and its presumed monosyllabic character, together with certain peculiarities of structure, has led some writers to regard it as utterly discordant from the general type of American speech, and as probably of foreign origin. But the monosyllabic character is much less apparent in the *Mazahui*, a dialect of the Otomi, and

disappears in the *Matlazinga* or *Pirinda* of Toluca, the affinity of which to the Otomi seems established by recent investigations. Other Mexican languages of undetermined affinities are represented by the Tarasca (of Michoacan), Tlapaneco (Puebla), Totonaco (Puebla and Vera Cruz), Zapoteco and Mixteco (Oaxaca), Zoqui and Mixe (in parts of Oaxaca, Tabasco, and Chiapas). The Huasteco or Huastec, which is spoken in the N. of Vera Cruz and in Puebla, has few coincidences with the Mexican or the Otomi, but is allied to the great Maya family. To the *Maya* stock belong the Quiché, Kakchiquel, Zutugil, Ixil, Chol (or Putum), Mame, and Pokonchi of Guatemala; Tzendal, Zotzil (Chamula), Chorti, and Lacandon of Chiapas; Chontal of Tabasco; with the Maya of Yucatan. The Abbé Brasseur de Bourbourg, an enthusiastic and indefatigable student of Central American antiquities and languages, published, besides a grammar and vocabulary of the Quiché (Paris, 1862), translations of the *Popul Vuh*, or sacred book, and of a Quiché drama, *Rabinal-Achi*. His discovery in 1863 of an ancient phonetic alphabet employed by the Mayas of Yucatan, preserved in manuscript by Bishop Landa, excited hopes that the pictured annals and sculptured stones of Central America must soon give up their secrets. The hope is not yet realized. The Abbé Brasseur's attempt at translation of a part of the Troano manuscript by means of Landa's alphabet was, as he subsequently admitted, unsuccessful. More ample materials for the study of the Maya language and its dialects may hereafter enable scholars to use the key which his discovery supplied. Dr. H. Berendt, who has given many years to the investigation of Central American languages, has compiled from ancient manuscripts a copious Maya dictionary, which it is hoped will soon be published. (For the literature of Central American languages, see E. G. Squier's *Monograph of Authors who have written on the Languages of Central America*, 1861.)

IN SOUTH AMERICA the number and diversity of idioms are much greater than in the North. "Of no part of the world," says Latham, "is the comparative philology more uncertain and obscure." For a general classification, that of A. d'Orbigny (*L'Homme Américain*, Paris, 1839) has been accepted provisionally, though it is founded on the physical types of races which the author regards as distinct, and not primarily on language. Varying (with Dr. Prichard and other recent writers) the order of D'Orbigny's groups, the South American nations may be divided as follows: I. ANDO-PERUVIAN, from the Isthmus of Darien to Cape Horn, comprising (1) the *Peruvian*—Quichuas or Kechuas (whose language was spoken by all tribes subject to the Incas) and the near-related Aymaras; Atacamas or Olipes; and Changos; (2) the *Antisan* (of the Eastern Andes)—Yuracaras of Bolivia, Mocetenes, Tacanas, Maropas, Apollistas, and various isolated tribes of unknown affinities; (3) *South-Andian*—Araucans of Chili, Patagonians (Tehuelhet), and Fugians (Yacana-cunuy, Alikhoolips, Pecherays, etc.).—II. EASTERN NATIONS (Brasilio-Guaranian of D'Orbigny); (1) *Tupi-Guaranian*—including many tribes speaking languages distinct from the Guarani, and of unknown affinities; (2) *Caribbean*—comprising nations of the northern coast of South America, Guiana, and Venezuela, allied to the Caribs of the Antilles, Tamanacas, Chaymas, Guaraúnas, Cumanagotos, etc.; (3) nations and isolated tribes speaking languages which seem not to belong to the Tupi-Guarani or the Carib stock, but which, with few exceptions, have never been adequately investigated. Among these are the "Botocondos" (Aimorés, Guaymarés), Goyataens, Puris, Guatos, Parecis, etc. (For the names and what little is known of the languages of these nations see Von Martius's important *Beiträge z. Ethnogr. und Sprachenkunde Amerika's*, with a volume of vocabularies, 1867.)—III. MIDLAND NATIONS, including (1) those on the Lower Paraguay and the great plain of *Chaco*—the Guaycurús, Lengoes, Tobas, Abipones, Mbocobis, Mbayans, Guayanos or Gualaches, Guatós, Payaguas or Payaguas, and others; and (2) the *Chiquitos* and the *Moxos*—between Potosi and the upper streams of the Parana—with whom D'Orbigny groups seventeen other tribes attached to the Chiquito and Moxo missions, speaking different languages.

Looking back to the vast field which has been only partially surveyed, the question presents itself: Is there any bond of union between these numerous families of languages radically distinct? any characteristic features common to them all which testify to the original unity of all, or at least distinguish them as a class from languages of the Eastern hemisphere? The answer must be given less confidently now than it might have been fifty years ago, when the attention of scholars had been directed to only a few of the American families of speech, and it was easy to assume that the structural and grammatical characteristics of these were common to all Indian languages. At present, broad generalizations are felt to be hazardous. As the





is *débaré*, "he speaks true;" the transitive-animate form is *déhiman*, "he speaks the truth of another person;" and of this the "pitying form" (as Baraga calls it) is *déhimashi*, "he speaks the truth of another, poor fellow!" or impersonally, "what they say of him is unfortunately true;" in the "dubitative" form, this becomes *déhimashin-adog*, "I think what they say," etc. All except the radical *déh* is grammar, and each successive modification of the meaning is given by regular conjugation-forms. In another family of language we have, as a specimen of Choctaw synthesis (Gallatin's *Synopsis*, 219), *Wéni tan-ti-ti-gi-na-tskaw-lung-ta-nue-ne-hi-ta-sesti*; translated, "They will by that time have nearly done granting [favors] from a distance to thee and me." The same capacity of synthesis is found in languages of the Pacific coast, of Mexico, and of South America. In the Shapatin Nez Perce of Oregon the word *ki-shup-tan-ta-ah-shan-lan-na-ni-na* signifies "he travelled by on foot in a rainy night." The primary verb is *véhna*, "to travel on foot;" *tan* and *na* are adverbial prefixes, meaning, respectively, "by night" and "in the rain;" *kan* denotes a "passing by;" *ni* is the characteristic of the indicative mood, *ki* of the third person, etc. (Hale's *Notes on Languages of the North-west*). Paredes observes that Mexican compounds usually consist of two words only, occasionally of three, and that such as exceed the latter number are principally used with reference to sacred things, having been formed by the missionaries. Of these, *tlacatintiliztlacacoli*, for "original sin," is an example. This is compounded from *tlacati*, "a person," *tintiliztli*, "commencement" or "principle," and *tlacacoli*, "sin." The name seems a long one, but perhaps the doctrine has never been clearly taught in fewer syllables.

The process of word-growth will be most conveniently exhibited by bringing together some of the derivatives of a single root. The following are selected from Chippewa words (in Baraga's *Dictionary*) formed on the verbal root *wab*, "to see." With the verb in the indicative is given the conditional participle, which is used as a noun to denote one who may or habitually does perform the act expressed by the verb, or who is conceived as performing it. To form this *nomen actoris*, and generally in conditional statements, the principal vowel of the root is strengthened; thus, *wásh-i*, "he sees," makes *wáshid*, "a seer"—i. e. one conceived as seeing, who may, can, or habitually does see; *ásh*, "he remains," makes *éshid*, "one who remains;" *nibo*, "he dies," *nibod*, "a dead person;" *glosse*, "he hunts," *gláoned*, "a hunter," etc. If the verb has an adverbial or other prefix, the change takes place in the vowel of the prefix, and that of the principal root is not affected. This vowel-change, a characteristic feature of Algonkin languages, is in itself a sufficient reason for regarding them as inflectional, and a sufficient proof that they are not destitute of true verb-forms.

The root *wab* is found in the primary verb *wásh-i*, "he sees;" and by the passive sense, "to be seen," come the meanings "to be light, bright, white," or otherwise visible. Hence,

*Wáshon*, it dawns, lit. "there is seeing;" *wáshon*, to-morrow, lit. "at the dawn;" conditional (with change of vowel) *wáshonag*, at dawning—i. e. whenever it dawns. *Wáshon* (n.), dawn, the east; *wáshonag*, in the east; hence, a name of the morning star.

*biwáshon*, dawn (lit. "seeing") comes.

*nin wáshonag*, I see (an animate object); *wáshonag*, one who sees, etc.

*nin wáshonag*, I see (an inanimate object); *wáshonag*, one who sees, etc.

*nin hanáshonag*, I lose sight of (it); *hanáshonag*, one who loses sight, etc.

*nin wáshonag*, I see myself; part. *wáshonag*.

*nin wáshonag*, I see something (intrans.); part. *wáshonag*.

*nin wáshonag*, I see, look on (indef. intrans.); part. *wáshonag*.

*nin wáshonag*, I see from a distance; part. *wáshonag*.

*wáshonag*, he is a seer (seer); part. *wáshonag*.

*nin wáshonag*, I make him see; part. *wáshonag*.

*nin wáshonag*, I am seeing—i. e. I survive the night.

*nin wáshonag*, I with difficulty survive the winter.

*Wáshon*, a swan (literally, "he is white").

*Wáshon*, a hare.

*Wáshon*, a blossom (lit. "it is seen").

*Wáshon*, white clay; *wáshonag*, he plasters with clay.

*Wáshonag* (intens.), lime—i. e. very white clay; *wáshonag*, he whitens with lime.

*Wáshonag*, white flannel.

*Wáshonag*, a blanket.

*Wáshonag*, tin—i. e. white metal; *ashik* is not an independent word, but a generic formative of names for rocks and minerals.

*Wáshonag*, it becomes white, is whitish or gray.

*Wáshonag*, he is whitish; part. *wáshonag*, a whitish man.

*Wáshonag*, he is (by nature) whitish; part. *wáshonag*, a white (whitish) man.

In the greater number of the derivatives here given, the root has its secondary or passive sense, "seen" = white, or distinctly visible. Still more numerous are the verbs expressing modes of seeing and relations of the subject to the object of sight. The variety of conjugation-forms that any of these verbs may assume is practically without limits. A paradigm of the primary *nin wab*—in Schoolcraft's orthography *no-wab*—fills 90 quarto pages (299-388) of the 4th vol. of his *Information respecting, etc. the Indian Tribes*. A manuscript paradigm of the same verb, by the Rev. Thomas Hurlburt, is still more extensive, and he declares, moreover, that having estimated as nearly as he could all the possible "inflections of this one root *wab*, he finds about 20,000,000." Evidently, however, he uses the term "inflections" in a larger sense than grammarians will allow it, making it include such modifications of the action as are effected by prefixing or incorporating adverbial particles. But apart from all these, which belong rather to the composition of words than to grammar, Indian conjugational forms are prodigiously numerous. They may be referred to three classes: (1) *personal*, expressing by the so-called "transitions" the grammatical person of the object as well as of the subject of the verb; (2) *animate* and *inanimate*, distinguishing the object or subject, or both, as belonging to one or the other of these two classes; (3) *modal* and *circumstantial*, corresponding more nearly to the Semitic than to Indo-European forms of conjugation, though far exceeding the former in number and variety. The personal conjugations, in which the pronouns of the subject and the object are united with the verb, are found in all American languages that have been investigated, and may be regarded as one of the characteristics of the class. The division of nouns into *animate* and *inanimate* is not peculiar to, nor is it recognized in all, these languages. Such a distinction is observed in the (new) Persian, and by Kafir tribes in South Africa; and there is something like it in the Tamil and other Dravidian tongues of Southern India, which divide nouns into "high caste" or "rational," and "no-caste" or "irrational." It pervades the entire structure of Algonkin languages, and is perhaps their most striking feature, modifying the inflections of all nouns and the conjugations of every verb, according as the action is exerted by or upon an animate or inanimate object. Thus, a Chippewa Indian says, *nin pakítéon*, "I strike him"—i. e. a man or a horse; *nin pakítéon*, "I strike it," a stone, a block, or other inanimate thing; *nin pakítéon*, "I am striking" (somebody or something indefinite); *nin pakítéon*, "I strike (an animate object) belonging to him"—i. e. his child, his horse; *pakítéon*, "it strikes" (and, used as a noun, "a hammer"); *pakítéon*, "it strikes something" (unintentionally), etc. In some cases the distinction is not merely a grammatical one, but inheres in the root—i. e. *nin nágéon*, "I eat" something inanimate, whence, impersonally, *nágéon*, "it is eaten" or "they eat it," used as a noun meaning "food," and the participial *nágéon*, "an eater;" but *nin wáshonag*, "I eat" something of the animate class (which includes bread, corn, potatoes, fruits, as well as the flesh of certain animals, and *caudad*, "an eater." In no other American family is this distinction so strongly marked or of so extended application as in the Algonkin, but it is found in the Iroquois, less prominently in the Cherokee, in some Mexican languages, in the Arrawak of Guiana, the Quichua of Peru, the Tupi (Guarani) of Brazil, etc. In the Dakota it is indicated only in the plural of animate nouns.

Algonkin verbs have not only conjugation-forms corresponding to the active, middle, and passive voices of Indo-European languages, but a great variety of modal and circumstantial conjugations, such as the inceptive, causative, desiderative, frequentative, habitual, mutual, involuntary, simulative (e. g. *niba*, "he sleeps;" *nibáshon*, "he feigns sleep"), compulsive, deteriorative or derogative, etc.; and many of these forms may be conjugated affirmatively, negatively, and doubtfully, the system of personal "transitions" and the distinction between animate and inanimate, in subject and object, being maintained throughout. Similar richness of verbal expression belongs to other American tongues. Von Tschudi enumerates thirteen classes or forms of Quichua verbs, all formed from the primary by conjugational suffixes.

In many languages nouns have the same form in the plural as in the singular, plurality being expressed by an independent word meaning "many," by a numeral, or only by the following verb. Others like the Sioux and Dakota, have a plural form for animate nouns, but not for the inanimate. In the Algonkin each of these two classes has its characteristic plural, that of animate nouns being nearly the same



in all dialects of the family, while the termination of the inanimate plural varies considerably. Cherokee nouns, pronouns, and verbs have *dual* as well as plural forms, and the Iroquois has in addition to these an "indeterminate" or collective plural. The distinction of *persons*, as first, second, and third, is so well established in English grammar that it seems to us the only natural one. In many Indian languages there is no pronoun of the third person, its place being supplied by a demonstrative. In many others there are two pronouns of the first person plural, which, combining with nouns and verbs, form the *inclusive* and *exclusive*, or "general" and "limited," plurals, the former including both the speaker and those to whom he speaks ("you and I"), the latter including only the speaker and those for whom he speaks, and excluding all others ("we, not you"). The Cherokee distinguishes two *third persons* as *present* or *absent*, and has also two first persons, dual and plural; and the same distinction is observed in the Chayma (and perhaps other Caribi-Tamanacan dialects), the Quichua, etc. The double first person plural (inclusive and exclusive) belongs to all Algonkin languages, to the Iroquois, Cherokee, Choctaw, Sahaptin (Nez Percé), Quichua, and others. It is found also in the Dravidian languages of Southern India, in the Manchu, in Polynesian and some Australian dialects, and in those of Hottentot tribes of South Africa, and would seem to have been very generally resorted to, at one stage of the development of language, in finding a way from the primitive dual to the conception of unlimited plurality. In the Cherokee, as has been said, the dual as well as the plural has inclusive and exclusive forms for the first person—"we two" (i. e. "he and I"), and "we two" (i. e. "thou and I, and not he"); but in the *third person* there is no distinction made between dual and plural.

In some Indian languages, and particularly in the Algonkin family, both transitive verbs and the (animate) nouns and pronouns they govern have two or three third-personal forms, distinguishing degrees of relation to the subject of the verb. Baraga (*Chippewé Grammar*) and Lacombe (*Grammaire Ojibwe*) call these the simple, the second, and the third-third persons: Cuq (*Études philologiques*) denominates the second as the third person "obviatif," and the third as the "sur-obviatif." To take an example from the English: in "John struck Paul," John is the first-third and Paul the second-third person; in "John struck Paul's son," "son" is the third-third, or "sur-obviatif." If the subject of the verb is in the first or second person, the governed noun (if in the third person) has the first or simple form: (Chip.) *nin sáigw nōs*, "I love my-father;" if there are two third persons in the sentence, one takes the second-third form—e. g. *aw inini od-anokitecan nōsaw*, "that man works for (serves) my father;" if there are three or more third persons, the first is in the simple form, the second in the second-third or obviative, the third and all others in the third-third or super-obviative: e. g. *Joseph agi-sadupinnan chinótáixan apáti ápis*, "Joseph took the young child and his mother." (This example is taken from Baraga, p. 72.) In the Chippewa, the second-third person ends in *n*, *an*, or *on*, the third-third in *ni*, *ani*, or *oni*, and a corresponding change is made in the form of the governing verb; e. g. *Jak ot-awéwan asakáthas-ini Nabéwan ot-awéni*, "The sister of Jacques loved the daughter of Elizabeth;" lit. "Jacques his-sister she-loved Elizabeth her-daughter," where "sister" and Elizabeth are in the second-third person, "daughter" in the third-third, and the verb has the double affix of second and third, *an-ini*. (Cuq.) The Eskimo has two forms for the third person, one of which, according to Egede, is used only when the object of the verb belongs to the subject; thus, *kitornâ turnivâ*, "he gave it to his (another person's) child," but *kitornê turnivâ*, "he gave it to his own child." Eliot, in his Massachusetts version of the Bible, makes use of the "obviative" form, but has not mentioned it in his grammar of the language; and as Zeisberger seems not to have discovered it in the so-called Delaware, it was not brought to the notice of Duponceau, Gallatin, or Pickering. It is probable that some such distinction between the principal and the dependent third persons may be found in most American dialects. Pandosy in his Yakama (Sahaptin) grammar notices a difference of inflection "when the governing substantive is itself governed by a verb." In the Quichua the distinction is effected by special forms of the demonstrative; in the Tupi of Brazil, by a "reflexive particle."

Not the least remarkable feature of these languages is the facility with which concrete and abstract names may be formed not only from every verb, but from the several voices, moods, and tenses of the verb. One species of verb-noun, of very frequent use in Algonkin speech, has been mentioned before—that, namely, which designates a person who habitually does, or may do, or who is conceived

as doing, the act expressed by the verb, corresponding to the English *nomen actoris* in *-er*. This name is formed as a conditional participle, or as the third person singular of the conditional present, with a change of the vowel of the root: thus, from Chip. *gōsse*, "he hunts," comes *gōssed*, "a hunter;" from *gimōdi*, "he steals," *gimōdel*, "one who steals, a thief" (and if the name is intended to convey a reproach, *gēmōdishkni*, "one who too much steals, an habitual thief"); from *ojiton*, "he makes it," *wejited*, "one who makes," etc. Another very large class of nouns is formed from the indicative present, to denote the action of the verb, answering to the English substantive participle in *-ing*: e. g. (Chip.) *gimōdi*, "he steals;" *gimōdi-wia*, "stealing, theft;" *miḡádi*, "he fights;" *miḡádiwin*, "fighting, war;" *minikwe*, "he drinks;" *anukwéwin*, "drinking" (so, *minikwéshkwin*, "too much drinking, intemperance;" *minikwésswin*, "not drinking, abstinence"). Other verb-nouns serve to name instruments for performing the act expressed by the verb; as from (Chip. *pakitige*, "he strikes," is formed *pakitigwan*, "a hammer," literally "it strikes;" from *páshkisi*, "it explodes, bursts" (with noise), comes *páshkisiḡan*, "a gun"—i. e. an exploding instrument: from *jibátabandan*, "he looks through something," *jibátabandjḡan*, "an instrument made for looking through, a spy-glass," etc. Since every so-called adjective may be conjugated as a verb, from which nouns may be formed for designating the actor, action, and instrument, and since the formation of all such verb-nouns is regular, so that every new name is self-defining, it is plain that the possible enlargement of the vocabulary is absolutely without limit. The Indian languages are far richer in concrete and special than in abstract and general names; but this is not because they are inadequate to the expression of abstract ideas or generalizations, but because the Indian aims always at the attainment of absolute precision, and at an exactness of denotation which higher culture and larger intelligence permit Indo-Europeans to disregard. There is an illustration of this in the nicety of the distinction made between the active and passive substantive-participle in many American languages. The Indian has no expression for *abstract* love, hate, truth, fear, anger, etc. Love, for instance, is either "a loving" or "a being-loved," according as it is referred to its subject or object, and it is named by an active or passive verb-noun. In English "the love of God" may mean either man's love to God, or God's love to man. The Algonkin avoids this ambiguity. In the Chippewa, for example, from *sáigw*, "he loves," is formed *sáigwáwin*, "a loving" (love given);

from *sáigwigi*, "he is loved," is formed *sáigwisáwin*, "a being-loved" (love received); from *sáigiini*, "he loves himself," is formed *sáigiiniáwin*, "self-loving;"

and from the mutual conjugation-form of the same verb, *sáigiidwin*, "mutual loving." So, from *pakitige*, "he strikes," come *pakitigéwin*, "a beating given," and *pakitégwin*, "a beating received." And the form of these verb-nouns may be modified according as the object of the action or emotion is animate or inanimate. Similar distinctions are found in other American languages. Paredes (quoted by Gallatin) notes the double forms of verbal nouns in the Mexican, "both of which express the acts of doing that which the verb signifies," the former actively, the latter passively; thus, "*teta cōtlatlitzli* is 'the love I have for another,' *nolla cōtloaca* is 'the love another has for me.'" In the Quichua, Von Tschudi notices four kinds of verb-nouns, formed respectively from the active participle and the imperfect, perfect, and future of the infinitive, in both active and passive voices—e. g. from *apa*, "to hear," come *apak*, "bearer," *apay*, "the burden" (that which is borne), *apasca*, "he who has borne," *apanca* or *apana*, "that which is to be borne," etc.

Some learned Europeans have not disdained to study the structure of the idioms of America with the same care as they study those of the Semitic languages and of the Greek and Latin. They no longer," said Baron von Humboldt, "attribute to the imperfection of a language what belongs to the rudeness of the nation. It is acknowledged that almost everywhere the Indian idioms display greater richness and more delicate gradations than might be supposed from the uncultivated state of the people by whom they are spoken;" and he observed as evidence of this that the *Idyle* of Theocritus "had been translated, with graceful simplicity, into the language of the Incas, and that he was assured that, excepting treatises on science and philosophy, there is scarcely any work of modern literature that might not be translated into the Peruvian." Naxera has given a translation of an ode of Anacreon into Otomi. The Abbé Brasseur de Bourbourg, by his French version of the *Rabinal-Achi*, from the Quiché of Guatemala, has shown that language to be not ill-furnished for poetical and dramatic composition. In the Algonkin, Iroquois, Chabta-



Muskoki, Dakota, and other North American families the readiness and ease with which new words have been formed for ideas and objects previously unknown—the formation being always in strict accordance with the structural laws of the language—give sufficient evidence (as Mr. Gallatin remarked) that these Indian tongues “had within themselves the power of progressive improvement whenever required by an advance in knowledge or civilization.” The author of *Études philologiques sur quelques Langues Sauvages de l'Amérique* (Montreal, 1866) and of *Jugement erroné de M. Ernest Renan sur les Langues Sauvages* (1869), who writes with excellent knowledge of his subject so far as the northern Algonkin and the Iroquois dialects are concerned, has shown how slight foundation there is for the opinions expressed by M. Renan and some other eminent philologists of Europe, that these languages are incapable of expressing abstract ideas, that their richness in forms and in special terms is at the expense of accuracy in denotation, and that they are destitute of true inflections. On this last point something has already been said in this article, but it may be well to add the well-considered statement of Mr. Gallatin in his last work, that “the Indian languages abound with inflections, having precisely the same character with those which are universally considered as such in other”—or, as he says elsewhere—“in the classical languages.”

However numerous may be the derivatives and possible syntheses, the number of roots in any Indian dialect is small. These, of course, are common to all languages of the same family, but they are not exempt from phonetic change in passing from one dialect to another. Their identity may thus be nearly lost, and perhaps cannot be established except by extensive comparison of dialects. The Dakota name for “ten,” for example, is in the Sioux *wi-ke-ke-mna*; in the Winnebago, *kh’ra-pun*; in the Ponka, *gthe-ba*. These (rejecting a prefix in the Sioux) are merely phonetic variations of the same name; *keke*, *kh’ra*, and *gthe* are equivalent, and so are *mna*, *pun*, and *ba*. In the Algonkin family the range of divergence is less wide, yet still considerable; the Abnaki *areni*, “man,” and the Illinois *illini*, are not far apart or from Chippewa *inini*; in Micmac *lun* (or *l’lun*) and Quinipi *ren* the difference is more apparent, and still more in Hudson’s Bay Cree *ethin’u*, Western Cree *iyinu*, and Shyenne *itani*.

Till the comparative grammar of the languages of each of the principal American families shall have been investigated, and the laws and limits of phonetic change are better understood than at present, questions as to the genetic relation of one of these families to another must remain unanswered. As yet, philology has no sufficient data for determining either the fact or the degree of such relationship. Still less is the philologist competent to decide, on evidence now supplied by language, that any family of American speech is, or is not, of Asiatic, European, or African derivation. In support of different theories respecting the origin of the Indian races, various resemblances and analogies have been pointed out between American dialects and one or another of the languages of the Old World. Those who believed the Indians to be descendants of the lost tribes of Israel, discovered in their languages striking affinities to the Hebrew, and one writer conjectured that the Mohawks were of the tribe of Levi, because their name corresponds so nearly to Hebrew *Mechokeke*, translated “law-giver” in Gen. xlix. 10. Vater in *Mithridates* gave a long list of words of similar sound and meaning in Indian and Asiatic languages, as evidence that America was peopled by emigration from North-eastern Asia. The vocabulary of the Caribs has been made to give evidence of their African origin. M. de Charencey, impressed by structural and grammatical resemblances between certain American dialects—particularly the Eastern Algonkin—and the Basque, is led to believe that the New World was peopled by Iberian colonists from Western Europe. *Des Affinités de la langue Basque avec les idiomes du Nouveau-Monde*, 1867. The supposed likeness of some Indian words to Greek, Latin, and Sanscrit has more than once been pointed out; as, for example, Algonkin *neigman* and Gr. *neikos*, Lat. *vincis*; *Arcteeball* and Gr. *diros*. Evidence satisfactory to such as were predisposed to accept it has been found of the genetic connection between American speech and Egyptian, Mongolian, Tangutic, Samoyedic, Malayan, and Polynesian, and in fact almost every known language of the world. On the other hand, ethnologists of the school of Morton, Nott, and Gliddon attach little weight to any such evidence of extra-American affinity, and regard the languages of the Indians, like their race, as autochthonous.

For a general view of the structure and comparative grammar of North American languages, Mr. Gallatin’s *Synopsis of the Indian Tribes* (Transactions of the Am. Antiq. Society, vol. ii.), supplemented by his notes on Hale’s *Vocabularies* (Trans. Am. Ethnol. Society, vol. ii.), are still the best guides. Mr. Pickering’s excellent paper

on *Indian Languages of America* (in the Appendix to the *Engel. Americana*, vol. vi., and separately printed 1831), and his notes to the reprint of Enot’s *Indian Grammar Begun* (in *Mass. Hist. Collections*, 2d series, vol. ix.), should be consulted, and a paper by Dr. F. Lieber *On the Place of Thought in American Languages*, in vol. ii. pp. 346-349 of Schoolcraft’s great collection of *Historical and Statistical Information respecting the Indian Tribes* (6 vols. 4to, 1851-56)—a work which contains much valuable material, though this, unfortunately, cannot easily be separated from the worthless mass in which it is buried. The third volume of *Mithridates*, by Adelung and Vater (1812-16), supplies much valuable information, particularly as to South American languages. For the general bibliography see Trübner’s edition of Ludewig’s *Literature of American Aboriginal Languages*, with Prof. W. W. Turner’s additions and corrections. *An Essay towards an Indian Bibliography*, by Mr. T. W. Field (New York, 1873), though primarily designed only as the catalogue of a private library, is a convenient and useful book of reference. For languages of the Pacific coast, Horatio Hale’s collected vocabularies and grammatical notes in vol. vii. (*Ethnography and Philology*) of the *Report of the U. S. Exploring Expedition*, supplied much valuable material, to which W. H. Dall’s *Alaska and its Resources* made important additions. The best authorities for the Dakota and Athabascan languages have been mentioned elsewhere in this article. For the Eskimo see the *Groenlandsk Grammatica* of O. Fabricius (Copenhagen, 1791), and Klein-schmidt’s *Grammatik d. Grönl. Sprache* (Berlin, 1851). For the Algonkin, besides the works of Duponceau, Pickering, and Gallatin, see Baraga’s *Otchipwee Grammar and Dictionary*, J. Howe’s *Cree Grammar*, Lacombe’s *Grammaire de la Langue des Cris* (Montreal, 1874) and accompanying *Dictionary*, and the two works previously mentioned by “N. O., ancien missionnaire” (M. Cuq), *Études philologiques*, etc. and *Jugement erroné de M. Ernest Renan*, etc., which give a good outline of Iroquois as well as Algonkin grammar. For the languages of South America generally see C. F. P. von Martius’s *Beiträge zur Ethnographie und Sprachkunde Amerika’s* (Leipzig, 1867), and A. d’Orbigny, *L’Homme Américain*, etc. (Paris, 1839); and as an aid to the comparison of South with North American languages, J. J. von Tschudi’s *Die Quichua Sprache* (Wien, 1853) is of special value. J. HAMMOND TRUMBULL.

**Indian Ocean** is the name of the vast sheet of water between Africa, Asia, and Australia, traversed by the equatorial current, flowing from E. to W. with a somewhat varying velocity, and forming a very rapid current along the eastern coast of Africa.

**Indianola**, post-v., cap. of Warren co., Ia., on the Chicago Rock Island and Pacific R. R., Indianola branch, 20 miles S. of Des Moines. It is the seat of Simpson Centenary College (Methodist Episcopal), has a national and a private bank, graded school, grist-mill, planing mill, manufactures of farming implements, several churches, 3 weekly newspapers, etc., and is situated in a beautiful and fertile region. Pop. 1428.

GRAHAM & KNOX, PUBLS. “HERALD.”

**Indianola**, port of entry, cap. of Calhoun co., Tex., on the W. shore of Matagorda Bay, 10 miles from the Gulf of Mexico. Its harbor is large and commodious; it has steamers thrice a week from New Orleans, and two lines of sailing vessels ply regularly to New York, and there are many other domestic ports with which it has a trade. About ten vessels bring lumber from Florida and Louisiana. Cattle, wool, hides, cotton, etc. are extensively shipped from this point, from which the Gulf, Western Texas and Pacific R. R. already extends over 70 miles into the interior. The town has two banks, a weekly newspaper, and several large importing and wholesale establishments. Pop. 1900; of Old Indianola, 206. On Sept. 15, 1875, a severe storm, lasting five days, visited the coast from Galveston to Indianola, causing the waters to rise and flood the more exposed places, sweeping away several small villages, with great loss of life, and destroying much property in Galveston, Matagorda, and other towns. Indianola was submerged, and except the larger business-houses, was entirely swept away. The loss of life throughout this section is believed to have been over 200.

CHARLES A. OGBURN, ED. “BULLETIN.”

**Indian Orchard**, a pleasant manufacturing post-v., constituting a part of Springfield, Mass. (Hampden co.). It is 6 miles N. E. of Springfield, on the Boston and Albany and the Springfield Athol and North-eastern R. Rs.

**Indian Point**, tp. of Knox co., Ill. Pop. 1861.

**Indian Prairie**, tp. of Wayne co., Ill. Pop. 1727.

**Indian Red**, a mineral pigment from Persia, consisting of ferric oxide and silica.



**Indian Ridge**, tp. of Clarke co., Ala. Pop. 316.

**Indian River**, in Brevard and Volusia cos., Fla., is a narrow tidal channel parallel and usually only half a mile from the coast. It extends S. S. E. from a point some 18 miles N. W. of Cape Canaveral to Indian River Inlet, 100 miles distant, and is continuous southward 50 miles to Jupiter Inlet as St. Lucie's Sound. It is in a beautiful and healthful region, and the river abounds in fish. It is navigable, and the inlet will admit vessels of 5 feet draught. The river is becoming a resort for invalids and sportsmen.

**Indian River**, hundred of Sussex co., Del. P. 1667.

**Indians, American.** At the time of the discovery of America the whole continent was occupied by scattered tribes, and as the land was supposed to be a part of Asia, and called India or India beyond the Ganges, the inhabitants received the name of Indians. The question of the origin of this population was for centuries a much-disputed one. Some tribes—for instance, the Athabascans—possessed a tradition concerning their emigration across the Pacific, and different scholars endeavored to establish a connection between the American Indians and the Jews, Welsh, Mongols, Malays, and other races of the eastern continent. The attempts were not successful; and while the modes of living and the implements of the American Indians resemble very much those belonging to the earlier stages of European and Asiatic races, no link of connection has been found between the respective languages. The different dialects or languages spoken by the American aborigines seem, in spite of all variations, to have originated from one common stock, and an identity of race seems furthermore to be confirmed by an extensive community in physiological traits and in the general character of their civilization. At the time of the discovery there was a great difference between the tribes living in Peru, Central America, Mexico, and New Mexico, and those living farther to the S. or to the N., with respect to the stage of civilization which they respectively represented. The former had domesticated the llama; they cultivated maize, squashes, beans, tobacco, plantains, etc.; they built houses of adobe and temples of stone; they understood the art of pottery, of making bronze, etc. The latter were sometimes almost wholly savage, living in holes in the ground, and eating their fish and game raw. And yet there were certain common traits in religious ideas, in moral character, in form of government, in industry and mode of living, etc., which pervaded the whole race from the savage to the semi-civilized. (For more particular information see ARCHITECTURE OF THE AMERICAN ABORIGINES, MAN AND HIS MIGRATIONS, INDIAN LANGUAGES, TRIBE, etc., and the names of the different tribes.)

**Indian Shot.** See CANNON.

**Indian Springs**, post-v. of Butts co., Ga., has saline sulphur springs, much visited for the cure of rheumatism and stomach and liver disorders. It has 1 weekly newspaper. Pop. 248.

**Indian Springs**, tp. and post-v. of Washington co., Md. Pop. 1563.

**Indian Springs**, tp. of Wayne co., N. C. Pop. 1280.

**Indian Summer.** See DARK DAY, in APPENDIX.

**Indian Territory**, a tract of land originally belonging to the Louisiana purchase, and which was set apart by the government of the U. S. as a permanent home for such of the Indian tribes as could be induced to settle there. It included at first all the unorganized portion of the Louisiana cession lying W. of its eastern meridian, and in 1850 its area was stated at 195,274 miles; but Kansas and a part of Nebraska were subsequently taken from it, and the boundary between North-western Texas and the north-western portion of this Territory was carefully surveyed. As it exists at present, its northern boundary is the 37th parallel of N. lat., which separates it from Kansas and for one degree of longitude from Colorado; its eastern boundary is the meridian of 94° 30' W. lon., which divides it from Arkansas and for a short distance from Missouri; the Red River, which separates it from Texas, is its southern boundary as far as to the 100th meridian, which it follows northward for its western boundary to the parallel of 36° 30', and then turns westward on this parallel to the 103d meridian (the eastern boundary of New Mexico), when it again runs N. along that meridian to the 37th parallel. It has thus Texas for its southern and western boundary, except for a distance of 35 miles on the 103d meridian, where it joins New Mexico. Its area is stated at 68,991 square miles, or 44,154,240 acres, which is probably a near approximation to the actual area. The greater part of the Territory has been granted in districts proportioned to their numbers to those Indian tribes which would confine themselves to their respective tracts, either cultivating them or using them as hunting-grounds, but

about one-fifth of the present area (8,947,473 acres) was ceded back by the Chickasaws, Choctaws, Creeks, and Seminoles to the U. S. in 1866 and 1867, and is now held by the government to be used as a home by other Indian tribes when they can be induced to settle down upon these lands as a permanent home.

**Face of the Country.**—There is a gentle declination from the foot-hills of the Rocky Mountains, which occupy the extreme N. W. portion of this Territory, towards the Mississippi River, and this general slope trends also somewhat towards the S. E., so as to reach the valley of the lower Red River. Between the Red and Canadian rivers there are several groups and ranges of mountains of no very great elevation, as the Washita Mountains, the Poteau and the Sans Bois mountains. In the eastern part of the Territory the rivers have broad and fertile bottom-lands, sometimes overflowed in spring or early summer, which are usually shut in by bluffs more or less abrupt, which form the boundaries of the undulating uplands. The western portion, especially the narrow strip extending from the 100th to the 103d meridian, is arid and for the most part treeless, forming a portion of that gradually diminishing region formerly known as the Great American Desert. The Arkansas and Red rivers, with their affluents, drain the Territory. Some of these affluents are nearly as large as the main rivers. The Arkansas enters the Territory near the 97th meridian, and leaves it at Fort Smith, in lat. about 35° 30', but its principal tributary, the Canadian River, traverses the entire Territory from W. to E., as do also its N. fork and the Cimarron or Red fork of the Arkansas. The other affluents of the Arkansas are, from the N., Verdigris and Little Verdigris and Neosho rivers and Flint Creek; from the W., Little Arkansas, Black Bear, Wolf Creek, and Poteau River, a branch of the Canadian. The tributaries of the Red River in the Territory are the N. fork of Red River, Cedar Creek, with numerous branches, the Washita River, a large and long stream, Muddy Creek, Walnut Creek, Baggy River, and Kianashi River.

**Geology.**—E. of the 97th meridian most of the Territory belongs to the coal-measures, though we believe but little coal has as yet been mined there. There is, however, a small tract of Eozoic rocks on the Arkansas River between the Cherokee and the Creek countries, about lat. 35° 30', and another in the S. W., crossed by the 35th parallel and lon. 99° W. All the rest of the Territory belongs to the Triassic and Jurassic formations, except a little tract of Cretaceous rocks in the extreme N. W., on the borders of New Mexico. The barren and sandy table-lands of the narrow strip in the N. W. are often covered, especially in summer, with saline efflorescence.

**Vegetation.**—The eastern part of the Territory has much rich and fertile land, not only on the river-bottoms, but on the upland prairies and woodlands. A belt of forest, known as the "Cross Timbers," from 5 to 30 miles in width, extends along the border of the Carboniferous formation from the Arkansas River to the Brazos, and separates the fertile and rich prairie-lands from the dry and sterile table-lands of the N. W. W. of these there are few trees except in the river-bottoms, and the soil grows more and more arid and unproductive, till at last there are only thorny cacti, yuccas, and the gray sagebrush to be seen, and even these only in scattered and widely separated patches.

**Animals.**—This is still, especially in its central and western portions, the favorite haunt of the buffalo, the antelope, and to some extent of the wild horse; deer and other game abound; the black or brown bear is found in the "Cross Timbers;" and the prairie dog, the wild-turkey, the prairie-hen, the sage-hen, and a great variety of birds of prey, as well as those noted for beautiful plumage or for melodious song, are found in all parts of the Territory. There are not many fish in the rivers, which, except the Arkansas and Red, are usually dry, except in pools, in the summer.

**Climate.**—Like that of most of the region between the same parallels W. of the Mississippi, the climate is warm and inclined to drought. In the S. E. it is more moist, the average rainfall being 52 inches, but it is also hot, the mean annual temperature exceeding 60° F. In the central portion there is not quite so much heat, the mean annual temperature ranging from 57° to 59°, and the rainfall having diminished to 35 inches. In the N. W. the mean temperature of the year is lower, not exceeding 55°, being reduced by the cold "northers" from the Rocky Mountains, and the rainfall does not average more than 20 inches for the year.

**Productions.**—The Cherokees, Creeks, Chickasaws, Choctaws, Senecas, Quapaws, and Shawnees have settled on their reservations, and many of them have good farms and have made considerable progress in civilization. These tribes had before the late war many slaves, and raised large crops which they sent to market. Since the emancipation of the slaves many of them still hire laborers and are wealthy;

but as no taxes are levied on either their personal or real estate, the census does not report their productions. The other tribes are nomadic, and make little or no effort to till the soil or engage in any branch of civilized industry. The following statistics were gathered in relation to the Territory in 1872: Acres of improved land, 204,674; bushels of wheat, etc., 6,739,353; value of farm produce, \$4,662,610; number of horses, cattle, etc., 164,465; their value, \$4,947,101; total value of real and personal property, \$16,987,818. Land is held in common, and is not included in this valuation.

There is one railroad, which traverses this Territory from N. to S.,—the Missouri Kansas and Texas Railway—250 miles of it within the Territory. The Atlantic and Pacific Railway also extends from Seneca to Vinita, a distance of about 35 miles in the Territory, connecting there with the Missouri Kansas and Texas. Numerous other railroads have been projected, and one, a Pacific Railway to follow the 35th parallel, has been endeavoring to obtain from Congress the right of way and a grant of lands through the Territory, but the Indians oppose it.

*Banks, etc.*—There are no banks, savings banks, insurance companies, or, so far as we can learn, private banking-houses, in the Territory.

*Population.*—Until the census of 1870 there had been no attempt to take a full census of the inhabitants of the Indian Territory. As the Indians were not taxed, and had no interest as voters, etc. in the government of the U. S., there seemed no other motive except that of curiosity for such enumeration. The number of white persons and of persons of African descent in the Territory was enumerated. In 1850 these together numbered 9761. In 1870 the change which had taken place in the relations of some of the tribes during and consequent upon the late civil war made an enumeration necessary. The U. S. marshal reported in 1870 that there were in the Territory 68,152 inhabitants. Of these, 2107 were whites, 6378 colored persons of African descent, 59,367 Indians sustaining tribal relations, of whom 19,067 were on reservations and at agencies and more or less civilized. (Of these, 3884 were men, 4485 women, 5146 male children, and 5592 female children.) There were also 5900 reported as estimated members of these reservations and agencies, but not actually enumerated by the assistant marshals. The estimated number of nomadic Indians (*i. e.* not on reservations or located at or near agencies) in the Territory was 34,400. Later statistics, taken in 1872, give a materially different statement. They make the number of civilized Indians, including the Cherokees, Choctaws, Creeks, Chickasaws, Seminoles, Quapaws, Senecas, Wyandots, Shawnees, etc., 55,974, occupying reservations of 19,618,095 acres, of which 216,800 acres are under cultivation by individuals and 4455 by the government. These Indians occupy 5244 dwelling-houses. The uncivilized Indians, including stragglers and Osages, Caddoes, Kiowas, Comanches, Apaches and Delawares, Cheyennes, Arapahoes and Apaches, numbered 14,515, making an aggregate of 70,389 Indians, or about 11,000 more than the census reported. The Osages, Kiowas, Comanches, and stragglers had reservations amounting to 9,544,720 acres, of which only 2603 acres were cultivated by individuals and 666 by the government. The other uncivilized Indians, numbering 6522, had no definite reservations, but roamed at will through the 15,000,000 acres of unallotted lands. The uncivilized Indians had in all but 256 permanent buildings. The total amount of funds held in trust by the U. S. government for all these tribes, civilized and uncivilized, is about \$8,000,000.

*Education.*—The schools are mostly confined to the Cherokees, Choctaws, Creeks, Chickasaws, and Seminoles, the other tribes caring little for schools. In these five tribes there were in 1873, 153 schools, with 4706 scholars. The Cherokees had in 1873, 66 of these schools, attended by 2300 children, and besides, an orphan school, with 90 pupils, 1 female high school, and 1 (Moravian) missionary school. Their school fund amounts to \$520,134.64, and their orphan fund to \$248,600.51. The Creeks had in 1873, 1 boarding school and 31 day schools, attended by 860 pupils. The Choctaws and Chickasaws had 2 boarding schools and 18 day schools, and 1329 scholars. The Seminoles, 5 day schools and 207 scholars. The school funds for all the tribes except the Cherokees amount to about \$251,000. The leading chiefs of the Cherokees, Creeks, and Choctaws advocate the abolition of the tribal system, the holding of the lands in severalty, and the education of the children to fit them for citizenship.

*Religion.*—The Cherokees, Creeks, Choctaws, and Chickasaws have been for half a century under missionary instruction, and a very considerable proportion of them are members of Christian churches. The aggregate number of church members in these four tribes somewhat exceeds 7500. Of these, over 3100 are Cherokees, 2050 Creeks,

2500 Chickasaws and Choctaws. In the entire Territory the Baptists in 1874 had 3 associations, 61 churches, 47 ministers, and 3910 members. The Methodist Church, South, has also a considerable number of churches and communicants in the Territory, and several missions among the less civilized Indians. Their report of their conferences in 1874 gives for the Indian mission (not all, we think, in this Territory) 20 travelling preachers, 82 local preachers, 172 white, 454 colored, and 4590 Indian members. The Presbyterians, both North and South, have mission stations in the Territory, as have also the Congregationalists. The Roman Catholics have two mission stations, and there are several Moravian congregations.

*Newspapers.*—There are three or four newspapers printed in the Territory. One, at Tahlequah, is partly in the Cherokee language, and one at Caddo is, we believe, in the Creek or Choctaw. None of these papers have a very large circulation.

The government of the civilized Indians, and indeed of all the Indian tribes of the Territory, is one of independent chiefs, whose power is, however, limited. The tribes are the wards of the U. S. government, which nevertheless interferes as seldom as possible. For the purpose of punishing crimes against citizens of the U. S. the Territory is annexed to the judicial districts of Arkansas and Missouri. The Cherokees have a legislature or council of their own, as do some of the other civilized tribes, though not so completely organized. They have also courts and a code of laws, few and simple, but sufficient for their purposes. They are not represented, even by a delegate, in Congress, but occasionally, when they desire some change in their arrangements with the U. S. government, they send some of their most intelligent chiefs to Washington to represent their case before the President, the secretary of the interior, or a congressional committee.

*Divisions of the Territory.*—There are, of course, no counties or townships in the Territory, but all the civilized tribes, and some of the uncivilized, have their reservations—considerable tracts of land, lying each in one body, which is the joint property of the whole tribe. Some of the tribes, having diminished in numbers, had more land than they needed, and have ceded it back to the U. S. for a liberal sum of money, which is invested and the income applied to the use of the tribe.

The reservations set apart for the tribes now there are as follows:

Tribes.	No. of Houses.	Population, estimated.	Acres of reservation.	Improved by individuals.	Improved by government.
Cherokees.....	3,655	17,217	5,000,000	89,250	
Choctaws.....	16,000	6,600,000	50,000		
Creeks.....	12,255	3,215,000	31,000	4,390	
Chickasaws.....	6,000	1,377,600	39,000		
Seminole.....	500	2,438	200,000	7,500	
Quapaws, Senecas, Wyandots, Shawnees, etc.	879	1,219	157,000		65
Osages.....	83	2,823	1,500,000	30	116
Caddoes.....	1	1528	Not sur.	925	180
Kiowas.....	9	2,000	3,519,440	186	70
Comanches.....	2,198	4,011,440		60	250
Fragments of tribes settled together.....	104	1,192	483,840	1,342	50

The two branches of the Apache tribe (Pima and Coyote) or so many of them as are in this Territory, the Delawares, Cheyennes, and Arapahoes, numbering together 4774 persons, have as yet no definite reservations.

*Towns.*—There are no large towns in the Territory. Tahlequah, the capital of the Cherokee country; Caddo, the largest settlement in the Choctaw nation; Vinita, the point of junction of the Missouri Kansas and Texas and the S. W. branch of the Pacific railroads; Blue Jacket, on the former road; Muscogee, in the Creek country; and Tishomingo, in the Chickasaw Nation,—are settlements of moderate size. The U. S. government has ten or twelve forts, some of them of considerable size, in the Territory.

*History.*—The history of the Territory is very brief. Though a part of the Louisiana purchase, it does not seem to have had at any time any considerable population. It was occasionally traversed by the Apaches, Comanches, or Arapahoes, and perhaps by the Cheyennes, in the pursuit of the buffalo or the wild horse. It was sold to the U. S. government in 1832 as the home of the tribes E. of the Mississippi, principally on account of its remoteness from white settlements, and the Creeks, Choctaws, Chickasaws, and Cherokees were removed thither from 1833 to 1838, and the Seminoles and some fragments of other tribes a little later. The first grants of land secured to them by treaty were much larger than those they now hold, and embraced portions of Kansas and Nebraska. By subsequent treaties these were ceded back to the U. S. During

\* These have each a separate though small reservation.



the late civil war several of the more civilized tribes took the side of the South, and were at first held to have forfeited their lands, but were finally reinstated in their possession. L. P. BROCKETT.

#### Indian Tobacco. See LOBELIA.

**Indian town**, a thriving suburb of St. John, N. B., near the mouth of the St. John River. Here the river steamers have their wharves. A steam-ferry connects it with Point Pleasant. Indian town has large steam saw-mills and an extensive lumber-trade. Pop. about 2500.

**Indian Town**, tp. of Bureau co., Ill. Pop. 1660.

**Indian Valley**, post-tp. of Floyd co., Va. Pop. 1475.

**Indian Village**, tp. of Tama co., Ia. Pop. 1523.

**Indian Yellow**, or **Purree**, a yellow pigment, consisting essentially of euxanthate of magnesium. (See PURREE.)

**India Rubber, Caoutchouc** (from *cachuchu* of the South American Indians), or **Gum Elastic** [Ger. *Kautschuk*; *Federharz*; Fr. *caoutchouc*], a peculiar substance, composed of carbon and hydrogen, found in suspension in the milky juice of a great many different families of plants. It has been stated that all milky vegetable juices contain it, but this is not the case, many of these juices yield gums resins free from caoutchouc.

**History**.—Although known at a very early date to the Peruvians and the Chinese, it was not brought to Europe till the beginning of the eighteenth century. The first scientific notice with regard to it appeared in the *Transactions of the French Academy of Sciences* in 1735 from the pen of M. de la Condamine, who had noticed it, under the name of *cachuchu*, on his voyage down the Amazon. He describes it as in constant use among the natives in the form of bottles, boots, etc., and for making cloth waterproof. In 1751 he again called attention to "the elastic resin" of Cayenne (*Mém. de l'Acad. Royale*, 1751, pp. 17, 319), his friend M. Fresneau having reported its occurrence in the French colony of Cayenne. Herissant and Macquer (*Mém. de l'Acad. Roy.*, 1763, p. 49) published their chemical investigations on "solution of caoutchouc," and Macquer in 1768, "on means of dissolving the resin caoutchouc." Priestley (1770) mentioned the use of the gum for erasing lead-pencil marks, its cost being three shillings for "a cubical piece of about half an inch." Bernard published investigations in 1781; Fourcroy, on the sap in 1790; Gros-sart, "on the means of making instruments of gum elastic" in 1791. Important contributions to the chemistry of caoutchouc have been made by Faraday, Nees von Eisenbach and Marquart, Adriani, Himly, Payen, Bouchardat, and others, while the practical applications have been made by Mackintosh, Hancock, Goodyear, A. G. Day, and other inventors. The first use made of caoutchouc in Europe was for erasing pencil-marks; it was then used in solution in oil of turpentine and alcohol and in coal-tar naphtha for waterproofing cloth, the most important industry of this kind having been founded in 1823 by Mackintosh at Glasgow. Rubber overshoes, made by the natives of pure gum, were imported from Pará in 1825, and formed an important article of commerce till the increased price of the gum made it necessary to limit its use to a minimum in the manufacture of the cloth overshoes covered with rubber much diluted with litharge, whiting, etc., and vulcanized with sulphur, which are now in use. In 1826, Rattier and Guibal introduced machinery for cutting threads of rubber for the manufacture of elastic fabrics, which have since been extensively produced. The most important invention in regard to rubber was made by Charles Goodyear of Massachusetts in 1839, and patented June 15, 1844. It consisted in mixing with the rubber a small quantity of sulphur, fashioning the articles from the plastic material, and curing or vulcanizing the mixture by exposure to a temperature of 265° to 270° F. The product, known as vulcanized rubber, possessed all the desirable properties of rubber with none of its objectionable qualities, and soon found a thousand important applications. The next great step in the rubber industry was the invention of hard rubber or vulcanite. The invention is claimed for Nelson Goodyear, but the writer, after the most careful investigation of the subject, believes that the real inventor of flexible "whalebone" rubber was Austin G. Day of Connecticut. Nelson Goodyear's caveat, filed Dec. 31, 1849, and his patent, granted May 6, 1851, are for a hard, stiff, inflexible compound, which he says is best obtained by heating a mixture of rubber, sulphur, magnesia, etc. Day patented Aug. 10, 1858, a mixture of 2 parts of rubber and 1 of sulphur, heated to 275° to 300° F., which he describes as flexible and elastic. This product, correctly described by Day, is the vulcanite or hard rubber which is so extensively manufactured for combs, pen-holders, jewelry, etc. Goodyear's brittle compound has never been an article of commerce,

though his representatives have succeeded in monopolizing Day's invention under the plea that it was covered by Goodyear's patent. (See *Am. Chemist*, ii. 329.)

**Botany**.—Caoutchouc is produced by numerous trees and shrubs of the families Euphorbiaceæ, Urticaceæ, Artocarpaceæ, Asclepiadeæ, and Cinchonaceæ. The best rubber, which is brought from Pará, South America, is obtained from the *Siphonia elastica* of Persoon, *Siphonia Cuchucha* of Rich, *Jatropha elastica* of Linnaeus, and *Hevea Guianensis* of Aublet. Six or seven other species of *Siphonia* furnish caoutchouc in Central and South America. In India the most abundant rubber tree is the *Ficus elastica*. It occurs on the coast of Coromandel, and is abundant over more than 10,000 square miles in Assam; grows solitary or in twofold or threefold groups. The main trunk of one measured 74 feet in circumference, while the girth of the main trunk with the supports immediately around it was 120 feet. The area covered by the expanded branches was 610 square feet, and the height of the central tree was 100 feet. It was computed that 43,340 of these trees grew within a length of 30 miles and a breadth of 8 miles in the forest near Ferozepoor, in the district of Chardwar, in Assam. The same tree was said to be equally abundant in the district of Naudwar. The geographical range in Assam seemed to be between 25° 10' and 27° 20' N. lat., and 90° 40' and 95° 30' E. lon. It grows on the slopes of hills up to an elevation of probably 2250 feet. The *Urceola elastica* abounds in the islands of the Indian Archipelago, at Sumatra and Penang; produces the gintawan of the Malays. It is described as a creeper of growth so rapid that in five years it extends 200 feet, and is from 20 to 30 inches in girth; can yield by tapping, without being injured, 50 to 60 pounds of caoutchouc in one season. The families of plants yielding caoutchouc thrive in tropical parts of the world where high temperature is combined with moisture. The belt of land around the globe 500 miles N. and 500 miles S. of the equator abounds in trees producing the gum of India rubber. We find, accordingly, that caoutchouc is imported from Pará and other places in South America, from Central America, India, Singapore, Vera Cruz, Sierra Leone, Java, Sumatra, and Penang. The caoutchouc of Pará, South America, is produced by *Siphonia elastica*; Central America, *Siphonia caoutchouc*, *Castilleja elastica*; Penang, *Urceola elastica*; Sumatra, *Urceola elastica*; Java, a species of *Ficus*; continent of India, *Ficus elastica*; Sierra Leone, a species of *Siphonia*. The industrial demands for India rubber are so important that experiments have been made in Brazil with a view to cultivate the trees, as the cinchonas have been grown in the Himalaya. Caoutchouc occurs in opium to the extent of 4 or 5 per cent.; also in the juice of the milkweed (*Asclepias*), which grows abundantly in the U. S. and Canada. Efforts have been made to extract it from milkweed, and it is said that a company has been recently organized for this purpose in Canada.

**Sources of Supply**.—Most of the rubber of commerce is derived from South America, from Pará, Central America, Mexico, Carthage, etc.; smaller quantities from Java, Penang, Singapore, Assam, and Natal.

**Collecting the Juice**.—The juice is obtained by tapping, that drawn from old trees in the cold season being preferred, and the flow being greater the higher the incisions are made in the tree. When the bleeding is confined to the cold months, and not repeated too often, the trees do not appear to suffer in consequence.

**Properties and Composition of the Juice**.—Caoutchouc juice or sap has been imported from time to time into England in considerable quantities, but it is found more economical to prepare the crude rubber where the juice is collected. It resembles ordinary cow's milk in color and consistence. Its sp. gr. varies from 1.012 to 1.041. Several circumstances may conduce to give the commercial juice a grayish-brown, milky-gray, or pale-yellow color, but the pure juice, as it issues from the tree, is white. Dr. Adriani, who made some valuable (*Chem. News*, ii. 277, 289) experiments upon the fresh juice of the *Ficus elastica*, tapped by himself, says that as the general result of his experiments the quantity of solid matter contained in the milky juice decreases according to its being collected from incisions made in the higher and consequently younger parts of the plant. The tree which yielded the juice for his experiments was a young plant 2.25 mètres in height.

Am t of juice evaporated	Height at which it was taken.	Total residue.	Per cent.
0.183 grms.	0.30 mètres.	0.046 grms.	25.15
0.395 "	1.74 "	0.095 "	24.05
0.143 "	2.10 "	0.030 "	20.98
0.825 "	Top.	0.145 "	17.70

These figures prove, as stated above, that the juice in the older parts of the plant does contain more solid matter than that in the younger parts. Old trees, then, furnish the richest juice, and Mr. Griffiths states that the juice of



the reflex roots, which lie exposed, is richer in gum than any which is subsequently drawn off. If the juice be left at rest for a few hours, the globules of the gum rise to the surface and float like cream on milk. Heat and agitation also cause the juice to coagulate. There is a conflict in the statements concerning the action of alcohol, Adriani affirming that it produces coagulation, while Ure states that in two samples of juice containing, respectively, 20 per cent. and 37 per cent. of solid caoutchouc, alcohol of 0.825 sp. gr. afforded no appearance of coagulum when mixed with them in any proportion. The juice of the *Bejuca*, and possibly that of other plants, produces coagulation of the caoutchouc juice. The emulsive juice mixes readily with water, alcohol, and pyroxylic spirit, though it does not become at all clearer; it will not mix with caoutchine, naphtha, nor, indeed, with any of the usual solvents of solid caoutchouc, but remains at the bottom of these liquids as distinct as mercury does under water. When caoutchouc has once been coagulated it is not possible to bring it back again to the emulsive state. Ammonia prevents coagulation, and was used for this purpose in the importation of liquid caoutchouc prior to 1855. The following physical and chemical properties of the juice are taken from Adriani's paper: Under the microscope caoutchouc juice is seen to consist of a clear liquid wherein float a large number of spherical globules. These globules strongly refract light, and present, consequently, black circumferences by transmitted light, while they reflect the light with a white color. The diameter of the globules varies from  $\frac{3}{1000}$  to  $\frac{5}{1000}$  of an inch, averaging about  $\frac{4}{1000}$ . The reaction of the juice is slightly acid. The addition of water produces no change. Alcohol does not change the appearance of the globules, but causes the formation of groups of needle-shaped crystals. Ether causes the globules to adhere together and form an amorphous mass, and also develops crystals, which appear to be a magnesian salt of a peculiar organic acid. The following analyses have been published:

*Juice of Ficus elastica (Adriani).*

Water .....	82.30
Caoutchouc .....	9.57
Resin, soluble in alcohol, but not in ether .....	1.53
Magnesia, combined with peculiar organic acid .....	4.49
A substance soluble in water and alcohol, but not in ether (sugar) .....	0.36
An organic substance, soluble in water, takes a yellow tinge with alkalies (dextrine), and traces of salts of lime and soda .....	2.18
	100.48

*Juice of Niphonia eucheua (Faraday).*

Water, acid, etc. ....	56.37
Caoutchouc .....	31.70
Substances soluble in water, not in alcohol .....	2.90
Amorphous precipitate .....	1.90
Peculiar bitter coloring-matter, a highly azotized body .....	7.13
Wax .....	100.00

Dr. Ure found in two specimens 20 per cent. and 37 per cent., respectively, of caoutchouc. Alcohol of 0.825 sp. gr. failed to afford any appearance of coagulum when mixed in any proportion; whence he infers, contrary to the conclusions of Faraday, that albumen is not a necessary constituent of the juice. A. Girard (*Compt. rend.*, 67, 523) discovered a crystallizable saccharine substance, *dambonite* ( $C_4H_8O_3$ ), in the white liquid found in the interior of the loaves of caoutchouc from Gaboon on the W. coast of Africa. Later, he noticed another saccharine substance, *haracite* ( $C_7H_{12}O_6$ ). (*Compt. rend.*, 73, 126.) Both these bodies may be sublimed without decomposition.

*Preparation of the Crude Caoutchouc.*—The juice is dried over a fire, when it becomes blackened by smoke, or in the sun, when it is very light-colored, on moulds of clay, paddles, or (formerly) on lasts imported from the U. S. for overshoes. According to Mr. Edwards, the last, on the end of a stick, was dipped into the milk, and immediately held over the smoke to dry; it was then redipped, and the process repeated till the shoe was of sufficient thickness. When clay moulds are used, they are subsequently broken and shaken out of the rubber bottles produced upon them. The juice is sometimes evaporated by solar heat, a pellicle of rubber forming on the surface, and being renewed as fast as it is removed until all the rubber is removed. These sheets are rolled into balls and combined into masses. In Nicaragua the juice is coagulated by an application of the juice of the *bejuca* vine. The coagulated mass is pressed into cakes by hand, and rolled out into a sheet on a board with a wooden roller. These sheets are called tortillas; they are about 2 feet in diameter and 2 inches thick. Faraday recommends for the purification of caoutchouc to dilute the natural juice with four times its weight of water, and leave it at rest for twenty-four hours. The caoutchouc then separates and rises to the surface in the form of a

cream. This is removed, diffused through a fresh quantity of water, and again left to rise to the surface. By repeating this operation till the wash-water is perfectly limpid, the caoutchouc may be obtained very nearly pure. It is then to be spread upon a plate of unglazed earthenware to absorb the water, and afterwards pressed. The crude rubber of commerce presents different shapes and structure according to the method and care employed in its preparation. The purest from Pará is much more valuable than that from other localities. It appears in large bottles and thick plates, often entirely free from impurities, and very light colored within. The Carthagena gum comes in very large lumps, often weighing 100 pounds, and evidently formed by pressing thin sheets together. It is black within as well as without. The East Indian gum appears as a conglomerate of light and dark reddish-brown masses, often mixed with much wood, bark, leaves, gravel, etc. Crude impure rubber often undergoes a very injurious change, especially when exposed to the direct rays of the sun. It softens, becomes smeary and semi-fluid like tar. African gum is said to be more liable to suffer in this way than any other. In the interior of many of the balls which come from Brazil and the East Indies spots are often found of a viscid, tarry matter, which when exposed to the air seems to act like a ferment and decomposes the whole mass into a viscid, sticky, semi-fluid substance which is good for nothing.

*Physical Properties of Caoutchouc.*—Pure caoutchouc freshly prepared is colorless and translucent. The dark color which it generally exhibits is attributed to soot and to aloëtic and other impurities, and to the action of sunlight and oxygen. It is a bad conductor of heat and a non-conductor of electricity. It develops electricity by friction. Its specific gravity varies from 0.920 to 0.962. "Its texture is not fibrous, but under the microscope it is seen to contain pores, irregularly rounded and very numerous, which communicate with each other, and become distended by capillary attraction in those liquids in which caoutchouc is not soluble. Thin sections of different qualities of gum, immersed in water during thirty days, absorbed from 18.7 to 26.4 per cent. Their volumes were increased from  $\frac{15}{1000}$  to  $\frac{16}{1000}$ , and their tenacity and adhesiveness were impaired. It takes a very long time to eliminate water from thick masses of gum, since the exterior pores contract in drying, and thus retard the desiccation of the interior. Anhydrous alcohol, especially when warm, easily penetrates thin sections of caoutchouc. Immersed during eight days and warmed at intervals, the sections become opaque and more adhesive, even in the midst of the liquid; their volume was increased 9.4 per cent., and the weight 18 per cent., although the alcohol had dissolved  $\frac{1}{1000}$  of an oily, yellowish, fatty matter. After evaporation of the absorbed alcohol, the caoutchouc was less tenacious, more translucent and adhesive than before treatment." (*Payen*.) Freshly-cut surfaces adhere easily and firmly when pressed together—a property which is made available in forming tubes and vessels out of sheet caoutchouc. By cold or long quiescence it becomes hard and stiff, but not brittle. It is capable of condensation under compression. A cube of 2½ inches was compressed  $\frac{1}{10}$  under a pressure of 200 tons. It is perfectly elastic, becoming turbid and fibrous when strongly stretched. Gerard observed that fibres which may be extended to six times their length, might again be extended six times after exposure to a temperature of 212° F., and that the original length could thus be extended from 1 to 16625. The diameter being of course at the same time diminished, fibres of remarkable fineness are obtained in this way. Rubber may be temporarily deprived of its elasticity. If a strip be forcibly stretched, and while in this condition be quickly cooled, it will lose its elasticity, and may be left for an indefinite time without regaining it. A simple way of cooling the strip is to wet it and evaporate the water by vibrating it rapidly in the air. In the above condition the caoutchouc resembles frozen rubber, though it is not quite so rigid as it might be in such a state. It soon regains its elasticity on being subjected to an atmosphere of 70° F., or even much below this; but rubber deprived of its latent heat by compression has been kept several weeks in an atmosphere of 80° F. without returning to its normal condition. If the heat be raised much above 80°, or if the rubber be placed in contact with a good conductor at 80°, it gradually recovers its latent heat, and in a few minutes is restored to its original dimensions. If successive portions of the inelastic strip be pinched between the fingers, it contracts powerfully in these parts, leaving the others unaltered, thereby preserving the appearance of a string of knots or beads, which may be preserved in this state for any length of time if not handled and if kept at a moderate temperature. The junctions of the different portions continue abrupt and well defined, showing that there is no tendency to distribution or equilibrium of the latent



heat. When the inelastic strip is enclosed in the hand a slight degree of coolness is felt from the rapid absorption of heat. The above peculiarity is stated to belong to the native gum, and to be hardly perceptible in the rubber prepared in either of the following methods: (1) solution in turpentine and subsequent drying, and (2) merely grinding the crude material to a pasty mass and reducing to thin sheets between heated rollers. Another method of rendering caoutchouc inelastic was employed in 1840 in the manufacture of "elastic tissues," to prepare the threads for receiving a sheath upon the braiding-machine. The threads were stretched by hand, in the act of winding upon the reel, to seven or eight times their natural length, and left two or three weeks in a state of tension. The elasticity in this case also may be restored by warming the rubber—rubbing it between the palms of the hands, for instance. Considerable heat is developed in the sudden extension of caoutchouc. Mr. Brockedon states that he raised the temperature of an ounce of water two degrees in fifteen minutes, by collecting the heat evolved by the extension of caoutchouc thread. (*Blossom*.) An apparent paradox has been announced in the fact that India rubber, when stretched and exposed to the heat, contracts instead of expanding—a fact very contrary to common experience as the result of the application of heat. This is explained, however, by the fact that the rubber is very porous and filled with air-cells, which, when the rubber is stretched, assume an elongated shape. When heat is applied it of course expands the rubber to a certain degree, but at the same time it expands the air-cells, which, by shortening their longitudinal axes, produces a virtual contraction of the rubber.

*Effect of Heat on Caoutchouc.*—Below 0° C. it becomes hard and rigid. When heated it gradually softens, and at 120° C. (248° F.) begins to melt; when it is fused it remains greasy and semi-fluid after cooling, but if exposed to the air in thin layers gradually dries up and recovers its original properties, provided it has not been heated much above its melting-point. If, however, it be heated to 200° C. (398° F.), it begins to fume, and is converted into a viscid mass which no longer dries up. If mixed in this state with half its weight of lime slaked to powder, it forms a tenacious non-drying cement, which serves admirably for attaching glass plates to vessels with ground lips, such as are used for preserving anatomical preparations, as it forms an air-tight but easily-loosened joint; if a drying cement be required, a quantity of red lead may be added equal in weight to the lime." (*Watts*.) By destructive distillation caoutchouc yields an empyreumatic oil called *oil of caoutchouc*, which is a mixture of a considerable number of hydrocarbons. The following compounds have been recognized by Bouchardat, Humly, and G. Williams:

Composition.	Sp. gr.	Boiling point.
Tetraylene..... $C_4H_6$	0.630	32° F.
Caoutchene..... $C_4H_6$	0.650	58° F.
Faradayin..... $C_6H_8$	0.654	91° F.
Isoprene..... $C_5H_8$	0.682	166° F.
Caoutcholin..... $C_{10}H_{16}$	0.842	352° F.
Hexene..... $C_6H_{10}$	0.921	599° F.
Croosote, resin, etc.		

From impure gum small quantities of carbon dioxide, carbon monoxide, water, and ammonia are also produced. The residue left in the retort forms, when dissolved in oil, a varnish impervious to moisture and very elastic. Exposed at once to a red heat, caoutchouc yields 30,000 cubic feet of extremely rich gas to the ton, which is free from ammonia and sulphur compounds. Ignited in contact with the air, it burns with a sooty flame.

*Effect of Water on Caoutchouc.*—Water, whether hot or cold, has no solvent action upon it, but by long boiling in this liquid it swells to some extent, in which state it is affected by some solvents with greater facility than in its ordinary condition. Exposed to the air, the caoutchouc resumes after a time its original form, though the desiccation proceeds very slowly. The absorption of water by thin sheets has been already alluded to. W. A. Miller noticed that when a sheet of the best masticated rubber was exposed in water, open to the air, to diffused light, it finally absorbed 87 per cent. of water, becoming white, opaque, slimy, and sticky. In this condition water could be squeezed out of it. In sea-water, under like conditions, it absorbed only 5 per cent.

*Solubility of Caoutchouc.*—In alcohol it swells and softens, but does not dissolve. Alcohol precipitates it from its solutions. It sometimes extracts a fatty, fusible yellow matter, which is probably an oxidation product. Ether, freed from alcohol by washing with water, dissolves caoutchouc in moderate quantity, leaving it on evaporation with its original properties, except that it adheres firmly like a sheet newly cut. "No solvent appears to make a complete solution of caoutchouc, but a mixture formed by the interposition of the dissolved portion between the pores of the insoluble substance, which is considerably swelled

up, and has thus become easy to disintegrate. By employing a sufficient quantity of these solvents, renewed from time to time, without agitation, so as not to break the tumefied portion, the caoutchouc may be completely separated into two parts—viz. a substance perfectly soluble, ductile, and adhering strongly to the surface of bodies to which it is applied; and another substance, elastic, tenacious, and sparingly soluble. The proportions of these two principles vary with the quantity of the caoutchouc and the nature of the solvent employed. Anhydrous ether extracts from amber-colored caoutchouc 60 per cent. of white soluble matter; oil of turpentine separates from common caoutchouc 49 per cent. of soluble matter having a yellow color." (*Watts*.) Chloroform, oil of caoutchouc, oil of turpentine, oil of lavender, and many other essential oils are solvents for caoutchouc. A mixture of 1 part of caoutchouc with 11 of oil of turpentine, worked up to a thin paste, to which is then added  $\frac{1}{2}$  part of a hot concentrated solution of sulphide of potassium ( $K_2S_2$ ), leaves the caoutchouc on evaporation perfectly elastic and without viscosity. Bisulphide of carbon is one of the best solvents, particularly when mixed with 6 to 8 per cent. of absolute alcohol. "If the alcohol be mixed with a little water, a dough is obtained, from which the caoutchouc may be drawn out into threads and spun. By Gerard's process gutta percha is also soluble in the above mixtures of sulphuretted carbon and alcohol." (*Ure*.) Considerable discrepancy exists among writers with regard to the solubility of caoutchouc in the fixed oils, especially in linseed oil. According to Booth, linseed oil has no effect. J. Spiller exposed virgin, unmanufactured rubber for nine months to the action of boiled and of unboiled linseed oil. "It resisted the action of the solvents," he says, "almost perfectly retaining its toughness, except in those parts which were above the surface of the liquid and exposed to light. Virgin rubber, masticated and treated in the same way, was in each case greatly swollen and gelatinized, and, indeed, in the case of the unboiled oil, was completely dissolved." Perfectly dissolved by boiling linseed oil. (*Heuser*.) Linseed oil dissolves caoutchouc, forming a varnish which, according to Ure and Parnell, has not the property of depositing the gum on exposure to the air. Varrentrapp, in the *Handwörterbuch*, says linseed oil behaves like other fatty oils, which take up a little caoutchouc when heated. He also remarks that different varieties of gum behave very differently with regard to solvents, some being with difficulty soluble even in bisulphide of carbon. He attributes this difference to the presence of more or less water. Coal-tar naphtha, benzol, coal and shale oil naphthas, and petroleum naphtha are all solvents for caoutchouc. The naphtha solution or varnish was used in preparing the waterproof cloth of Mackintosh, being placed between two thicknesses of the cloth. A mixture of 50 parts of benzol and 70 parts of rectified turpentine has been recently recommended as a solvent for 26 parts of caoutchouc. The crude gum must first be boiled in water to remove dirt, etc., cut under water into sheets about one-third of an inch thick, rolled out into thin strips, and thoroughly dried in a heated room. The mixture of gum, etc. must be passed through a mill. The action of turpentine must be free from fat.

*Action of Reagents on Caoutchouc.*—Acids and alkalis have no effect on it when dilute, and little when concentrated unless heated. Sulphuric acid carbonizes it slightly on the surface when cold, but entirely decomposes it when hot, with the formation of carbonic and sulphurous acids. Strong nitric acid decomposes it, especially when heated, forming carbonic and oxalic acids, and evolving nitric oxide. The strongest potash lye does not attack it at a boiling heat. Gases, such as chlorine, sulphurous acid, and fluo-silicic acid, have no action upon it, but nitrous acid vapor readily attacks it. Ammonia, after a contact prolonged several months, seems to exert the curious influence of bringing it back to the state of an emulsion, in which form it may be used as a varnish, as it recovers its peculiar qualities on drying. Thoroughly kneaded with sulphur and exposed to heat for several hours, it is converted into *vulcanized rubber*, which, with less than 1 of sulphur to 4 of gum, is soft and pliable; with half its weight of sulphur, after exposure to a temperature above 280° F., it is hard and flexible, like whalebone—*vulcanite*. W. A. Miller has shown (*J. Lond. Chem. Soc.*, 1865, p. 273), in an investigation on the *Decay of Gutta Percha and Caoutchouc*, that caoutchouc is liable to deterioration by exposure to the action of oxygen in the presence of solar light, but the gum is less rapidly injured by their influence when in the native state than when it has been previously masticated. When subjected to the action of air, excluded from light, it does not experience any marked change, even during very long periods. It is, however, important to observe that the masticated rubber is much more porous than the unmanufactured caoutchouc. A sample of the best Pará rubber after nine months' exposure had gained 2.8

per cent., had become brown and sticky, and yielded to alcohol 11.81 per cent. of a resin containing C. 67.25, H. 9.54, O. 23.25.

**Chemical Composition of Caoutchouc.**—According to the experiments of Ure's *Phil. Trans.*, 1822, confirmed by those of Faraday (*Trans. Journal of Soc. Arts, and Art.*, xi. 19), caoutchouc is composed wholly of carbon and hydrogen, containing 87.5 per cent. of carbon and 12.5 hydrogen. It is not, however, a simple proximate principle, but chiefly a mixture of two substances, one much more soluble in ether, benzole, and other liquids than the other. The following analyses have been published (Ure's *Phil. Trans.*, 1822; Faraday's *Q. J. Sci.*, 1826, xxi. 19; G. Williams's *J. Chem. Soc.*, vi. 123):

	Ure.	Faraday.	G. Williams's Brown.	Yellow.
Carbon.....	90.	87.2	85.1	87.2
Hydrogen.....	9.12	12.8	12.3	12.8
Oxygen.....	0.83			
Nitrogen.....			0.7	
Loss.....			0.9	
Ash.....				
	100.00	100.0	100.0	100.0

The following are the results of W. A. Miller's analyses of pure manufactured Para rubber, compared with a sample of good sheet masticated or manufactured rubber (*J. Chem. Soc.*, 1865, iii. 273):

	Virgin.	Masticated.
Pure caoutchouc.....	96.50	96.64
Resin.....	1.80	2.06
Moisture.....	1.30	0.82
Ash.....	0.30	0.48
	100.00	100.00

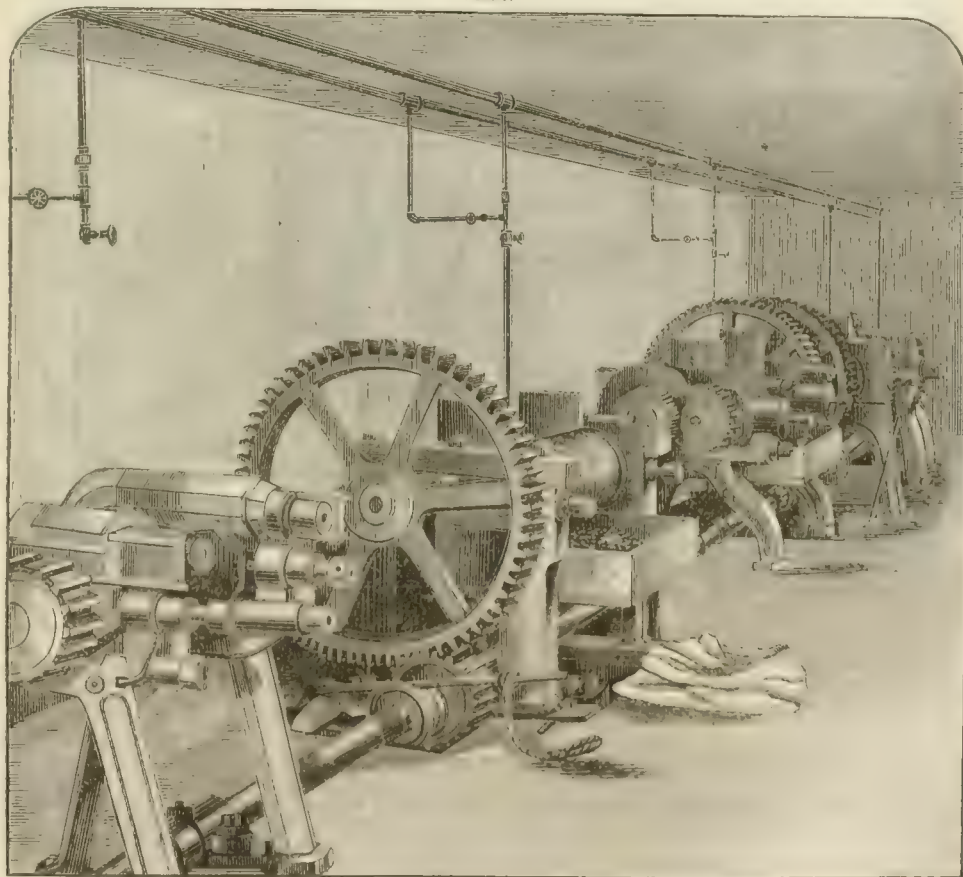
Deducting moisture and ash, the elementary composition gave—

	Virgin.	Masticated.
Carbon.....	85.82	85.53
Hydrogen.....	11.11	12.06
Oxygen.....	3.07	2.41
	100.00	100.00

Adriani (*Chem. News*, ii., 1860, 311), found the following composition for a sample of caoutchouc which had been dried for months over sulphuric acid. The specimen was in part readily reduced to powder, and contained C. 87.25, H. 10.34, O. 11.40; total, 99.99. This sample also contained nitrogen, but its quantity was not determined. Several chemists report the presence of nitrogen in commercial caoutchouc. Adriani found that a sample of the above caoutchouc, after having been confined in very dry air for some weeks, lost its most prominent physical properties, and that a change set in which Payen compares with the growing rancid of fats and oils. "Perhaps," Adriani says, "the decomposition starts from that constituent portion which contains nitrogen, although this element is present in only minute quantity."

**Caoutchouc manufactures** have of late years acquired enormous importance, and are found in every department of the industrial arts. The caoutchouc is used (1) in blocks, cakes, sheets, etc.; (2) in tapes or threads in woven fabrics for the production of elastic tissues; (3) as a varnish between two surfaces of cloth or on one surface, for the production of waterproof fabrics; (4) in solution alone or combined with other substances as a cement; (5) combined with a small quantity of sulphur and mixed with other substances, as *soft vulcanized rubber*, for the manufacture of overshoes, boots, gloves, waterproof clothing, and other goods, life-preservers, gas-bags, steam and water packing, belting, fire-hose, tubing, springs, artificial sponge, etc.; (6) combined with a larger proportion of sulphur and cured at a higher temperature, as *hard vulcanized rubber*, or vulcanite, for the manufacture of combs, pen and pencil holders, rulers, inkstands, buttons, canes, syringes, jewelry, and colored with vermilion for mountings for artificial teeth, etc.; (7) combined with asphalts, oils, sulphur, etc., and vulcanized, as the *kerite* of A. G. Day, for covering telegraph wire—a most valuable substitute for gutta percha for air-lines, as it is not affected by atmospheric influences, which so quickly destroy the latter substance.

FIG. 1.



Masticating rolls.

**Purification of the Crude Gum.**—The crude gum is soaked in hot water, to which is frequently added some soda ley in order to soften and cleanse it. It is then masticated between most powerful rolls made of chilled iron, under streams of cold water. By this operation it is torn into

shreds and cleansed of its impurities, and finally appears as a loose mat composed of sheets. These mats are placed in drying rooms heated by steam for several weeks, to remove the moisture. When ready for use they are kneaded between smooth rolls, which are hollow and warmed by

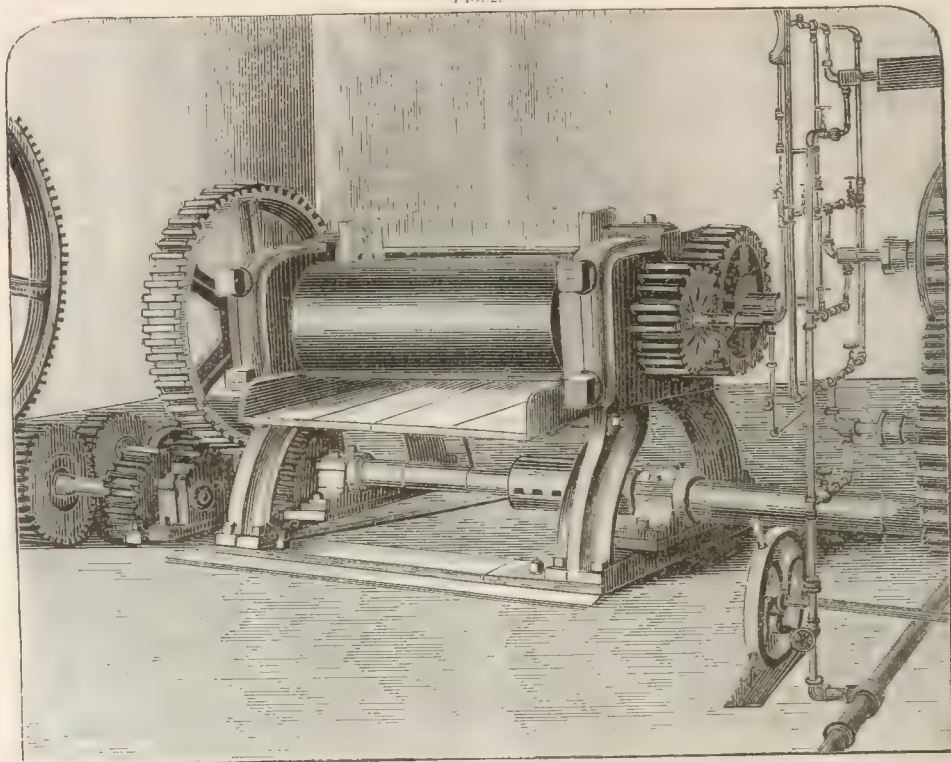


steam, one of which revolves much faster than the other. Here the gum is thoroughly mixed and reduced to a homogeneous mass, ready for cutting into any desired form, or for mixture with the materials necessary to convert it into soft or hard vulcanized rubber.

*Cutting into sheets* is performed by a self-acting machine, in which a straight steel blade, kept cool with water, vibrates in a horizontal position. *Strips or bands* are cut from disks by circular shears, like those used in paper-works. *Threads of India rubber* for weaving into elastic fabrics are either natural or vulcanized; they are cut from ribbons or bands by circular cutting edges. "They are stretched, and kept extended till nearly deprived of their elasticity, and till they form a thread of moderate fineness. This thread is put into a braid-machine and covered with a sheath of cotton, silk, linen, or worsted. The clothed caoutchouc is then laid as warp in a loom and woven into an elegant ribbon. When woven, it is exposed upon a table to the action of a hot smoothing-iron, which restoring to the caoutchouc all its primitive elasticity, the ribbon retracts considerably in length, and the braiding corrugates equally upon the caoutchouc cores. Such bands possess a remarkable elasticity, combined with any desired degree of softness. Sometimes cloth is made of these braided strands of caoutchouc, used both as warp and as weft,

which is therefore elastic in all directions. When a light fabric is required, the strands of caoutchouc, either naked or braided, are alternated with common warp yarns." (*Ure.*) *Round threads* are made from a mixture of India rubber and bisulphide of carbon, with a little absolute alcohol. This paste is put into a vertical cylinder, somewhat similar to those which are used by the vermicelli-makers. The elastic matter, forced through by the piston, comes out in threads through small holes placed in a single row, in order that they may not overlies each other—a precaution that is not required in the making of vermicelli. The threads are received on an endless web of velvet in motion, and traverse in this way a course of 13 feet; they are then taken up by a web of common cloth, which passes over a space of 500 to 660 feet in about ten minutes. At the end of this journey they are sufficiently dried; the solvent is in great measure separated; the threads then quit the web, and are received into channels or grooves, which conduct them into small cups disposed in seven rows, in such manner that each one has its own particular cup. When the cups are full the filament is taken out, and is left for some days exposed to the action of the air. The threads produced by pressure have any required thickness, and this may be made to vary at pleasure. Experience has shown that a thickness of .0394 of an inch is preferable for regular work,

FIG. 2.



Mixing rolls.

but these do not suffice for all kinds of fabrics; in a great number of cases they must be used finer. For this purpose annealing is resorted to. The caoutchouc, being drawn out and exposed to a temperature of 239° F., no longer shrinks, but retains the length it has acquired, and moreover may even be drawn out anew. By thus stretching and annealing it successively a thread of caoutchouc may be brought to a degree of fineness limited only by the dexterity of the workman, and may, for example, be represented by a length of 98,400 feet to 2,205 pounds. The thread thus obtained is of common caoutchouc, but nothing is simpler than to make, in the same manner, thread of vulcanized caoutchouc; for this purpose it is only necessary to incorporate the caoutchouc into a paste with flowers of sulphur, and to heat to the temperature of 266° or 284°. Let it be noted in passing that at the temperature of 239°, necessary for the annealing of the stretched thread, no vulcanization takes place. (*Muspratt.*)

*Waterproof fabrics* are made by placing a varnish or paste of caoutchouc, dissolved in any of its solvents, between two layers of cloth (*double-texture fabrics*) or on one side of the cloth (*single-texture fabrics*). The poorest kind of rubber may be used for this purpose. An objection existed to the single-texture fabrics, as the rubber surface was

liable to become sticky and adhere when exposed to the sun, closely packed, or brought in contact with perspiration, hot surfaces, grease, etc. This was prevented by the *sincalor* process (*sine calore*, "without heat"), the nature of which was kept secret. It is also prevented by using vulcanized rubber, the mixture of rubber, sulphur, etc. being applied to the cloth by means of calender rolls, and vulcanized afterwards.

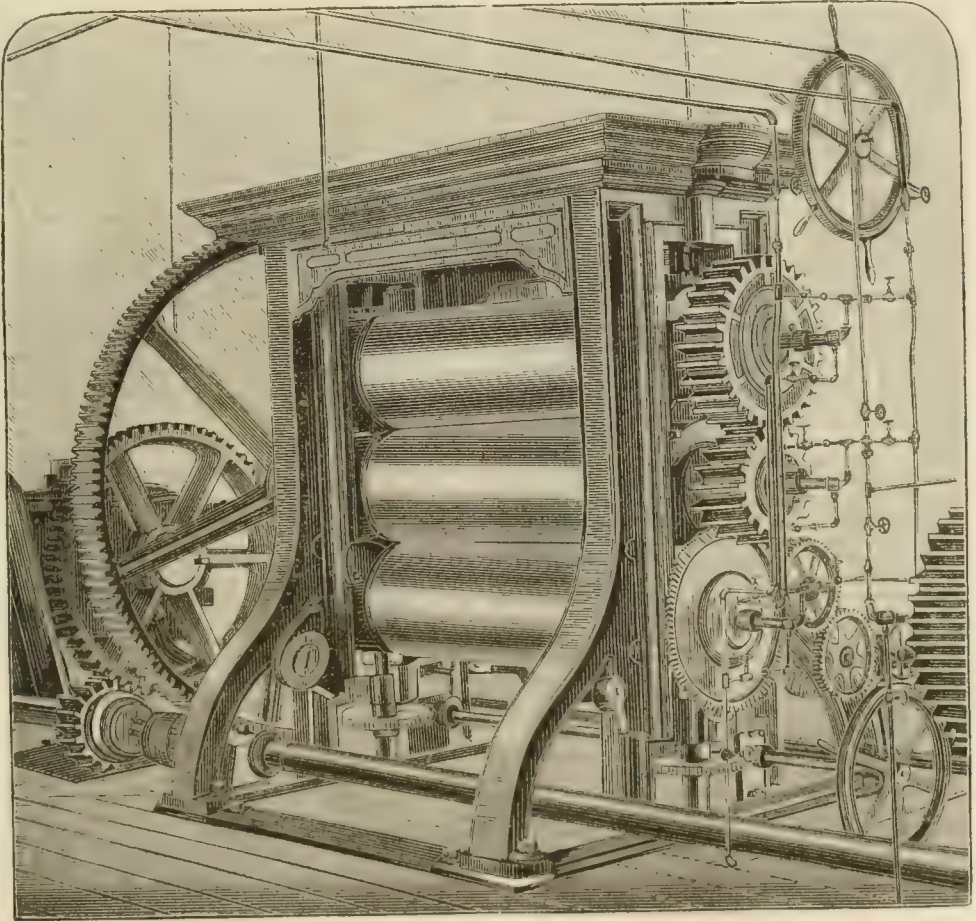
*Rubber cements*, possessing astonishing adhesive properties, are made by combining solutions of caoutchouc in naphtha or other suitable solvent with other materials of a resinous character. Jeffrey's marine glue is made by dissolving 1 pound of caoutchouc in 1 gallon coal-tar naphtha, and adding 20 pounds shell-lac. The mixture is gently heated till uniform, and is then poured out upon plates of iron to solidify. For use it is melted at a temperature of about 250° F. It is insoluble in water, and wood joined by it breaks sooner across the fibres than at the joint. A cheaper marine glue is made by substituting asphalt for the shell-lac. A liquid marine glue is made by increasing the quantity of the solvent.

*Soft vulcanized caoutchouc* was invented by Charles Good-year of Massachusetts. In the early introduction of India-rubber goods it was found that the articles were not

only liable to serious injury from various causes, but they were often found to deteriorate and become almost useless after a few years of the most careful use. The following are some of the most serious disadvantages of the unvulcanized gum: (1) It becomes rigid and inflexible in cold weather. (2) It is softened and decomposed in the sun and hot weather. (3) It is very soluble, and quickly dissolved when brought in contact with any kind of grease, essential or fatty oils, and, though more slowly, yet as surely, dissolved by perspiration. (4) It is, in its native state, so very adhesive that when any two surfaces are brought in contact they become, by slight pressure, one mass that cannot be separated. (5) It loses its elasticity by continued tension or constant use. (6) It has a very unpleasant odor. The Mackintosh goods made in England, and in which a solvent was used, were less liable to damage and decomposition, because the gum was protected by being spread between two cloths. Even in these goods, however, the gum was found to melt and penetrate through the meshes of the cloth in a warm climate, or when much worn

by those who perspire freely, and purchasers were cautioned against approaching too near the fire with the goods. The inability to overcome these defects caused the failure of many manufacturers in Boston, South Boston, Chelsea, Woburn, and Framingham, Mass., and in Staten Island and Troy, N. Y. Factories had been started in these places with capitals varying from \$50,000 to \$500,000. In the summer of 1838, Mr. Goodyear became acquainted with Nathaniel Hayward, who had been employed as foreman of the Eagle Company at Woburn, where he had made use of sulphur by impregnating the solvent with it. It was through him that Mr. Goodyear received the first knowledge of the use of sulphur as a drier of gum-elastic. Mr. Goodyear purchased the claim for combining sulphur with India rubber, for which a patent was taken out Feb. 24, 1839. "It should be remarked," says Mr. G., "that this claim was for the use of sulphur, and not for the heating or vulcanizing process, which he subsequently discovered." Mr. G. manufactured a large lot of goods containing sulphur, but they all decomposed in a short time. While ex-

FIG. 3.



perimenting upon some of the material, after the failure of the compound, to ascertain the effect of heat upon it, he was surprised to find that the specimen, being carelessly brought in contact with a hot stove, charred like leather. He inferred directly that if the process of charring could be stopped at the right point, it might divest the gum of its native adhesiveness throughout. Upon further trial he was convinced of the correctness of this inference by finding that India rubber could not be melted in boiling sulphur at any heat ever so great, but always charred. On heating one of his specimens before an open fire, he noticed upon the edge of the charred portions of the fabric a line or border that was not charred, but perfectly cured. His discovery was now established; it remained only to complete it in detail. In speaking previously of the obstacles that stood in his way, Mr. Goodyear says: "No one who had any knowledge of the nature of the gum would be likely to apply a high degree of heat to it from design, when it was so well known that it would melt at a low temperature." The process of treating caoutchouc which Mr. Goodyear thus discovered is

known as vulcanization. The product of his manufacture is known as *soft rubber*. Since there are to-day other processes for treating caoutchouc different from that of Charles Goodyear, and which in some instances yield an entirely different product, but all of which pass under the same general designation of "vulcanization," the latter term must be understood as embracing the treatment of caoutchouc with some form of sulphur to effect certain changes in its properties, and yield a soft or a hard product.

The following valuable properties of the soft vulcanized rubber are enumerated by Mr. Goodyear: (1) *Elasticity*.—Improved and increased as regards strength and continuance, and also made available in all climates and in all circumstances. (2) *Pliability*.—Pliable in the highest degree, not being affected or made rigid by the greatest cold. (3) *Durability*.—Unchanged by time, whether kept in a wet or dry state. (4) *Insolubility*.—Not absolutely insoluble, because it can be softened, and even dissolved, by powerful solvents of the gum when heated and boiled. Its power of resistance to solvents and other destructive chemical agents



is, however, truly great. In a few words, it is either improved or remains unimpaired when exposed to destructive agents that destroy other fabrics, and even wood, leather, and the metals, such as iron, copper, and brass. (5) *Unalterability by Climate and Artificial Heat.*—Endurance of artificial heat very great; when compounded with particular reference to this quality, and with a larger proportion of sulphur than is ordinarily used, it will bear a heat of 300° F. Above this heats, but does not melt. (6) *Inadhesiveness.*—Entirely free from this objection, no way being yet found to unite it firmly, even when it is desired. (7) *Impermeability to Air, Gases, and Liquids.*—Improved for retaining water and other liquids, as it is not softened by them, but it cannot be stated that it is more impervious to air and gases. (8) *Plasticity.*—The facility with which it is formed into any shape before being heated in the oven is not surpassed by wax or by lead, or any other material. (9) *Non-electric Property.*—One of the best non-conductors of electricity. (10) *Odor.*—Mr. Goodyear says that vulcanized India rubber is, to a very great extent, freed from the natural offensive odor of the native gum.

*Theory of Vulcanization.*—The sulphur appears to combine directly with the rubber; the total change in properties and insolubility in the ordinary solvents for rubber makes the theory of mere mechanical mixture untenable; while the fact that no appreciable quantity of sulphuretted hydrogen is evolved during the operation makes it improbable that a substitution of sulphur for hydrogen occurs. In experiments conducted by Prof. B. Silhman and the writer it was found that mixtures of sulphur, even when vulcanized into hard vulcanite, lost only 2 to 3 per cent. in weight, of which much was moisture; in two cases the  $H_2S$  produced amounted to 0.36–0.59 per cent. of the weight of the mixture.

*The manufacture of soft vulcanite goods* is effected by simple mechanical means. The purified and masticated gum is kneaded on the warm rolls with the proper proportion of sulphur; less than one-fourth the weight of the gum, Goodyear's patent states, generally 5 or 6 per cent. in practice. Various other substances are added to increase the volume of the product and make the caoutchouc, which is the most expensive material, go further. The following is a mixture in common use: rubber 16, sulphur 1, whitening 14, white lead 24, litharge 2. Lead compounds blacken the goods by forming black sulphide of lead; oxide of zinc is sometimes used in its place. Refuse vulcanized rubber and fabrics composed of rubber and cloth are torn up on the masticating rolls and incorporated with the mass for some goods. After the mass is kneaded into a uniform mixture, it is taken from the rolls in the form of a thick sheet and rolled into smooth sheets between calender rolls. From these plastic sheets articles of any desired shape are readily formed by simple mechanical means. The mixture may also be applied on the calender rolls to one or both sides of cloth or canvas. As the mixture is in this condition very adhesive, the coated cloth can be cut and fashioned into overshoes, boots, fire-hose, etc., each article consisting practically of one single piece after vulcanization. The combination with the rubber of cloth or canvas gives great strength to the manufactured articles, while the rubber gives the waterproof properties. Fire-hose made of several layers of rubber-coated cotton duck was found by Prof. Henry Morton and the writer to withstand an internal water-pressure of from 375 to 435 pounds to the square inch. To prevent the decay of the canvas of this hose, Mr. John Murphy of the New York Gutta Percha and Rubber Manufacturing Co. uses carbolic acid, which is simply incorporated with the rubber mixture before it is applied to the cloth. Sheets built up of successive layers of canvas and rubber are extensively employed for valves and for packing.

*The heating or vulcanizing* is conducted in very strong horizontal cast-iron cylinders (the heaters), one end of which is movable and serves as a door. The goods to be vulcanized are loaded upon a car and run in on a railway which extends along the bottom of the heater. To prevent adhesion of the different articles, powdered soapstone (steatite) is freely used, the goods being often packed in boxes filled with this substance. When the heater is charged the door is securely fastened, and steam from a high-pressure boiler let in till the desired temperature is secured. The temperature employed and the time of exposure vary somewhat according to the character of the articles; 5 hours at 240° F. is stated to be the temperature employed for fire-hose. The following 44-hour "heat" is used in some of the factories where smaller articles are made: 1 hour at 255° F.; 1 hour at 260°; 1 hour at 265°; 1 hour at 270°; 1 hour at 275°. The temperature should never exceed 280° F.

*Parker's cold vulcanizing process* was patented by Alexander Parker of Birmingham, and has been used to a limited

extent, though, owing to the fact that the sulphurization of the caoutchouc is more or less superficial, the manufactured articles are inferior to those vulcanized by Goodyear's process; in fact, they are sometimes almost worthless. The caoutchouc articles are simply immersed in a mixture of 40 parts of sulphide of carbon and 1 part of chloride of sulphur; they are next placed in a room heated to 70° F., and when all the sulphide of carbon has been volatilized, the process is in so far complete that it is only requisite to boil them in a solution of 1 pound of caustic potassa to 3 gallons of water, the vulcanized caoutchouc being next washed to remove excess of alkali. Humphrey in 1870 introduced the use of gasoline from petroleum, instead of sulphide of carbon, as the former fluid dissolves chloride of sulphur readily.

*Other methods of vulcanization* have been tried, but with little success: (1) By immersing the sheet caoutchouc in sulphur heated to 233° F. till it has absorbed about  $\frac{1}{2}$  of its weight, and then heating it for a short time to 302° F., or by immersing the caoutchouc in sulphur heated to 302° F., and keeping up that temperature till the sulphuration is complete. (2) Hancock: exposing the rubber in sheets to vapors of sulphur. (3) H. Gaultier de Claubry (1860) vulcanizes caoutchouc by the aid of bleaching-powder and flowers of sulphur. This mixture produces chloride of sulphur, and the caoutchouc treated by it contains some chloride of calcium. (4) Gérard: by immersing articles of caoutchouc in a solution of polysulphide of calcium or potassium, marking 25° Baumé, keeping them in it for three hours at a temperature of 300° F. under a pressure of 5 atmospheres or 75 pounds to the square inch. The goods are finally washed with an alkaline ley of 60° B. (5) Burke: mixing the rubber with 5 to 15 per cent. of orange sulphide of antimony (*kermes*), and heating the articles fashioned from it to 250°–280° F.

*Hard vulcanized caoutchouc, vulcanite, chonite, hard rubber,* is prepared by kneading together 16 parts of rubber and 8 of sulphur in the manner already described for soft rubber, rolling the plastic mixture into sheets, rods, tubes, and other forms, and vulcanizing in a steam-tight heater. To secure a smooth, polished surface each article may be enveloped in thick tin-foil, which is stripped off after vulcanization. The articles are placed in the heater in trays filled with powdered soapstone or water. The product is very hard, and possesses a spring-like elasticity, like that of whalebone. It may be sawed, filed, and worked in a lathe like ivory, and admits a very high polish. Its color is dark brown, nearly black. It may be colored jet black by the addition of a little litharge, red by vermilion. A mixture of 16 parts of rubber, 6 of sulphur, and 12 of vermilion is bright red, and is much used. When properly made, vulcanite is not brittle; an elastic shred may be cut with a penknife from its edge. The careful regulation of the temperature of the heater during its vulcanization is necessary to secure the best product. The following heat gives excellent results: 1 hour at 275° F.; 3 hours at 300°; 3 hours at 305°. Vulcanite differs from soft rubber in the proportion of sulphur used, in the high heats used in curing it, and in its hardness. The turnings and borings of vulcanite are reduced to a fine powder and pressed in hot iron moulds for the manufacture of buttons, strips for knife-handles, etc. The vulcanite is not attacked by solvents, neither those which dissolve the pure caoutchouc nor the mineral acids and alkalies. On this account it is used in place of glass for cups for galvanic batteries. It is also especially distinguished by the large quantity of electricity which it evolves when rubbed; hence it makes an excellent material for the plates of electrical machines. It will be impossible to enumerate the various applications of this material: some of them have been already mentioned. An important application is for the manufacture of emery-wheels and bones for sharpening scythes, sickles, etc. For this purpose it is mixed before vulcanizing with emery or quartz. The following proportions give excellent results: rubber, 11 parts; sulphur, 5 parts; emery, 160 parts.

Nelson Goodyear is generally considered to have been the discoverer of *flexible vulcanite*, and was claimed to be such by Henry B. Goodyear, the administrator of his estate. No one will dispute his claim to the discovery of *hard rubber*, but the writer and others who have carefully examined the history of the case believe that Austin G. Day of Connecticut invented the flexible vulcanite, which is the only kind that ever possessed any practical value or commercial importance. Nelson Goodyear's original patent was granted May 6, 1851. In this he says: "The nature of my invention consists in so compounding caoutchouc with other substances that the composition thus formed, when subjected to the heating or curing process described in the patent of Charles Goodyear, dated June 15, 1844, and in the reissue of said patent, dated Dec. 25,



1819, will form a hard, stiff substance hitherto unknown . . . etc. The indispensable ingredients used in my composition are caoutchouc and sulphur: and when only these two ingredients are used, the best proportions will be about equal parts by weight of each of them; indeed, a much less proportion of sulphur will not suffice. But though the combination of so large a proportion of sulphur with the caoutchouc will produce, when cured, a hard substance, a still better result will be obtained by the introduction of magnesia, lime, carbonate of magnesia or lime, or sulphate of magnesia or lime, into the composition, in which case the following proportion will be found a highly advantageous one—namely, 1 pound of caoutchouc,  $\frac{1}{2}$  pound of sulphur, and  $\frac{1}{2}$  pound of magnesia or lime, or carbonate of magnesia or lime, or sulphate of magnesia or lime . . . etc. The compound must be subjected to the heating or curing process already mentioned as patented by Charles Goodyear, and to which reference is hereby made for a particular description thereof: in most cases the heat will be required to be raised as high as  $260^{\circ}$  or  $275^{\circ}$  F., and the time of exposure to the heat will range from three to six hours or even longer . . . etc. What I do claim as my invention, and desire to secure by letters patent, is the combining of India rubber and sulphur, either with or without shell-lac, for making a hard and inflexible substance hitherto unknown, substantially as herein set forth. And I also claim the combining of India rubber, sulphur, and magnesia or lime, or a carbonate or a sulphate of magnesia or of lime, either with or without shell-lac, for making a hard and inflexible substance hitherto unknown, substantially as herein set forth." The product of the foregoing specifications is distinctly stated to be an inflexible substance.

On the death of Nelson Goodyear, Henry B. Goodyear, his administrator, obtained two separate reissues of the original patent—one for the process of manufacture, and the other for the product, both bearing date of May 8, 1858. In both these reissues we find an entirely new property claimed for the product—*viz.* the spring-like property, under flexure, found in whalebone. The writer has discussed this subject with the men who worked in the factory when Goodyear made his experiments, and who say that he never made "whalebone rubber," but simply a hard, brittle compound. He used a large proportion of magnesia in all his compounds, and did not heat them above  $275^{\circ}$  F.; both of which facts are fatal to the theory that he made whalebone rubber. His specimens were cured in a heater used for soft-rubber goods, which was run at heats from  $255^{\circ}$  to  $275^{\circ}$  F.; a higher temperature would have ruined the goods. In an elaborate series of experiments on this subject, made on a large scale by Prof. B. Silliman and the writer, it was found that a mixture of rubber 16, sulphur 8, and magnesia 8 was converted into a hard, brittle compound by a temperature of  $275^{\circ}$  F., but under no conditions into whalebone rubber; while a mixture of rubber 16 and sulphur 8 could not be hardened at all unless heated above  $275^{\circ}$  F. This confirms the other statements with regard to Goodyear's hard, brittle, and useless product. Day has never been able to vindicate his claims to this invention in the courts against the powerful combination of capital which holds the Goodyear patents. (See *Am. Chemist*, ii. 329.)

Dental vulcanite, consisting of rubber 16, sulphur 6 to 8, vermilion 12 to 16, was mixed and sold to the dentists, who used it for plates for mounting artificial teeth. This is one of the most important applications of hard rubber ever made, as it greatly reduced the cost of artificial teeth. The dentist makes a mould of the mouth in plaster of Paris, sets a plate of the plastic-rubber mixture in it, arranges the porcelain teeth in proper position, and heats the whole in a small vulcanizer over a gas-burner, thus converting the whole into a light plate of teeth which fits the mouth of the patient. The high charges of the patentees of this application of vulcanite drove the dentists to seek to evade the patents. The greatest success attended the efforts of J. B. Newbrough and E. Fagan of New York, who obtained patents for hardening rubber by means of iodine and bromine. Considerable litigation resulted, which finally terminated in a compromise. It was found that rubber could be hardened by iodine and colored with oxide of iron without the aid of any sulphur, but when colored with vermilion a certain addition of sulphur was required—less, however, than the minimum of the hard rubber patents. (See *Am. Chemist*, ii. 373.) Newbrough also succeeded in hardening rubber with a product obtained by treating oil of turpentine with oil of vitriol.

Compounds of coal tar, asphalt, etc. with caoutchouc have been frequently tested, but they can be used only for very inferior goods.

Keric is a compound containing coal tar and asphalt, with several other substances, the exact nature of which is a secret. It was invented by Austin G. Day, and is extensively

used for covering telegraph wire. It is cheaper than gutta percha, and possesses the additional advantage of resisting the atmospheric influences which destroy this substance.

*Kamptulicon* is the name that was given to a mixture of India rubber, gutta percha, and cork or wood sawdust. It was rolled into sheets, vulcanized by contact with sulphur, and used for floor-cloth.

*Artificial caoutchouc* has been made from oil, chloride of sulphur, and collodion (*Parkene*), and from the resinous body produced by the oxidation of linseed oil (*Campticon*).

Statistics of the India rubber industry are given in the 9th census report. The capital invested in this industry in the U. S. in 1870 was \$7,486,600, the number of establishments 36, hands employed 6025, the value of the products \$14,566,374.

*Literature.*—*Gum-elastica and its Varieties, with a Detailed Account of its Applications and Uses, and of the Discovery of Vulcanization* by Charles Goodyear (New Haven, Conn., 1853); *The Caoutchouc or India Rubber Manufacture in England*, by Thomas Handcock (London, 1857); *The Boot and Shoe Manufacturer's Guide* (including a history of India rubber and gutta percha), by W. H. Richardson (Boston, 1858); *Nouveau manuel complet du Fabricant d'objets en Caoutchouc, en Gutta percha et en Gomme-facile*, par M. Paulin Desormeaux (Manuel Roret, Paris, 1855); *Caoutchouc and Gutta Percha considered chiefly in their Chemical Relations*, by T. M. Blossom (a most valuable series of papers, written largely from notes collected by the writer of this article, and extensively quoted here); *Am. Chemist*, ii. 81, 137, 173, 225, 287, 329, 373. (See also Ure's *Diet.*, Payen's *Précis de Chimie Industrielle*, *Haudec.* d. *Chimie*, Muspratt's *Chem.*, especially the last German edition.) C. F. CHANDLER.

**Indibilis**, a Spanish prince of the tribe of Iltergetes, first mentioned in B. C. 218 as commanding the native auxiliaries under Hanno, the Carthaginian governor. In 212, Indibilis led a force of 7500 men to the aid of Hasdrubal against P. Cornelius Scipio, who was killed in battle. Soon afterward he came into conflict with the Carthaginian governor, who required the surrender of his daughters as pledges of fidelity. These hostages were captured by the younger Scipio (Africanus) in 210, and the honorable treatment given them so impressed Indibilis that in the following year (209) he joined his forces to the Romans. In 206 they revolted from Rome, but were conquered and pardoned; again revolted in the following year (205), when he was defeated and killed.

**In'dican.** See INDIGO, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.

**Indicopeus'tes** (COSMAS), an Egyptian trader in the sixth century; in early life made extensive voyages in the East, visiting Syria, Arabia, Ethiopia, Persia, and India, carefully observing the modes of life, manners, and customs of all the peoples with whom he opened a traffic, and probably keeping a journal of his wanderings. After many years spent in this manner, Cosmas renounced the world, and, entering a monastery, devoted himself to contemplation and study. His store of personal knowledge of geography, which had gained him the surname of *Indico-peus'tes* ("the Indian navigator"), was increased by the study of Scripture and the ancient writers, until he became the oracle of Egypt upon all matters of cosmography. In his old age he wrote in Greek a work in twelve books upon universal geography, usually cited by the Latin title, *Topographia Christiana sive Christianorum Opinio de Mundo*, of which the chief object was to combat the opinion of the astronomers that the earth was a spherical body. According to Cosmas, the shape and proportions of the earth are shadowed forth in Scripture by the description of the Jewish tabernacle. It is a vast oblong plain enclosed by the ocean, the length from E. to W. being just twice that from N. to S. Multitudes of proofs were adduced in support of this opinion from Scripture, reason, testimony, and the authority of the Fathers of the Church. In the part of his work based upon personal observation, Cosmas described the countries he had visited with considerable accuracy, and inserts by way of episodes many curious pieces of information, the most important of which related to an inscribed marble throne set up by Pharaoh Sesostris (247-222 B. C.) at Adulis in Nubia, near the coast of the Red Sea. He also preserved some fragments of ancient writers otherwise unknown. The book of Cosmas was written at different times, and the manner of it very much in completeness. It was first published by Montfaucon in his *Collectio Nova Patrum et Scriptum Græcorum*, Vol. ii. Paris, 1706, and this is still the best edition. Cosmas wrote other works, commentaries on Ptolemy and Ctesibius, a treatise of *Universal Cosmography*, and a *Universal Tables*, no longer extant.



**Indic'tion** [Lat. *indictio*, "proclamation"], the name used in chronology for a certain method of reckoning time by periods of fifteen years. This method was occasioned by a tax which was levied in the Roman empire every fifteenth year, and the point of time from which the indictions began was Sept. 15, 512. Its use in reckoning time was commenced chiefly by ecclesiastical historians during the life of Athanasius. Later on, when the method was adopted by the popes, Jan. 1, 513, was fixed as the starting-point, and this change was called the papal indictment. During the Middle Ages reckoning by indictions was commonly used, not only by writers, but in practical life, in charters and public deeds. (As to the historical commencement of the era of indictions, see Gibbon's *Decline and Fall*.)

**Indict'ment** [Lat. *indicio*, to "show"], a written accusation of one or more persons of an indictable offence, consisting of a felony or misdemeanor, preferred to, and presented upon oath by, a grand jury. (See GRAND JURY, CRIME.) A draught of the indictment, prepared by the attorney-general, district attorney, or other proper officer representing the government, is laid before the grand jury when they are lawfully convened, and if twelve or more of them are satisfied, from the *ex parte* evidence presented to them, that there is *prima facie* reason to conclude that the alleged offender is guilty, the words "A true bill" are written upon the back of the draught, and the indictment is then said to be "found;" and upon the basis of the charges therein contained the prisoner is placed on trial, at a regular session of the proper court, before a petit jury. (See JURY.) When a presentment is made by the grand jury, an indictment containing the charges presented is drawn up subsequently, and upon this the party accused is tried. (For a definition of "presentment" see GRAND JURY.) An indictment commences with a formal preliminary statement termed the "caption," contains next the special charge or accusation, sometimes termed technically the "statement" or the "body of the indictment," and terminates with a formal ending, called the "conclusion." The caption, which is, strictly speaking, in the nature of a preamble only, and no part of the indictment proper, states the name and term of the court in which the indictment was found, the names of the justices, and the fact that the grand jury was lawfully convened, and that they were duly sworn and charged. It shows an observance of such forms and rules of law as must be complied with before the finding of the indictment, in order that the court may acquire jurisdiction in the particular instance. The "statement" or body of the indictment is a narrative of the offence charged, and must contain a full and particular description of the alleged crime, and have such a degree of certainty and precision in the accusation that it may be seen by the court that the act charged, if true, would constitute a crime. The name of the prisoner should be stated, or if that is not known, he should be so described as to be adequately identified. The time and place at which the offence was committed should also be alleged, though it is not generally necessary that allegations on these particular points should be proved exactly as charged. It is, however, essential that in stating the time the offence should appear to have been committed before the finding of the indictment, and within the period prescribed by law for the prosecution of the particular crime alleged. Moreover, in certain classes of cases the time must be specified correctly, and any variance between the allegation and the proof will be fatal. Thus, in the indictment for perjury, the day on which the perjury was committed must be truly stated. When murder is charged, the death must be described as occurring within a year and a day from the time when the fatal injury is alleged to have been committed. The place named must be within the jurisdiction of the court. When several persons engage in the commission of an offence, they may be indicted either jointly or separately. It is an allowable and frequent practice to describe the same offence in the indictment in several different ways, the successive statements being termed "counts;" the object of this is to prevent the possibility of a variance or failure of proof. By variously modifying the terms of the accusation in this way, it is rendered more likely that some one of the counts will accurately correspond with the evidence to be adduced, and if any count is sustained, the prisoner may be convicted. Whenever an indictment charges an offence created or declared by statute, it must be accurately framed in accordance with the provisions of the statute. There are also various rules of law which must be observed to prevent the allegations of an indictment from being absurd, inconsistent, or repugnant. Particular technical averments are sometimes necessary to be employed. Thus, in a charge of felony, the word "feloniously" must be used; in a case of burglary, the word "burglariously." So larceny is alleged by the words "took and carried away." But though there are certain formalities to be observed in framing every in-

dictment, the allegation of the nature of the offence and the acts constituting it will afford scope for the exercise of special discretion and professional skill. The general rule is that the indictment must charge explicitly everything that is necessary to constitute the offence; every material circumstance embraced within the definition of the alleged crime must be stated. The "conclusion" of the indictment is a formal statement with which the law requires that it should end. The usual phraseology is, "against the peace and dignity" of the king or commonwealth. In indictments for a statutory offence it is customary to use also the phrase "contrary to the form of the statute in such case made and provided." Since in the U. S. crimes are generally defined by statute, this mode of concluding the indictment is commonly employed. The mode of framing the body of the indictment is also sometimes modified by statutory provisions. Only the common-law rules upon the subject have been here stated.

At common law, the defendant was not, in cases of treason and felony, entitled to a copy of the indictment. In prosecutions for high treason the rule was changed in England by statute, and it was provided that a copy should be given to him ten days before the trial. But in other cases of felony the rule remained unaltered. The court at the time of the arraignment would order the indictment to be read over slowly to the prisoner, but would grant no further privilege in this respect. This harsh rule has been abolished in several of the States of the Union by statute. Thus, in New York every person indicted for any offence, who shall have been arrested or held to bail, "shall on demand, and on paying the fees allowed by law therefor, be entitled to a copy of the indictment and of all indorsements thereon." Similar statutes have been enacted in New Hampshire, Vermont, Ohio, Illinois, Michigan, Wisconsin, Georgia, Texas, and a few other States.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Indies, East.** See INDIA, INDO-CHINA, and EASTERN ARCHIPELAGO.

**Indies, West.** See ANTILLES, and WEST INDIES.

**Indiges'tion, or Dyspepsia** [Gr. *δύς*, "bad," and *πέψω*, to "digest"]. Indigestion has many forms, and includes groups of symptoms indicative of departure from one or many of the conditions of healthy digestion. The digestive process is complex, and is performed by the agency of the saliva, the gastric juice, and the intestinal, pancreatic, and biliary secretions. For the proper secretion of these several digestive fluids the blood must be in a healthy state, and be freely supplied to the glandular structure of the stomach and intestines. The innervation essential to the digestive process demands moderation of mental activity, emotional tranquillity, vigor and healthful action of the nervous centres, especially of the sympathetic system. Tonicity of the muscular walls of the stomach and intestine is essential for the thorough contact and admixture of food with the digestive fluids, for its transit through the intestinal tract, and for the regular evacuation from the bowels of undigested and excretory matter. Indigestion may be gastric or intestinal—often the two combined. It is either primary—an essential disorder of the digestive apparatus—or secondary and symptomatic of disease in other organs. Obstruction of the circulation of the blood by chronic disease of a large vascular organ—as, the liver, spleen, or kidney—induces passive congestion of the mucous surfaces. Heart disease, rapidity of circulation, and elevation of temperature in fevers and febrile disorders cause gastro-intestinal engorgement, catarrh, and indigestion. When bile is imperfectly eliminated, when urea is imperfectly excreted by the kidneys, when fecal matter is retained and absorbed, the effete elements circulating in the blood excite gastric or intestinal or gastro-intestinal catarrh. Primary or idiopathic indigestion includes all cases in which careful investigation has failed to discover a dependency on other disease. It may be a simple functional disorder of digestion, or due to an organic cause in some part of the digestive tract. Functional dyspepsia is termed atonic. Organic dyspepsia, if mild and due to temporary and slight lesions of the secretory surface, is termed irritative; if severe, it is designated chronic gastritis, a condition which by associated symptoms and physical exploration may be found to depend upon ulcer, cancer, or inflammatory thickening. Atonic dyspepsia may be due to defective innervation—from continuous and exhaustive mental action; from emotional disturbances, as excitement, sorrow, fear; from prolonged exercise and fatigue; from dissipation. It may be caused by deficient supply and quality of the blood, inactive circulation from indolence and neglect of exercise, anæmia and impoverished blood from privation or recent sickness. Deficient or perverted secretion of digestive fluids results. Conversely, digestion may be interfered with by excess of blood and gastric catarrh, when neglected



cleanliness or chilling of the skin or cold extremities determine blood to internal parts. Obesity, indolence, general debility may lower the tonicity of the muscular structure of the stomach and intestines, and weaken the peristaltic movements, causing failure in the contact of food with digestive fluids, and resulting in its accumulation and fermentation. As a rule, however, nerve-force, blood-supply, and digestive apparatus are not primarily at fault, and are adequate to ordinary digestion, the majority of indigestions being the result of gross excesses of diet and violations of hygienic law, excess of food, too frequent meals, rapid eating with incomplete mastication and insalivation, food unfit for digestion or improperly and insufficiently cooked, the habitual use of condiments, rendering the peptic glands dependent upon their stimulus, the imbibition in excess of liquids, as water, tea, or coffee, at meals, causing dilution of the gastric juice. Alcoholic stimulants create temporary and artificial appetite, but soon destroy healthy digestion. Tea, coffee, and tobacco impair the innervation of the stomach.

The chief symptoms of gastric indigestion are sense of fullness, weight, distress, and dull pain over the stomach, coated or irritable tongue, foul breath, perverted appetite—usually poor in the morning, and often morbid and irregular—sometimes nausea and vomiting, eructations of gas, regurgitation of acid or alkaline liquids and of food, often constipation, and less often colicky pain, with irregularity and looseness. There may exist lassitude, mental inactivity, drowsiness, cranial oppression, headache, vertigo, sometimes clouded vision, diplopia or double vision, and numerous nervous symptoms and perversions of the senses may exist; shortness of breath, sighing respiration, præcordial distress, palpitation and irregular action of the heart. There may be poor circulation; relaxed and pallid or sallow surface and complexion; cold hands and feet; in women, menstrual disorders. With the more marked and aggravated symptoms there may be mental depression, anxiety, despondency, and apprehension, constituting hypochondria. A diagnosis of the form of dyspepsia is essential to a correct treatment. Atonic may be distinguished from irritative dyspepsia by the following differences:

#### In Functional or Atonic Dyspepsia.

1. Deficiency or irregularity of appetite, absence of thirst.
2. Ingestion of food affords sense of comfort for a time.
3. Food retained.
4. Condiments and stimulants craved, aid digestion, and cause sense of comfort.
5. Languor and inaptitude for exertion during digestion.
6. Tongue pale, broad, flabby, thinly furred.
7. Breath foul.
8. No fever.
9. Persons in general good health and flesh.
10. Constitutional symptoms few.

#### In Irritative Dyspepsia.

1. Morbid craving for food, morbid thirst.
2. Ingestion of food causes distress.
3. Food often ejected when taken, or soon after.
4. Condiments and stimulants create or intensify distress.
5. Pain and mental distress during digestion.
6. Tongue small, compact, red, with elevated papillæ or sensitive abraded patches.
7. Breath may or may not be foul.
8. Often slight fever.
9. Reduced health, bad nutrition, and emaciation.
10. Variable general effects.

The symptoms of functional and irritative dyspepsia often coexist. In functional dyspepsia the fermentation of food develops gases. Eructations may be of carbonic acid gas from acetous fermentation, of hydrogen and carbonic acid gas from decomposition of hydrocarbons or fatty food, or of sulphuretted hydrogen from decomposition of nitrogenous substances, as meats, eggs. Of regurgitated liquids, the most common is a clear, opalescent, insipid, alkaline liquid, sometimes saltish or brackish, probably the accumulation in the œsophagus of saliva, and its frequent rising in the throat is known as waterbrash or pyrosis. In gastric catarrh gelatinous mucus may rise in the throat. The regurgitation of acid, acid liquid, causes sense of burning in the stomach, beneath the sternum, and in the throat, technically cardialgia, popularly termed heartburn. Such fluid is usually serum or sero-mucus, containing acetic or lactic acid. If brown, acid, bitter, rancid, and offensive, it is due to the conversion of fatty food into butyric acid. Food may be regurgitated at various stages of its digestion. When food is ejected many hours after ingestion, it may present products of fermentation—sporules of *Tarula cerevisiæ*, or sporules aggregated into segmented, cubical masses, known as *Sarcina ventriculi* (Coccina, a "wool-pack"). Coffee ground substance in ejecta is due to blood which has undergone gastric digestion, and indicates an abraded, ulcerated, bleeding surface. The accumulation of food and its ejection en masse hours after ingestion denote obstruction at the lower or pyloric orifice. The prevalent idea that gastric juice is often regurgitated is erroneous. Bile appears in regurgitated fluids seldom,

and in vomited matter only after prolonged or violent emesis. In aged persons a steadily progressive loss of appetite, progressive inanition and emaciation, and death from slow asthenia, without other symptoms of indigestion or evidence of disease in other organs, result from degeneration of the gastric and intestinal tubules, the peptic glands. When fatty food passes in the fæces undigested, disease of the pancreas may be suspected.

Atonic dyspepsia predisposes to acute indigestion, sub-acute gastritis, gastro-enteric catarrh—the cholera morbus of adults and cholera infantum of children—whenever exciting causes are superadded, as the imbibition of cold water or eating acid fruits, chilling of the heated body in summer. Indigestion may at first induce looseness of the bowels, irregular action, or diarrhœa, but ultimately produces constipation. Indigestion, by developing lactic acid in excess, is the frequent cause of rheumatism. It is the source of the lithic acid or gouty diathesis. Indigestion is the frequent cause of urinary precipitates. Imperfect digestion of nitrogenous food gives rise to oxalic acid, oxalate of lime in the urine, irritation and congestion of the kidneys and bladder. Indigestion in young and susceptible children and infants is the most frequent cause of convulsions and sudden febrile attacks. It may be the chief or only cause of chorea (St. Vitus's dance). Chronic irritative dyspepsia is most often the result of alcoholic excess, less often of excessive errors of diet, or may be symptomatic of gastric ulcer, pyloric constriction, or malignant disease.

In the treatment of indigestion regulation of diet alone often effects a cure. The diet should be nutritious, moderate in quantity, taken at regular intervals, and slowly eaten. The food at breakfast should be simple and laxative, at dinner substantial, at supper light. Of dishes there should be variety, yet simplicity, including animal food, vegetables, and fruits in restricted quantities. Bread should be stale or aërated. Milk may be freely taken, corrected with soda or lime-water. Fatty food, grease, sugar, and pastry should be avoided. Artificial adjuvants to the diet, as Liebig's prepared food, Ridge's food, and malt extract are of value. Drink of any kind at meals should be very limited. Attention to general regimen is essential. There must be outdoor exercise, freedom from mental stress, from physical fatigue, and dissipation in any form. By clothing, active friction, and judicious bathing the external circulation is kept vigorous. Tendency of the food to decompose demands correctives. For the acid stomach, bicarbonate of soda, the bicarbonate of potash, or lime-water; for alkaline fluid and gastric mucus, dilute mineral acids and acidulated drinks. Bismuth, either the subnitrate or subcarbonate, is the remedy for pyrosis. When the stomach fails to digest albuminoids, pepsine may be given. Pancreatine will aid the intestinal digestion of fat. Fermentation of food, with fetid products and foul breath, may be treated by the sulphite, bisulphite, or hyposulphite of soda, the sulpho-carbolate of soda; charcoal is also efficacious. In atony of the stomach, carminatives, as ginger, calamus, capsicum, and compound tincture of cardamum stimulate glandular secretion; bitter vegetable tonics, chamomile, quassia, calumbo, gentian, wild-cherry bark, cascarrilla, and cinchona barks create appetite, and nux vomica increases the muscular tone and activity of the stomach and intestines and prevents flatulence. Quinine and ferruginous tonics, as the citrate of iron and quinine, the lactophosphate and carbonate of iron, and Bland's pills produce general vigor, improve the blood, and aid digestion. Laxatives are essential when constipation exists; violent cathartics are to be avoided. Laxative food, as the coarse cereals and ripe fruit before breakfast, may be tried. Tamarinds and figs, St. Germain tea, senna, and magnesia may be used to stimulate the bowels to action. Often active exercise, walking, or horseback riding will suffice. Rubbing and kneading the bowels or the application of electricity to the abdominal muscles will cure obstinate constipation. Rhubarb, podophyllin, or dried ox bile in small quantities may be needed to increase the secretion of bile, also to unload the rectum, belladonna and nux vomica to create permanent tonicity and regular action of the bowels. A judicious combination of these remedies in a tonic-laxative pill may be taken until the stomach and intestines resume healthy and vigorous activity. Saline purges are to be avoided. But the milder mineral waters may be taken when acid indigestion is present or there is a personal tendency to rheumatism or gout.

E. DAWSON HENSON, JR.

**Indighirka**, or Zapadnaia Kotima, a river of Eastern Siberia, rises in the Yachno Mountains, in the government of Jakutsk, and crosses the Arctic Ocean in lat. 156° E., after a course of 750 miles, mostly through deserts and frozen marshes. A few villages are scattered along its banks, whose inhabitants live exclusively by hunting.



**In'digo** (*Indicum* of the ancients, the most important blue dye known. It is obtained from several species of the genus *Indigofera* which grow principally in warm climates. It has also been noticed in morbid urine, and Dr. Schunck has shown that it may be obtained from the urine of healthy men and animals by the action of strong acids. It has also been observed in the milk of cows.

**History.**—This most valuable dyeing substance was used as a dyestuff in India and Egypt long before the Christian era, and the Romans were acquainted with it, although they only used it as a pigment, not knowing how to render it soluble, and so available for dyeing. It is only since the sixteenth century, or from the time of the discovery of the passage to India round the Cape of Good Hope, that it has become generally known in Europe; and its employment as a dye was greatly retarded by the opposition it met with from the large vested interests of the wood-cultivators, who induced the English, French, and German governments to promulgate several enactments against its use. So severe were some of them that Henry IV. of France issued an edict condemning to death any one who used that pernicious drug called the "devil's food." It is only since the year 1737 that the French dyers have had the right of using indigo without restriction. It was urged against this dye that it was fugitive, and even prejudicial to the wool. The Dutch were the first to introduce it.



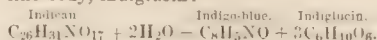
Indigofera.

**Botany.**—This coloring-matter is furnished by the leaves of several species of plants belonging to very different genera and orders—from *Indigofera tinctoria*, *I. Anil*, *I. disperma*, and *I. pseudotinctoria*, cultivated especially in the East and West Indies; also from *Nerium tinctorium* and *Calanthe verrucifolia*, natives of Hindostan; *Asclepias tinctoria* and *Marsdenia tinctoria* of Sumatra; *Polygonum tinctorium*, *Isatis indigotica*, *Justicia tinctoria*, and *Blattia Tankervillei* of China; and *Amaroria frutescens* of South Carolina. The only European plant which yields true indigo-blue is *Isatis tinctoria*, WOOD (which see). This plant was much used in Europe before the introduction of indigo, but it is inferior in quality and small in quantity, and is now used only as an addition to the indigo-vat. Many other European plants yield blue coloring-matters, but they are not believed to be identical with indigo.

**Cultivation.**—The indigo plants require a warm climate, with not too much rain. The seeds are sown about the first of April, and in the latter part of June the flower-buds burst and the plants will bear cuttings. Two months later a second inferior cutting is taken, and a third and fourth of diminished value may be made.

**Indican.**—The plants do not contain the indigo when they are gathered, but a peculiar substance, indican, which is a yellow, transparent, glutinous solid, soluble in alcohol, ether, and water. Indican is a glucoside, and is converted

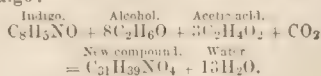
by fermentation or by boiling with sulphuric or hydrochloric acid into indigo-blue, indigo-red, etc., and a peculiar glucose-like body, indigluin:



Fermentation does not appear to be essential, as a mere infusion of the plant in hot water deposits indigo on standing in the air. Indican yields by decomposition, besides indigo-blue and indigo-red, a variety of bodies, as oxindicanine, oxindicanin, indicasin, indicanin, indifulvin, indihumin, etc. (See *Watts's Diet.*, article "Indican.") Indican has been found in human blood and urine.

**The extraction of the indigo in Bengal** is effected either from fresh or dry leaves. (1) *From the Fresh Leaves.*—Two large stone cisterns are provided—the *steeper*, or fermenting vat, about 20 feet square and 3 feet deep, and the *beater*, standing lower, of the same width, but a third longer. The fresh plants, tied in bundles, are stratified in the steeper and fastened down by beams. They are then covered with water, when fermentation begins at once, and is completed in fourteen or fifteen hours. The liquid is at first yellow, but becomes dark green, and exhibits a blue scum. It is drawn off into the beater, and ten men beat it with oars or shovels called *busquets*. Paddle-wheels or dashers have been used. After being beaten for an hour and a half, if the previous fermentation has been satisfactory the indigo agglomerates into flocks and settles as a precipitate. The object of the beating is to introduce oxygen. The precipitation may be hastened by the addition of lime-water, but this throws down extractive matter, and makes the indigo hard and red. The precipitate is allowed to subside, the supernatant water is drawn off, and the moist precipitate is strained through a coarse bag. It is then boiled to separate a yellow extractive matter and increase the density and intensity of its color. It is then sent to the *dripping* or filtering vat, which contains a perforated false bottom covered with cotton cloth. The drained magma is placed in a strong bag and squeezed in a press, and the moist mass is cut with a brass wire into cubes about three inches each way. The cubes are dried in the air, a white efflorescence which appears during the drying being removed with a brush: 1000 parts of the liquor from the steeping vat yield 0.50 to 0.75 indigo. (2) *From Dried Leaves.*—The cuttings are dried in the sun, the leaves separated from the stems by thrashing, and stored away for convenient treatment. To obtain the indigo they are macerated for two hours with six times their bulk of water. The solution is treated as when obtained from wet leaves. As the use of dry leaves makes it possible to select the most suitable weather for macerating, the indigo produced is more uniform, and the fermentation, capricious in its course, is superseded by simple maceration.

In the hilly regions of India the leaves of the *Nerium tinctorium*, a small tree, are treated for the extraction of indigo. It is necessary to use hot water for steeping; 250 pounds of fresh leaves yield 1 pound of indigo. Dr. Schunck has explained why if the indigo-manufacturer does not manage the fermentation with great care the indigo will be poor in quality and small in quantity, and even in some cases entirely lose the coloring-matter. The indigluin produced by the decomposition of the indican is liable to pass by fermentation into alcohol and acetic acid, and these bodies unite with the indigo and form a body which resists oxidation, and consequently fails to furnish indigo:



**The commercial varieties of indigo** are very numerous. The Bengal indigo ranks first in quality; it is classified as—fine blue, fine purple and violet, fine red and violet, good purple and violet, middling violet, middling defective, consuming fine, middling and good, ordinary, and ordinary and lean trash. Some merchants recognize sixteen distinct grades. Besides the Bengal, there occurs in commerce the Java, twenty-one grades. The Bengal and Java range from 40 to 80 per cent. of indigo-blue; the remaining varieties vary from 10 to 37 per cent.; they are Coromandel, Oude, Madras, Manila, Egyptian, Guatemala, Caraccas, and Mexican.

**Properties of the Crude Indigo.**—The color is deep blue, with a shade more or less purple or violet. It is devoid of smell and taste. It may be dry or moist, hard or soft, compact or porous. Being always more or less porous, it adheres slightly to the tongue. Its fracture is dull and earthy. The streak produced by the nail is glossy and purplish-red in the best qualities; when it is dull, and the indigo furrows on each side of the streak, the quality is poor. The best indigo floats upon water.



**Composition of Crude Indigo.**—Besides indigo-blue (indigotine), which is the characteristic constituent of indigo, and which varies in quantity from 10 to 80 per cent., a variety of other bodies are present, either derived from the plant or added intentionally. Among these are (1) indigo-gluten, a nitrogenous body resembling ordinary vegetable gluten. It is extracted by treating the indigo with acid and then boiling with water. (2) Indigo-brown, extracted by alkalis. The indigo green of some authors is supposed to be a mixture of indigo-brown and a little indigo-blue. (3) Indigo red, extracted by boiling alcohol. (4) Brown resinous bodies. (5) Mineral matters (ash), usually from 6 to 12 per cent., but sometimes 30 to 40 per cent. in Madras indigo. They are composed of carbonate and phosphate of lime, oxide of iron, alumina, soda-salts, clay, sand, and sometimes a trace of copper and lead. (6) Water, from 3 to 10 per cent. Chevreul gives the following analysis of a fair sample of Guatemala indigo:

Indigotine .....	45.
Soluble in water: gum, etc., deoxidized indigo, a green matter combined with ammonia, etc. ....	12.
Soluble in alcohol: resin, green matters, a trace of indigo blue, .....	30.
A red resin, soluble in hydrochloric acid, .....	6.
Carbonate of lime .....	2.
Oxide of iron and alumina, .....	2.
Silica (sand) and clay .....	3.
	100.

The adulterants are starch (most common), rosin, Prussian blue, smalt, ground dyewoods, etc.

The purification of indigo is effected by boiling it successively with dilute acid, water, and alcohol. The pure indigotine may be extracted by changing it to soluble white indigo by reducing agents, as explained further on, and subsequently reoxidizing it.

**Indigo blue, indigotine, oxidized indigo ( $C_{16}H_5NO$ ),** may be obtained nearly pure by exhausting indigo by solvents as above mentioned. It may also be obtained (1) by sublimation, in crystals, mixing the powdered indigo with plaster of Paris and water, spreading it on an iron plate to harden, and carefully heating the dry cake; (2) by solution in boiling aniline, which deposits it in crystals on cooling; (3) by reducing it to soluble white indigo by contact with grape-sugar, soda-ley, water, and alcohol, or by contact with slaked lime, copperas, and water. The yellow solution obtained deposits indigotine as a blue powder when exposed to the air. Indigotine appears as blue crystals with a coppery lustre, or as a dark-blue powder, acquiring this lustre when rubbed with a hard body. It has neither taste nor smell, acid nor basic properties; sp. gr. 1.500. Heated in the open air, it melts, boils, and burns with a smoky flame. Heated in a current of air at about  $550^{\circ}F$ , it volatilizes without decomposition as a purple vapor. It is insoluble in water, in dilute hydrochloric and sulphuric acids, and in alkaline lyes, in cold ether, alcohol, oil of turpentine, and fatty oils. Its best solvent is boiling aniline. It is soluble to a greater or less extent in hot creosote, phenol, benzol, chloroform, alcohol, ether, essential oils, fatty oils, petroleum, amyl alcohol; in the acetates, chlorides, etc. of aniline, morphine, etc., bees' wax, Japan wax, Canada wax, paraffin, spermaceti, and stearic acid. It is soluble in anhydrous acetic acid to which a very small quantity of sulphuric acid has been added, and is precipitated from the solution by the addition of water. This is the only process known by which indigotine can be reproduced in its primitive state on fabrics, without previous reduction to soluble white indigo.

The action of sulphuric acid on indigo gives rise to three distinct compounds, the production of which depends upon the strength and ratio of the acid, the temperature, and the duration of the contact: it is difficult to conduct the reaction so as to prevent the formation of at least a small portion of each. If powdered indigo is digested with oil of vitriol, and the deep-blue liquid poured into 10 or 20 parts of cold water, a purple powder remains undissolved which is (1) sulphophenic acid, while the deep-blue solution contains (2) sulphindigotic and (3) hyposulphindigotic acid. By forming the ammonium salts of the last two acids, evaporating to dryness, and digesting with alcohol, the hyposulphindigotate only is dissolved.

**Sulphophenic Acid ( $2C_{16}H_5NO_3SO_3$ ), Sulphopurpuric Acid, Indigo Purple, Phœnicin.** This acid is best prepared by adding 1 part of indigo to 4 parts of oil of vitriol, and heating from 30 minutes to an hour, or until a drop gives a deep purple color with a large quantity of cold water. Too high a temperature or too long digestion causes the formation of much sulphindigotic acid. The acid mixture is thrown into 10 to 50 parts cold water, and the beautiful purple precipitate is collected on a filter and washed with weak hydrochloric acid. It forms a blue mass or a purple-

red powder. It is soluble in water, and soluble in strong sulphuric acid, especially in the fuming acid; both gradually change it into sulphindigotic acid, more rapidly if heated. It is insoluble in dilute acids. The salts of this acid are prepared by adding its solution to an aqueous solution of any salt. They appear as purple flocks, which are but slightly soluble in water. When dry they are red. Their solutions are blue; are reduced to yellow liquids by sulphydric acid, copperas, and lime, or by caustic alkalis, but become blue again on exposure to the air. Wool may be dyed with this acid by immersing it in an aqueous solution and adding a little hydrochloric acid. By passing the wool so dyed through a weak bath of carbonate of soda various shades of purple may be produced, a small quantity of sulphindigotic, which is always present, being removed, and the sulphophenic acid of soda being formed, which is a faster dye than the acid. A peculiar purple-blue, consisting probably of the soda-salt of this acid, has been invented by L. and E. Baileys (*Engl. pat. J.*, cliv. 318), and patented in England by Johnson. It is made by dropping powdered indigo into 20 times its weight of fused acid sulphate of soda, pouring the product into a large quantity of water, and adding common salt. It separates as a precipitate of silky crystals, possessing a beautiful coppery lustre when dry. See samples dyed with it in *Rep. Chim. app.*, 1861, p. 215.

**Sulphindigotic Acid ( $C_{16}H_5NO_3SO_3$ ), Sulphate of Indigo, Soluble Blue Indigo, Sulphindigic Acid, Sulphocarlic Acid.**—This acid is prepared by dissolving 1 part of indigo in 10 or 12 parts of concentrated sulphuric acid (6 parts of fuming acid answer the same purpose), and heating the whole for several hours at  $120^{\circ}F$ . The operation is complete when a portion dissolves completely in cold water. The product is a mixture of this acid with hyposulphindigotic acid. To free it from this, and the impurities derived from the indigo, well-washed wool is allowed to absorb the dyes from the solution. This is washed in water and digested in a dilute solution of carbonate of ammonia, which dissolves both acids. On evaporating to dryness the two ammonia-salts may be separated by alcohol (83 per cent.) in which the sulphindigotate is insoluble. This separation is not resorted to in practice, the mixture of the two acids being used directly. The sulphindigotic acid may be freed from the excess of sulphuric acid by adding an excess of a solution of common salt. It is then obtained as a blue precipitate which may be drained on a filter. Sulphindigotic acid is very soluble in water and in alcohol, but not in strong saline solutions. Charcoal, especially that from blood, removes it completely from its aqueous solution, but yields it to alkaline carbonates. It is decomposed by an excess of caustic alkali, and the color cannot be restored. Reducing agents, as stannous and ferrous salts, sulphydric acid, nascent hydrogen, etc., decolorize it, the color being restored by exposure to the air. Sulphindigotates are formed by neutralizing the free acid or by double decomposition. They do not crystallize, are dark blue with a coppery lustre, and taste feebly saline and decidedly of indigo. The alkaline sulphindigotates are slightly soluble in cold water (requiring 100 to 150 parts), more so in hot water. The lime, magnesina, and alumina salts are freely soluble. The solution is blue by reflected light, red by transmitted light.

**Alkaline Sulphindigotates, Indigo Carmine, Blue-Carmine, Soluble Indigo, and Precipitated Indigo** are prepared by adding alkaline carbonates to the diluted solution of the acid. They appear as precipitates, being insoluble in saline solutions; the alkaline sulphates formed at the same time are sufficient for the purpose. The potassium-salt dissolves in 140 parts of cold water, and in much less boiling water; 1 part of salt gives a blue color to 500,000 parts of water, about  $\frac{1}{10}$  grain per gallon. Water containing 1 per cent. of acetate of sodium does not dissolve it in the cold. It is soluble in sulphuric acid, insoluble in concentrated hydrochloric and in alcohol of sp. gr. 0.800. The sodium-salt resembles the potassium-salt, and is used for similar purposes, much more extensively. It is more soluble in saline solutions. Besides being useful as a dye, the indigo carmine is used as a water-color pigment, and made into balls with starch and a little gum water it is used as washing blue.

**Hyposulphindigotic Acid, Hyposulphocarlic Acid.** This acid, the composition of which is not known, has been already mentioned as always occurring in the solution obtained by treating indigo with sulphuric acid. The acid differs little from sulphindigotic acid, and the salts are distinguished chiefly by their solubility in alcohol of 84 per cent.

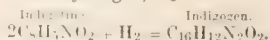
**Commercial Preparations of Indigo and Sulphuric Acid** are mixtures of the three acids above mentioned or their salts. There are three distinct kinds of preparation: (1) The simple solution of the acid in water, known as *Saxon*



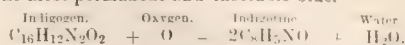
blue (having been first introduced by Barth at Grossenhayn in Saxony in 1745), *chemic*, *chemic blue*, *sour extract of indigo*, *sulphate of indigo*, etc. Numerous receipts are given for its preparation. Persoz says mix 1 pound each of indigo, fuming sulphuric acid, and oil of vitriol. After standing 48 hours, heat the mixture over a water-bath till it gives no precipitate in cold water. Dilute to 1.134 or 18° B. Haussmann uses indigo 1, fuming acid 6.5. Another adds gradually 1 part indigo to 5 or 6 fuming acid or 10 to 12 common acid, allows it to stand 24 to 48 hours, pours into cold water, and filters. Another: 1 pound indigo in 15 pounds common acid; keep at 120–140° F. for three days. (2) The precipitated acids, *paste*, *sweet extract*, made by adding a strong solution of salt to the diluted and filtered solution of indigo in sulphuric acid. *Receipts*.—1 pound indigo, 5 acid, 10 to 12 hours at 100° F., diluted with 3 gallons water, filtered, concentrated to 3 gallons, treated with 1 pounds of common salt, drained on a filter. Another: 10 pounds indigo, 80 acid, 24 hours at 80° F., diluted with 5 gallons water, treated with solution of 80 pounds salt in smallest quantity of water. (3) Neutral soda-salts, *indigo carmine*, *soluble indigo*, *solid blue*, *chemic*, *cerubin*, *cerule sulphate*, *extract of indigo*. This is made by neutralizing the solution of indigo in sulphuric acid by carbonate of soda; being insoluble in saline solutions, it appears as a precipitate, which is washed on a filter with solution of salt, and sold as a paste or as a dry powder. The washing with salt-solution removes green matters (chlorophyll?) and improves the shades. *Receipts*.—Add 37 pounds acid to 4 pounds indigo, keep at 60°–70° F. for 8 days. Pour into it a solution of 40 pounds salt, then a solution of 60 pounds carbonate-of-soda crystals; add 2 pounds precipitated carbonate of lime; filter, wash with salt-solution. The yield is 120 pounds. Adding acid to indigo secures a richer and purer color. An inferior quality is made with 8 pounds indigo, 74 acid, 144 salt, 112 carbonate-of-soda crystals, and 4 chalk, in same manner. A fair sample of carmine of indigo gave water 85., indigo 10.2, saline residue 4.8.

*Dyeing with Sulphuric Acid Compounds of Indigo*.—(1) Cotton has no affinity for these compounds, and they are never used except for a faint bluing for market, as in washing clothes. For this purpose the free sulphuric acid is removed by acetate of lead, or neutralized by acetate of soda, the product being erroneously called "acetate of indigo." (2) Wool is dyed only in the acids or in carmines acidulated, as alkalies, and even soap, are liable to remove the color. Saxon blue (acid) was formerly used with alum and cream of tartar. Carmine is now preferred with alum and cream of tartar, used warm. For printing, so-called "acetate of indigo" is used. These colors are fugitive, and are now generally replaced by Prussian blue, etc., except for compound colors, as green, olive, gray, black, etc. (3) Silk is dyed in the same manner as wool, but is generally first alumed. Carmine is generally used, as it is easily fixed, and is free from the green tinge of the acids. For printing, a solution of carmine, with oxalic acid and gum, with sometimes a little alum, is used.

*Indigo White* ( $C_{16}H_{12}N_2O_2$ ), *Indigogen*, *White Indigo*, *Reduced or Decolorized Indigo*. The sulphuric acid compounds of indigo already described are not suitable for dyeing cotton, and as they do not give colors on wool and silk that can be considered fast, indigo would have but a limited application in dyeing and calico-printing were it not for the indigo-white. This compound is produced by the action of reducing agents on indigo, and results in the addition to a double molecule of indigotine of a double atom or molecule of hydrogen,  $H_2$ :



Chevreul supposed that indigogen existed ready formed in the indigo plants, but this was shown by Schunck to be erroneous, (1) because indigogen is soluble only in alkaline solutions, while the juices of these plants are acid; (2) because indigogen turns blue on exposure to the air by oxidation, forming indigotine; (3) he determined the compound existing in the plants to be the glucoside indican ( $C_{26}H_{31}NO_{17}$ ), as already stated. The indigogen being soluble in alkalies, the dyer has only to impregnate his yarns and fabrics with the solution and expose them to the atmosphere, when the insoluble blue indigotine is formed throughout their substance, and they are uniformly dyed with the most permanent and insoluble blue.



(For advanced views on the constitution of indigotine and indigogen see Löwenthal *J. pr. Chem.*, lxx, 463.; Baeyer (*Ber. Chem. Ges.*, 1868, 17), and A. Strecker (*Jahresb. d. Chem.*, 1868, 789).) A great variety of reducing agents accomplish this change in indigotine:

(1) Alkaline metals which decompose water, as sodium, potassium, sodium amalgam, etc.

(2) Metals which decompose water in the presence of an alkaline base, as tin, antimony, aluminum, zinc, and phosphorus.

(3) Metallic oxides capable of higher oxidation, as ferrous, manganous, and stannous oxides.

(4) Acids capable of higher oxidation, as phosphorous, hypophosphorous, hyposulphurous, and sulphurous acids.

(5) Some sulphurets, phosphurets, and arsenurets, as realgar, orpiment, stannous sulphide, sulphides of antimony, potassium, sodium, hydrogen, etc.

(6) Organic bodies oxidizable in presence of alkalies, as glucose, gallic acid, etc.

(7) Reducing and alkaline fermentations, as the butyrous and urinous.

Löwenthal denies the production of indigogen by sulphurous and phosphorous acids, sulphide of potassium, and some of the other substances mentioned above. (*J. pr. Chem.*, lxx, 463.)

Indigogen may be prepared from indigo purified by hydrochloric acid by mixing it with slaked lime, ferrous sulphate, and water in vessels so arranged that air is excluded. The clear yellow solution produced is transferred to another vessel, and the indigogen precipitated by hydrochloric acid. The precipitate is filtered in an atmosphere of carbonic acid, and washed with dilute sulphurous acid. It is a grayish-white, lustrous body, insoluble in water and acids, soluble in alkalies, alcohol, and ether. Its solutions are yellow, and turn blue and deposit indigotine when exposed to the air. Indigogen forms with lime a neutral compound readily soluble in water, and a basic compound almost insoluble. The latter is precipitated from a solution of the neutral compound by digestion with an excess of lime. It is also formed when indigo is digested with copperas and an excess of lime in making the solution of indigogen. It is a lemon-yellow compound, which in the air becomes first green, then blue. Most metallic salts produce in solutions of indigogen precipitates which are generally white, but become blue in the air. Berzelius supposed from these properties of the lime-compounds that an excess of lime should be carefully avoided, but Schlumberger has shown that in practice other conditions occur which not only prevent any injurious results from such excess, but make its presence very desirable.

*Application of Indigogen in Dyeing and Calico-printing*.—This form of indigo being soluble, can be made to penetrate textile fibres, and when by oxidation the indigogen is converted into insoluble blue indigotine, the color is fixed in the pores of the fibres, so as to adhere firmly and resist the action of washing and soap. Indigogen is employed as follows:

(1) *Ordinary "Vat dyeing"*.—The indigo is reduced and dissolved, and the yarn or cloth is immersed, and then exposed to the air. Figures in white, which may even be colored, are produced by printing on *resists* beforehand, which prevent the penetration of the dye, or discharges after dyeing, which remove the color.

(2) *"Pencil Blue"*.—The solution of reduced indigo is printed or painted on certain portions only of the cloth with a "pencil," a small flat, blunt-pointed piece of wood.

(3) *"Precipitated or Fast Blue"*.—Indigogen is precipitated as a paste in combination with strongly reducing metallic oxides, as hydrated stannous oxide, to prevent too rapid oxidation. This paste, properly thickened, is printed on the goods, and the cloth is then passed through lime-water or soda-ley to replace the stannous oxide and form a soluble compound of indigogen, which penetrates the fibre and is fixed by subsequent exposure.

(4) *"China Blue"*.—Pulverized indigo is printed on the cloth, and then so treated, by passing it successively through milk of lime, copperas, soda-ley, and sulphuric acid, as to fix the color by causing local reduction and solution, and subsequent oxidation.

The *indigo vats* or solutions employed by dyers and calico-printers are varied according to the character of the goods.

*Cold vats* are produced by reducing agents of a mineral origin, while *warm vats* are produced by organic matters which undergo fermentation, and thus develop indigogen.

(1) *The Copperas Vat*.—To 2000 gallons water are added 60 pounds indigo, 180 slaked lime, 120 ferrous sulphate (copperas), which must be free from every trace of copper-salt. This vat is used for calico, linen yarn, linen thread, and hemp yarn and thread. After exposure to the air the color of the goods can be improved by passing them through hot milk of lime or caustic alkali, by which some yellow matters are eliminated.

(2) *The Tin Vat*, commonly used for calico-printing.—The indigo is reduced by a solution of stannous oxide in soda-ley. By adding to this an acid solution of tin, a pre-



opitate is obtained consisting of indigogen and stannous oxide, which is used in printing.

(3) *The Orpiment Vat* is made by mixing indigo, sulphide of arsenic, and potash. It is chiefly used in calico-printing.

(4) *The Zinc Vat* has recently been introduced by R. Schloesser & Co. of Manchester, Eng., as a marked improvement on the copperas vat. It is free from the bulky precipitate of oxide of iron, and avoids the loss of indigo due to its combination with this oxide. It is composed of 2000 gallons of water, 20 pounds indigo, 30 iron borings, 30 of their remarkable powdered zinc, 35 quicklime. The zinc furnishes hydrogen by decomposing water.

(5) *The Hyposulphite Vat* was introduced by Schützenberger and De Lalande (*Chem. Centr.*, 1873, 735). The authors employ a solution of sodium hyposulphite as the reducing agent for the indigo. A solution of sodium bisulphite of 30° to 35° B., is agitated with pieces of sheet or granulated zinc in a closed vessel. The quantity of zinc should fill about one-fourth of the internal space of the vessel. After about an hour the solution is mixed with milk of lime in excess, which precipitates the zinc-salt. After agitation and the addition of water, the liquid is filtered or the clear solution decanted, the whole operation being conducted with as complete exclusion of air as possible. The hyposulphite solution so obtained is added to the indigo, together with the necessary amount of lime and soda. The yellow solution obtained contains, as insoluble constituents, only the earthy matters in the indigo. From 1 kilo. indigo a very concentrated vat of from 10 to 15 litres can be prepared. The dyeing of cotton takes place in the cold, that of woollens with gentle warmth. The excess of sodium hyposulphite is said to reduce the froth which forms on the surface of the bath. By adopting the foregoing method in the case of woollens, clearer and fresher tints are obtainable. A new method of printing with a concentrated and thickened alkaline solution of indigo reduced with great excess of sodium hyposulphite, gives universal satisfaction, and is certain to supersede the older costly and troublesome process in which tin and tin-salts are employed. For oxidation, the printed pieces are hung out in the air 12 to 14 hours, and then washed and soaped. In comparison with the older method, 50 to 60 per cent. of indigo is economized, the shades are finer and more permanent, and the definition sharper.

(6) *The Woad or Pastel Vat*.—In former times woad was the only material known to the dyers of Europe for producing the blue color of indigo. For this purpose it was previously submitted to a peculiar process of fermentation, and the product was named *pastel* in France. For most purposes indigo has taken the place of woad in the dye-house, and for cotton goods it is now used alone. In the dyeing of woollen goods, however, the use of woad has been retained to the present day, for the purpose rather of exciting fermentation, and thus reducing the indigo which is employed at the same time, than of imparting any color to the material to be dyed. Indeed, the woad used by woollen dyers in this country contains no trace of coloring-matter. Various substitutes, such as rhubarb-leaves, turnip-tops, weld, and other vegetable matters, have accordingly been tried, but without success, since the fermentation is more steadily maintained by means of woad than by any other material. Pastel, which does contain a little blue coloring-matter, is preferred to woad by many of the French dyers. The materials employed in the ordinary woad or pastel vat, in addition to woad and indigo, are madder, bran, and lime. The chemical action which takes place in the woad vat is not difficult to understand. The nitrogenous matters of the woad begin, when the temperature is raised, to enter into a state of fermentation, which is kept up by means of the sugar, starch, extractive matter, etc. of the madder and bran. In consequence of the fermentation, the indigo-blue becomes reduced, and is then dissolved by the lime, thus rendering the liquid fit for dyeing. Great care is necessary in order to prevent the process of fermentation from passing into one of putrefaction, which if allowed to proceed would lead to the entire destruction of the indigo-blue in the liquor. If any tendency to do so is observed, it is arrested by the addition of lime, which combines with the acetic, lactic, and other organic acids that commence to form when putrefaction sets in. On the other hand, an excess of lime must also be avoided, since the reduced indigo-blue is thereby rendered insoluble, and unfit to combine with the material. In setting a vat the following materials are used: 5 cwt. woad, 30 pounds indigo, 56 bran, 7 molder, and 10 quarts lime. The vat is first filled with water heated to 140° F.; the materials are then added and well mixed. The whole is covered, and allowed to stand over night. At 6 o'clock the next morning 5 quarts more lime are added; at 10 o'clock, 5 pints more; at 12, the vat is heated to 120° F.; and at 3, another quart of lime is added. The vat is now ready for use. (*Ure*.)

(7) *The Potash or Indian Vat*.—Eight pounds of powdered indigo are added to a bath containing 3½ pounds bran, 3½ pounds madder, and 12 pounds potash, which is maintained for several hours at a temperature of 200° F. It is then allowed to cool to 100° F., when fermentation ensues. After about 48 hours the indigo is rendered soluble, being reduced by the decomposition of the sugar and other products contained in the bran and the madder-root during the process of fermentation. The bath should have a greenish-yellow appearance, having a frothy scum of a blue coppery hue. (*Calvert*.)

(8) *The German Vat*.—Of late years improvements have been made in this class of vats, by which the expense of using madder is avoided. They are now prepared by adding to water, at a temperature of 200° F., 20 buckets bran, 26 pounds soda crystals, 12 pounds indigo, and 5 pounds slaked lime. After five hours the bath is allowed to cool to 100° F., when fermentation ensues and the indigo is dissolved in the alkali. (*Calvert*.)

(9) *The Urine Vat* is employed only in small dye-houses and in certain localities, as at Verviers, for the dyeing of wool. The putrefying urine furnishes at once the reducing agents to convert the blue into white indigo, and the ammonia necessary to dissolve the latter. (*Watts's Dict.*)

*Resists* for printing on cloth to prevent the dyeing of certain portions, and thus produce figures on a blue ground, act either mechanically, as wax, pipeclay, etc., or chemically, by oxidizing the indigogen before it can penetrate the fibre, as salts of copper, mercuric chloride, etc. The following are receipts for different results (*Crooks*, p. 474): (1) *For Deep Blue*.—Water, 4 litres; sulphate of copper, 1.25 kilos.; acetate of copper, 500 grms.; nitrate of copper, 875 grms.; alum, 240 grms.; pipeclay, 2,125 kilos.; dextrine, 1.25 kilos. (2) *For Medium Blue*.—Water, 4 litres; sulphate of copper, 500 grms.; acetate of copper, 250 grms.; nitrate of copper, 500 grms.; alum, 240 grms.; pipeclay, 2 kilos.; dextrine, 1 kilo. (3) *Red Resist, so-called Lapis*.—Red liquor (acetate of alumina), sp. gr. 1.07, 12 litres; gum senegal, 2 to 3 kilos.; pipeclay, 4 to 6 kilos.; olive oil, 1 kilo.; sulphate of copper, 1 kilo.; nitrate of copper, 500 grms.; sal-ammoniac, 1.5 kilos. (4) *White Lapis, No. 1*.—Lime-juice, sp. gr. 1.109, 5 litres; thickened lime-juice, thickened with 1.5 kilos. of gum upon 2 litres, 1.5 litres; sulphate of copper, 1 kilo.; pipeclay, 3 kilos. *No. 2*.—Water, 2 litres; sulphate of zinc, 1 kilo.; pipeclay, 725 grms.; gum senegal, 500 grms.; solution of nitrate of copper, sp. gr. 1.52, 0.12 litre. (5) *For White Under-mordants and for Blue Contours*.—Caustic soda solution, sp. gr. 1.070, 8 litres; arseniate of potassa, 3.5 kilos.; corrosive sublimate, 500 grms.; pipeclay, 3 kilos.; gum senegal, 1.5 kilos.

*Discharge Patterns* are produced by dyeing the cotton cloth of a uniform blue in the copperas vat, and then printing upon it the desired figures with some powerful oxidizing agent, which will destroy the blue indigotine by converting it into soluble isatin, leaving the figure in white. The most useful discharge is chromic acid, but as it would be exhausted by the thickener before it reached the cloth, a circuitous process must be resorted to in order to secure its action. On the blue cloth bichromate or chromate of potash is padded (see CALICO-PRINTING), and when this has been dried in the dark, the figures to be discharged are printed with a mixture of acid: oxalic, tartaric, nitric, or sulphuric; a thickener, gum, dextrine, or starch; and some pipeclay. The chromic acid is set free and the color discharged at once, and the goods are washed in warm water to which some chalk has been added to neutralize the excess of acid. Another plan is to print on the blue cloth chromate of lead properly thickened, and pass through warm hydrochloric acid, when chromic acid and chlorine are liberated, which discharge the color. Hydrated binxide of manganese may be substituted for chromate of lead. The discharges can be made to include mordants, so that colored designs on a blue ground may be produced. Thus, if acetate of alumina or of iron, or both together, be mixed with a discharge, and the alumina fixed in the washing off, the goods may be dyed in madder or garancine with the production of red, lilac, purple, or chocolate designs. Sometimes the discharge and resist are combined together; for instance, on a light-blue ground are printed simultaneously, first, an ordinary resist; second, the same resist, to which have been added bichromate of potash and hydrochloric acid; on vating again a pattern of light blue and white will be found on a deep blue ground. *Resists*.—(1) Chrome liquor: water, 2 litres; yellow chromate of potash, 500 grms. (2) Acid composition: tartaric acid, 3 kilos.; oxalic acid, 250 grms.; dextrine, 4 kilos.; nitric acid, 500 grms.; water, 4 litres.

*Printing Penel Blue*, for which the orpiment vat is used, was formerly effected by hand, but is now accomplished from rolls by the aid of the "doctor box," by which the blue oxidized layer of color is removed and the roll works



last in the green solution containing the indigogen, carrying it at once to the cloth. *Receipt for an Opulent Mixture for Dark Pencil Blue.*—Indigo-pulp, 10 gallons, containing 40 pounds indigo; yellow orpiment, 10 pounds; soda-ley, 70° Tw., 1½ gallons; water, 18½ gallons; lime, 4 pounds. Boil till yellow, when spread on glass; let settle, and thicken the clear liquor with 120 pounds gum senegal. (For further details with regard to use of indigo in calico-printing see works mentioned at end of this article.)

*Products of the Decomposition of Indigo.*—Chlorine destroys moist indigo, as well as its sulphuric-acid compounds, with the formation of a variety of products which vary with the conditions of the treatment. Among them have been noticed trichlor-aniline, trichlor-phenol, chlor-isatin, and dichlor-isatin. Dilute nitric acid produces isatin ( $C_8H_5NO_2$ ) and a brown resin; a stronger acid forms indigotin (nitrosaleiclic acid ( $C_8H_3NO_3$ ); very strong acid (sp. gr. 1.45) yields picric acid (trinitrophenol) ( $C_6H_3NO_7$ ), forming at the same time carbonic, prussic, and oxalic acids, and the so-called artificial indigo-resin; 5 parts fuming nitric acid become so heated with 1 part indigo that the mass takes fire. Chromic acid destroys indigo, with the formation of isatin. Boiled with dilute potash, indigo is but slightly attacked, but with strong potash it is completely decomposed, with the formation of indigogen and isatate of potassium,  $KC_8H_5NO_3$  (Gerhardt, *Rep. Scienc.*, x, 371), of chrysanic acid (Fritzsche). Fused with potassic hydrate, it yields, first, isatic acid ( $C_8H_7NO_3$ ); then, from this, phenyl-carbamic acid ( $C_7H_7NO_2$ ); and further salicylic acid ( $C_7H_5O_3$ ), and phenylamine (aniline),  $C_6H_5N$ .

*Artificial Indigo.*—The nature of the products derived from indigo as just mentioned has created the impression in the minds of chemists that indigo will be prepared artificially from carbolic acid. Recently, Emmerling and Engler have actually produced indigotine from a compound acetone discovered in 1857 by Friedel, which they call *acetophenone*. Indigotine is isomeric with cyanide of benzoyl,  $C_7H_5O.CN$ .

*Testing and Valuation of Indigo.*—Water is determined by drying a weighed sample at 212° F. in a platinum crucible. After weighing, the whole is ignited for the percentage of ash. Starch may be detected by boiling with slightly alkaline water, and testing the cold filtrate with iodine. Older methods for determining approximately the percentage of indigotine were based upon oxidation—more recent methods on reduction. The following methods are given in *Watts's Dict.*:

(1) *With Chlorine Water.*—A weighed quantity of the finely pulverized indigo is added by small portions to a measured quantity of a saturated aqueous solution of chlorine as long as it dissolves with yellow color, and the quantity thus dissolved is ascertained by weighing the residue. A similar trial is then made with perfectly pure indigo-blue, and a comparison of the two results gives the proportion of coloring-matter in the sample of commercial indigo under examination. As the strength of the chlorine-water alters very quickly, it cannot be titrated long beforehand. (*Beszelius*.)

(2) *With Chloride of Lime.*—The indigo is first dissolved by digestion for five or six hours at 50° or 60° with fuming sulphuric acid; the solution is thoroughly mixed with distilled water, and poured into a graduated burette, and from this vessel it is added drop by drop to a measured quantity of aqueous chloride of lime, till the blue color just becomes permanent. A similar experiment being then made with an equal weight of pure indigo-blue, the coloring power of the two samples is in the inverse ratio of the quantities of the blue solution consumed in the two experiments. (Schlumberger, *Bull. Soc. industr. de Mulhouse*, vol. xv.)

(3) *With Hydrochloric Acid and Chlorate of Potassium.*—1 gm. of finely pulverized indigo is digested for some hours with 10 grms. of fuming sulphuric acid, agitating from time to time to assist the solution. The liquid is then poured into a basin containing a kilogramme of water; 50 grms. of strong hydrochloric acid are added, and the liquid is heated to the boiling-point. On the other hand, 0.25 gm. of chlorate of potassium is dissolved in 100 grms. of water, and the solution is poured into a graduated burette, and added drop by drop to the boiling indigo solution till the blue color changes to red-brown. The richness of the sample of indigo is directly proportional to the quantity of chlorate consumed. (Bolley, *Ann. Ch. Pharm.*, lxxv, 242.)

(4) *With Sulphuric Acid and Acid Chromate of Potassium.*—The mode of proceeding is the same as that just described; 10 grms. of pure indigo-blue prepared by Fritzsche's method require for decoloration exactly 7½ parts of the acid chromate. (Penny, *Chem. Soc. J.*, v, 297.)

All these methods are liable to the objection that it is difficult to institute an exact comparison between the different shades of color resulting from the oxidation of the

indigo in different cases, the pure green tint thus produced in solutions of pure indigo-blue giving place to a dirty olive or brownish-green when crude indigo is used, in consequence of the impurities contained in it. Moreover, in dissolving indigo in strong sulphuric acid it is scarcely possible to avoid the formation of sulphurous acid, the presence of which will of course raise the apparent percentage of indigo-blue in the sample. By employing these methods, indeed, it is common to find in a good sample of indigo more than 80 per cent. of pure indigo-blue, whereas the best qualities seldom contain above 60 per cent., and average qualities not more than 40 to 50 per cent.

The following methods, which depend upon the reduction instead of the oxidation of the indigo, give more exact results:

(5) *With Protosulphate of Iron.*—A weighed quantity of the finely pulverized indigo is well mixed with an equal weight of pure lime previously slaked with water. The mixture is poured into a stoppered bottle of known capacity, and the mortar is well rinsed with water, which is added to the rest. The bottle is now heated in a water-bath for several hours, and a quantity of finely powdered sulphate of iron is added; the bottle is then filled up with water; the stopper is inserted; and after the contents have been well shaken, the whole is left at rest for several hours, till the indigo is reduced and the sediment has sunk to the bottom. A portion of the clear liquor is then drawn off with a siphon, and the quantity of liquid having been accurately measured, it is mixed with an excess of hydrochloric acid, and the precipitate, after having been oxidized (by exposure to the air), is collected on a weighed filter and washed with water. Lastly, the filter with the indigo-blue is dried at the heat of the water-bath and weighed; and the weight of the filter having been subtracted from that of the whole, the weight of the indigo-blue is ascertained. Suppose, for example, that the whole quantity of liquid was 200 measures, and that 50 measures have been drawn off, yielding 10 grains of indigo-blue: then the total quantity of indigo-blue in the sample is 40 grains. For 60 grains of indigo it is necessary to take from 1 pound to 2 pounds of water. This method, though rather tedious, gives better results than any of the preceding. The quantity of indigo-blue indicated by it is usually somewhat less than the actual quantity contained in the sample.

Leuchs (*Zeitschr. f. Chem.* [2], v, 159) converts the indigo into indigo-white by digestion with ferrous sulphate and milk of lime, mixes the clear solution, acidulated with sulphuric acid, with a solution of ammonio-ferrous sulphate, and determines the quantity of ferrous salt thereby produced by means of a  $\frac{1}{10}$  normal solution of potassium chromate. The conversion of indigo-white into indigo-blue by ferric salts takes place as shown by the equation:  $C_{16}H_{12}N_2O_2 + Fe_2O_3 + 2FeO + H_2O + C_{16}H_{10}N_2O_2$ . 1.31 gm. of the sample of indigo is mixed, in a tall cylindrical, well-closed vessel, with a quantity of lime and solution of ferrous sulphate occupying 300 cub. cent.; 100 c. c. of the clear solution are then added to 66½ c. c. of a solution of ammoniacal iron-alum acidulated with sulphuric acid; the liquid is filtered, and 100 c. c. of it titrated with the  $\frac{1}{10}$ th chrome-solution. If the latter be added from a measuring tube divided into ½ c. c., each division will correspond to 1 p. c. indigo-blue in the sample under examination.

(6) *With Stannous Chloride.*—The tin-solution is titrated with a solution of pure indigo-blue, prepared by dissolving the substance dried at 210°–230° C. (410°–446° F.) in 16 parts of strong sulphuric acid, with the addition of pounded glass to divide the indigo and facilitate the solution. The indigo-solution thus obtained is diluted with water till a litre of it contains exactly 1 gm. of indigo-blue. The indigo to be examined is then dissolved in a similar manner, and the titrated tin-solution is added to it from a burette till the blue color changes through green to light yellow. Iron, if present in the indigo, must first be removed by digestion in hydrochloric acid, with addition of pounded glass. (E. Mulder, *Scheik. Onderz.*, iii, [1], 37; *Jahresber.*, 1860, p. 613.)

(7) *With Zinc.*—A solution of indigo in sulphuric acid is diluted with water and hydrochloric acid, and decolorized by zinc in an atmosphere of carbonic anhydride. A measured volume of this solution is then introduced into a graduated tube filled with air or oxygen gas, and the volume of oxygen absorbed is read off after a few hours. A similar experiment is then made with pure indigo-blue, and the value of the commercial sample is determined by comparison of the results.

*Literature.*—In addition to the works mentioned at the end of CALICO-PRINTING, see *Notes upon Indigo*, by John Q. Hayes, in the *Bulletin of the National Association of Wool Manufacturers* (Boston, 1873); *Lecture by Dr. Grace Calvert*, *Am. Chemist*, iii, 221; *Handbook of Dyeing and Calico-printing*, by W. Crooks (London, 1874). C. F. CHANDLER.



**Indigo Bird**, *Cyanospiza cyanea*, one of our most beautiful native finches, is of a rich greenish-blue, feeds on seeds and insects, nests in the U. S., usually on a low bush or on tall grass, and winters in tropical America. The bird is nearly six inches long, and has a brief but very pleasant song.

**Indigotine.** See INDIGO, by PROF. C. F. CHANDLER, Ph. D., M. D., LL.D.

**Indirect.** In music, consecutive unisons, fifths and octaves, are said to be indirect when they are not actually expressed in form, but still implied or involved in the progression.

**Indium** [Gr. *indikon*, "dark-blue dye"], a metal discovered by means of the spectroscopic in Freiberg zinc-blende by Reich and Richter in 1863. It has since been found in various zinc minerals and in wolfram, also in the flue-dust of the furnaces in which zinc ores are treated, as well as in the zinc itself. The zinc-blende of Roxbury, Conn., was found by Prof. Cornwall to contain a considerable proportion of indium. The Freiberg zinc contains about 0.05 per cent. of indium. Böttger found the flue-dust of the Gossler furnaces to contain about 0.1 per cent. of the oxide  $\text{In}_2\text{O}_3$ . Metallic indium is obtained by dissolving the ores or metal in acid and adding pieces of metallic zinc to the solution. The indium, together with some small amounts of other metals, is thereby precipitated in the metallic state. When purified the metal is found to have a bluish-silvery lustre, resembling lead in its softness and ductility. Its specific gravity is 7.421, atomic weight 113.4. It tarnishes slowly in air. Its melting-point is  $176^\circ \text{C}$ . ( $349^\circ \text{F}$ ). Its very low fusion point compared with other metals permanent in air is a striking peculiarity. It is not very volatile, and resists oxidation at temperatures considerably above its point of fusion. The spectrum consists of two blue lines. E. WALLER.

**Individuality** [Lat. *individuum*, "that cannot be divided"], in the ordinary sense of the word, is defined as "a state of oneness" (*Arbuthnot*), or "the quality of being individual; separate or distinct existence" (*Worcester*); and the idea obtained is of a complete unit which is itself indivisible without mutilation. The current idea, inasmuch as it is based chiefly upon a contemplation of the higher forms of life, is so distinct in this respect that it assumes an axiomatic character, but, far from being thus self-evident, there are few questions involved in such uncertainty, and concerning which opinions have varied so widely, as respecting this very subject. Some of the definitions that have been given are radically antagonistic. Thus, on one hand, Schultz-Schultzenstein, in the consideration of plants, has regarded "not only the shoot, but even its single parts, the internodes, with their leaves, as series of individuals shooting out of each other, or intimately connected by continuable bud formation." On the other hand, Huxley, by the study of the phenomena of increase in the lower animals, was led to believe that "the individual animal is the sum of the phenomena presented by a single life; in other words, it is all those animal forms which proceed from a single egg, taken together." The many intermediate views have been based upon a partial consideration of the facts in the case, and take their shade from the nature of the phenomena studied. If we attempt to apply either of the definitions cited, the results will often appear to be absurd in view of the conventional idea of individuality. Thus, if we accept the signification of Schultz-Schultzenstein for the plant, for the coral animal, or for the protozoon, not only will the flowers and the leaves, as well as the distinct animals, be individuals, but the intermediate spaces will represent indefinite individuals: in this case potentiality of individualism, or the possible future development of a more or less perfect plant or animal from the space in question, is confounded with actual individuality, or the positive development of a plant or animal. But if we accept Huxley's definition it becomes, in the lower forms of life, equally impossible to recognize either the constituents of the individual or the complete individual. Inasmuch as the sum of the production of an egg or a seed constitutes the "individual" in the case of polyps, hydroids, etc., which are capable of indefinite reproduction by budding and by excised parts, the traces of individuality would be only evident if the entire life-phenomena, from the moment of excision from the egg to the death of the last constituent, could be observed: in the case of plants, too, the constituents of the individual may be propagated for centuries, and may be spread over the globe—e. g. the weeping willows, and the many plants that are almost exclusively raised from buds or shoots—and although they may be thus entirely disconnected, and many of the derivative plants dead, inasmuch as they were derived from the same germ, they are only parts of an individual. Such are the contrary views that have been

entertained, and such the logical results of the opposite views. At first, both views might appear equally absurd, but they are really not so, and both are worthy of serious consideration. They follow naturally from different ways of viewing the diffused or limited individuality in the lower forms of life, which differs thus widely from the specific individuality in the higher and more familiar forms. Nevertheless, the mind revolts from such extension of the idea of individuality, and a study of certain phenomena, and the terms generally applied to them in the higher forms of life, may furnish hints for a more satisfactory restriction of the term "individual."

In the domain of teratology, or the science which treats of monsters, there is a special department of double monsters—i. e., the undoubted product of a single egg or ovum, but the contents of which were early segregated into two more or less distinct components, and both developed therefrom. There is, among such monsters, every grade of differentiation up to those twin organisms, such as the "Siamese Twins," which severally manifest differences of habit and temperament, as well as possess a nearly or quite complete and independent set of organs. Now, whatever we might call the other double monsters, and wherever we might be disposed to draw the line of distinction, the world would undoubtedly regard each of the constituents of the compound organism known as the "Siamese Twins" as an individual man.

If we also view the female of any vertebrate animal, we shall find a greater or less number of well-developed eggs, and potentially each of those is an individual, as under certain exciting causes it may develop into an organism similar to the parent. Nevertheless, there is room for much difference of opinion as to when, exactly, the individual comes into existence, for there are all grades from the formation of the egg to its maturity as a simple egg, its fecundation, and the development thereafter of a fœtus. A similar although less obvious difficulty as to the precise identification of the individual thus may or does prevail in the vertebrates as in the lowest of animals and plants. It may also be recalled that the body of man as well as all other animals is subject to constant changes by molecular action. Distinguishing, however, between potential and fully-developed individuality, we may, from the consideration and appreciation of the phenomena which would be generally recognized as individuality in the higher animals, be furnished with a clue for its recognition in the lower.

If, now, we are prepared to admit, e. g., the "Siamese Twins" as true individuals, notwithstanding their union and their origin from a single ovum, we must be prepared to apply the same principles to other forms, and designate as individuals forms which resemble and are homologous with others possessing all the elements of individuality. Thus, in the case of the common "sea-flowers" or "sea-anemones" (*Actiniidae*, etc.) we have undoubted individuality exhibited in the single product of each egg, and which does not increase by budding. But in the case of the colony of coral animals we have a number of similar forms connected together and constituting a tree-like combination. Inasmuch as there is in all except their union an exact homology between the *Actiniidae* and each of the coral animals, we are therefore compelled to recognize each constituent of the colony as an individual. In like manner are we obliged to recognize the individuality of the several constituents of the colony among anelephs, but in the case of many of these there is every gradation between a specialized individual and a mere permanent bud. On the whole, however, the recognition of individuality for the several components in these instances is attended with less embarrassment than an extreme course either way. Individuality, it must, however, be remembered, is much less defined in these budding and composite types than in the monogenetic-egged animals.

Still less is individuality developed in the vegetal kingdom. In plants generally, the elements of generation and reproduction (flowers, etc.) are developed periodically, and apparently as secondary products of the seed. The "flowers" and "fruit," e. g., are simply the outgrowth of the "plant;" in composite animals, on the other hand, the "zooids" are the prominent objects, and are simply connected by a continuous basis. Nevertheless, the term "individual" is better applicable to the organisms which are destined to continue the species, and which perform the same rôle in the vegetal kingdom as do the sexes in the animal kingdom, than to the undifferentiated as well as differentiated part of the plant, or than to the sum of the products (which may be scattered throughout the world) from a single seed. It will be, however, in any case, impossible to always discriminate exactly the individual, for the adage "*Natura non facit saltum*" is as applicable in this case as in others. But by recalling the phenomena



connected with reproduction in the several departments of nature, and attending to the distinction between potential and actual individuality, there will be few cases where serious doubt will practically exist.

Although the application of the term "individual" to each more or less perfect expression or simulacrum of the reproductive organism seems thus to be most advisable, it is important to distinguish the difference in the physiological as well as morphological value of the individuals. Thus, the specialized single product of an egg is the perfect "zoön" or animal, while the separate constituents of a colony derived from a single egg are called by Huxley "zooids," or animal-like organisms.

The principal differences in the inter-relations of individuals among various animals are the following:

I. The simple product of an egg incapable of multiplication by budding or fission, i. e. typical animals.

a. The sexes differentiated in distinct individuals: vertebrates generally, most articulates, majority of mollusks, many radiates, etc.

b. The sexes united in the same individual: a few fishes, many worms, many mollusks, many radiates, etc.

II. The compound product of an egg capable of multiplication by budding or fission, giving rise to new individuals or "zooids."

a. The zooids undergo little change, the egg-bearing form being an ordinary individual. Example, *Hydra*.

b. The zooids undergo great change, the egg-bearing form being a specialized individual. Example, most aculephs.

Thus the individual, as one separate animal, is very definite in the higher types and quite indefinite in the lower. In the Coelenterates, etc. the phenomena of individuality may be best considered in connection with their reproduction. (See REPRODUCTION.)

THEODORE GILL.

**Indivisibles.** In the mediæval geometry the method of indivisibles was essentially the same as the modern method of infinitesimals. It proceeds on the supposition that lines are made up of an infinite number of infinitesimal points, that surfaces are made up of an infinite number of lines, and that volumes are made up of an infinite number of surfaces. The method of indivisibles holds the same relation to the infinitesimal calculus, as devised by Leibnitz, that the ancient method of exhaustions does to the method of limits, as employed by Newton. As an example of the method of indivisibles, let it be required to deduce an expression for the volume of a right cone with a circular base. Denote the area of the base by  $A$ , the altitude of the cone by  $h$ , and let  $h$  be divided into an infinite number of equal parts; through each point of division suppose a plane to be passed, cutting out a section parallel to the base, and denote the distance of any such section from the vertex by  $h'$ . Then, if we denote the area of this section by  $a$ , we shall have, from the principles of elementary geometry,

$$a : A :: h'^2 : h^2, \text{ or } a = \frac{A}{h^2} \times h'^2.$$

From the nature of indivisibles we shall have the volume of the cone equal to the sum of all the sections from the vertex to the base; that is, the volume will be equal to  $\frac{1}{h^2}$

multiplied by the sum of the squares of all the values of  $h'$  from the vertex to the base. If we take one of the equal divisions of the altitude as a unit, and call it 1, the different values of  $h'$  will be the series of natural numbers from 0 to  $h$ ; but the limit of the sum of the squares of the natural numbers from 0 to  $h$ , when  $h$  approaches  $\infty$ , is equal to  $\frac{h^3}{3}$ ; hence, the required volume is equal to  $\frac{1}{h^2} \times \frac{h^3}{3}$  or to

$A \times \frac{h}{3}$ ; that is, the volume is equal to the base multiplied by one-third of the altitude. This result agrees with the well-known expression for the volume of a right cone with a circular base. W. G. PECK.

**Indo-China, Farther India, and India beyond the Ganges** are the names given to that portion of the south-eastern peninsula of Asia which is bounded on the N. by Thibet and China, on the W. by the Gulf of Tonquin and the China Sea, S. and S. W. by the China Sea, the Strait of Malacca, the Gulf of Martaban, and the Bay of Bengal, and on the N. W. by Hindustan. Its area is about 850,000 square miles, and the population is estimated at 25,000,000. The adjacent islands of Andaman, Mergui, Nicobar, and Prince of Wales belong to the Indo-Chinese peninsula.

**Physical Features.**—A bold, picturesque chain of mountains runs through the country in a continuous and unbroken ridge parallel with the coast, increasing in altitude as it approaches the city of Hué, the capital of Cochin-China. The northern province of Tonquin consists of a vast plain

watered by the Songkha River. Cochin-China proper stretches along the coast, and exhibits every diversity of scenery between 11° and 18° N. lat. The Méikhong, or Cambodia, which is the largest river of the Indo-Chinese peninsula, takes its rise in Yun-nan on the frontiers of S'efan, where it is called Lan-Tsang; towards the S. it is renamed Kew-lung-Keang, or Nine Dragon River. The volume of water which it receives from the stupendous mountains through which it forces its way renders it a mighty stream. It not only traverses the kingdoms of Laos and Cambodia, but after a course of more than 1500 miles separates into several distinct branches before emptying itself into the China Sea. Cochin-China, from its many navigable rivers, its central position, and its numerous excellent harbors, possesses extraordinary advantages for commerce. The Bay of Turon, situated in lat. 16° 7' N., is equalled by few in the Eastern World for its beauty of scenery; and for the security and conveniences which it affords to shipping it can be surpassed by none in the world. The chief town is Hué, or "the head," situated on a river navigable for ships of moderate burden. It is fortified, and all its arrangements are carried on in a style in which both magnitude and neatness are observed, showing a bold and warlike people. The other important towns are Cachoa in Tonquin, Saigon in Cambodia (a mercantile town of some importance, situated on a branch of the Saigon River), Faifi, now in ruins, and Turon, once the chief mart of trade between China and Japan. Udong, the present capital of Cambodia, is situated N. E. of Komput, one of its ports, and about 4½ miles from that arm of the Méikhong which forms the great lake Tala-Sarp, lying 135 miles from Komput. A marshy plain covered with a dense but magnificent forest stretches in an unbroken line almost to the very gates of the city of Udong. The Songkha, or "great river" of Tonquin, has a course of nearly 400 miles, while Hué, the river of Cochin-China proper, flows through a cultivated country and abounds in the finest scenery afforded by any of the rivers of Asia. The changes of climate in these regions are sudden. Heavy rains fall during the summer, which produce a general inundation at the end of October, after which the climate is pleasant for about three months and best fitted for European travel. British Burmah or Arracan, Pegu, Martaban, and Tenasserim, including all the W. or frontier lands, with their rivers and ports, are permanent portions of British territory and under the direct control of British authorities. The kingdom of Siam lies in the middle, extends to the Gulf of Siam, and comprises some portions of the Malayan peninsula. To the E. and N. E. of the frontier of British Burmah and around some portion of the Salween River are found several tribes of Karens, more properly Khariens, some of which acknowledge British, some Siamese, and others Burmese suzerainty, while there are other tribes which are not only rarely but nominally independent, and are said to be as wild as the mountains they inhabit. Passing over the Salween valley, and approaching the northern portions of Cambodia, there are found the Shan states, tributary to Burmah, and acknowledging their vassalage in the inverse ratio of their distance from the Burmese capital. To the W. of these Shan states are other tribes whose comparative proximity to the Irrawaddie makes them more substantially submissive to the Burmese government; and, strange to say, in crossing the Méikhong River other Shan states are met with which are tributary to China. But within the boundary of the Siamese territory, near the western frontiers of Anam, the southern limits of China proper, and the eastern boundaries of the Burman empire, are all occupied by Shan states whose allegiance to any of these four powers seems to be very ill defined. The Kakhyans are a portion of the vast horde of Singphos which inhabits the mountains N. of Assam. They have succeeded in ousting many of the Shan tribes, particularly the Páloungs, from the hill-districts. The commercial state of the Kakhyans, which is the name given to the Singphos by the Burmese, is in some respects very remarkable. They grow cotton in part of the country, out of which they manufacture a strong fabric for export and for their own consumption, which is of such excellent quality that Manchester could not attempt to compete with it in cheapness and durability, owing, no doubt, to the nominal value of labor among them. The Kakhyans constantly levy black-mail even to within 6 miles of Bambo, the seat of a Burman governor of the rank of wongyee. Everywhere they inspire the people with such terror that no Burmese or Siamese will travel alone in their vicinity. The general population of Northern Burmah is Shan; there are also several other tribes along the upper defile, such as the Pawons, Katha, Khadoos, etc. All these tribes are Booddhists, bearing a good character for quiet, orderly conduct, with some enterprise in trade and agriculture. The mineral products are yet undeveloped; the



lead and silver of Burmah, however, are found in the Shan states. The Shans are a fine, athletic, large-boned race, with long hair, which they twist into a knot behind, after the fashion of the Burmese; their dress is simply a coarse bag, with holes cut in it for the head and arms. Their language is a dialect between that of the Burmese and the Laotians. The latter call them *Khonpäh*, "wild forest-men." The Mai Longee teak-forests are found in this region; they have three large streams running through them, the Salueng, the Ma Come, and Ma Noi. These large streams are supplied by numerous small ones which the people call *hucio*. Through these lesser streams most of the teak timber is floated into the larger streams, by which it is carried for sale into the Maulmein River. Many thousands of logs are thus floated annually into the great markets of Burmah, Maulmein, and Siam from the famous Mai Longee forests. These forests, which produce unfailing supplies of the finest teak-wood in the world, are owned by a few hereditary princes of Chiengmai. The Laos iron-works are next in importance. Ban Boor, the home of iron, is a Laotian mining-town. The iron-works are about two days' journey from the town; the reason the miners live so far from their work is that the ground in the locality of the mines is sterile, and they believe the place to be infested with evil spirits. They always offer fowls and a variety of other offerings to the place before they commence operations, from a superstition that if they did not do so they would be afflicted with some dreadful malady. The iron is very abundant here; it is smelted at the mines, and conveyed to the town by means of elephants. The process of working the iron is very simple, the heaviest of the work being done by the women. The young men are the miners, the elderly men are the blacksmiths, the young women use the sledge-hammers, and the old women and children are the bellows-blowers. Taking the slender means they have for working iron into consideration, it is surprising to see the variety of tools they make. Chiengmai is the capital of the Laos. The surrounding scenery is very beautiful. To the westward, about 3 miles from the capital, are the Doie Saa Tape Hills, about 800 to 1000 feet high. The female population of Chiengmai are a hard-working, industrious people. They are all weavers and spinners. The whole process of spinning, weaving, and dyeing the cotton and silk is performed by the Laos women. They make silk sarongs of a strong, durable, and excellent texture. They are dyed after the fashion of the Scotch tartan, only of a broader pattern. The woollen patooarps are also made by them, many of which are exported. The whole of the market business is carried on by women. The market-girls come from the suburbs of Chiengmai, bringing with them vegetables, fruit, flowers, eggs, preserves, and fowls for sale, or for exchange for salt and salt fish, which are very dear here. The Laos are a hardy, industrious, and peaceable people, having a wholesome sense of what is right and just. The laws are severe; theft is invariably punished by death, drunkenness by imprisonment. The persons of the females are held sacred. The Laos form of marriage is in most cases performed and recorded by the *nai*, or magistrate; a divorce may be obtained where the parties are not comfortably suited to each other; morality is nowhere better observed. The Laos are a decidedly musical people, and certainly one of the most interesting of the Indo-Chinese races.

French or Lower Cochin-China lies in the southern extremity of the eastern portion of the Indo-Chinese peninsula, lat.  $9^{\circ} 5' - 10^{\circ} N.$ , lon.  $105^{\circ} - 107^{\circ} E.$  This vast territory has been gradually acquired by the French after the dreadful war said to be provoked by the continuous persecution of the Christians by the king of Anam, who is supposed to have secretly instigated the cruel murder of certain French and Spanish missionaries in his kingdom. At the conclusion of this war, which very greatly increased the military prestige of the French army in Cochin China, three rich provinces, called Ban-Hoa, Mètho, and Saigon, with the islands of Puloh, Condour, and a few others off the coast, came into the French possession (1861). In 1867 new hostilities led to fresh annexations of three provinces. A new treaty was formed ceding Vinhahong, Chantour, and Haytieng, thus yielding to the colony of Cochin-Chine Française an area of 21,600 square miles, and a population in 1870 72 of 1,294,287. According to the established system of the Indo-Chinese governments, every male belongs to the king, and must either enlist in his army, or work one-third, if not one-half, of the year for the sovereign without any pay. In urging on the vigorous measures which led to the French and Cochin-Chinese wars Napoleon III. seems to have been inspired with the tradition that France had prior claims to be adjusted, and far greater wrongs to be redressed, than even those which ostensibly led the French and Spanish governments to resolve on war. Cambodia was formerly a large, powerful, and independent

nation, and its kings were often at war with Anam and Siam. On some occasions the Cambodians were victorious, and succeeded in subjugating the provinces, at other times the Anamites or the Siamese had the advantage. During the reign of His Siamese Majesty P'hra-Chow-Maha-Chakrapät, who reigned in the old capital of Ayodhya in the year 1540 (A. D.), the Siamese, being at war with Pegu, were laid siege to by the Cambodians. Having subdued the Peguans, the king of Siam pursued the Cambodians, marched to the very capital of Cambodia, and besieged it, cutting off all supplies, until the king of Cambodia acknowledged himself vanquished, and offered to become tributary to Siam; on which the king of Siam returned to Ayodhya, taking with him as hostages the two sons of the king of Cambodia, the elder of whom was appointed governor of the Siamese province of Savankalok. On the death of the king of Cambodia the king of Siam was about to appoint as his successor the governor of Savankalok, when he learned that a relative of the deceased king, assisted by the Cochin-Chinese, had resolved to throw off his allegiance to the monarch of Siam. The latter sent a large army against the insurgents, but the Siamese were defeated and Cambodia became a province of Cochin-China. Finally, the king of Siam, having once more repelled the invasion of the Peguans and Burmese, marched to Cambodia, captured the capital, put the king to death, and appointed king in his stead one of the princes, P'hra-Narai-Rama, who was friendly to Siam. From that time for the space of 300 years the kings of Siam have held the right to establish the rulers of Cambodia and to the payment of an annual tribute. In 1787, Ghalong, the king of Anam, desirous of securing his throne against the joint armies of Cambodia and Siam, entered into the famous treaty with Louis XIV. of France, by which he agreed, in return for French aid, to cede to his allies the beautiful town and harbor of Turon Kwang Han and two adjacent islands. The vigorous help afforded by France proved effective not only in establishing Ghalong on the throne, but in adding to his dominions the rich provinces of Tonquin and Cambodia. But the promises made in the treaty to France were never fulfilled, with the exception that the French Christian missionaries enjoyed perfect civil and religious freedom. After the death of Ghalong, and during the reigns of the three successive emperors who followed him, Cochin-China was once more plunged into a series of wars, which led to the persecution of French Catholic missionaries, and which continued off and on for several years, until the establishment of Lower or French Cochin-China, when the kingdom of Cambodia was once more declared independent of Siam. The ruler of this kingdom, in reality only a viceroy appointed by the king of Siam, was crowned king in the presence of the French and Siamese representatives, at his capital of Udong, under the title of P'hra-Narodom, etc., in June, 1864. P'hra-Narodom has lately ceded to the French authorities the right of forming a settlement on the banks of the Mèikhong River at the junction where its four arms divide before falling into the China Sea, said to be one of the most delightful sites in the entire kingdom. Ever since the instalment of P'hra-Narodom under the French protectorate nothing has been left undone to secure the good-will of the natives. The laws and customs of the ancient régime are respected, and even upheld; the natural municipalities are carefully preserved; the land-tax, which has always been obnoxious to the cultivator of the soil, has been lowered; and, above all, the proportion of able-bodied men annually required for military and police service has been considerably lessened. In 1866 a new law was issued regulating civil offices. The resources of the country, however, are as yet but poorly developed, although rice of a very fine quality is produced in great abundance; cotton, sugar, indigo, silk, and tobacco are also successfully cultivated, but not with their utmost possible results. The dwarf mulberry grows freely; silkworms are raised with great facility, even with the poor attention given to this branch of industry; hemp, the betel, and the areca-nut are also abundant. The natives particularly excel in naval architecture, owing no doubt to the magnificent size and quality of the timber employed for that purpose; their row-galleys and pleasure-barges are often from 50 to 80 feet in length, composed of fine single planks, each extending from one extremity to the other. They employ various descriptions of vessels in their coasting-trade, in fishing, and in collecting the *bêche-de-mer*, or sea slug, and the swallows' nests among the clusters of islands called the Paracels. Their trading vessels are built on the plan of the Chinese junks. The religion of the most part of the inhabitants of the Indo-Chinese peninsula is a modification of the system of Buddhism. A yearly contribution is levied by the government for the support of a certain number of temples, priests, and monasteries, in which the priests invoke the deity for the public welfare. Voluntary



contributions of the people for the support of the priests are very great, as they are extremely superstitious.

**Indo-Chinese Races and Languages.**—The chief characteristics of the various races inhabiting the Indo-Chinese peninsula are mainly two: (1) they are more or less of Mongolian type; (2) they speak languages classed as monosyllabic. These races are now divided into seven groups: The Thibetian and Bhotyah, who inhabit Thibet proper N. of the Himalaya Mountains, comprise the first group. The most important of the races under this head are Bhors, Dhophias, Lepchas, Bhotans, Khamtis, Semboos, Nawars, with many others. The second group comprises the Burmese and the Lohytas, now in possession of the western portion of the Indo-Chinese peninsula. A number of wild tribes, commonly called Lohytas, are offshoots of these respective races. The third group is the numerous Nagha tribes, or serpent-worshippers. They style themselves Khawphee, and are found scattered all along the regions W. of the river Khopheeli. The remaining tribes worthy of mention are the Khyengs, who inhabit the Yoomahdong Mountains, which separate Assam from the beautiful valley of the Irrawaddie; the Khâriens, a wild but remarkable hill-tribe, who occupy the mountains of Pegu and the southern part of Burmah (the more civilized Khâriens are found scattered in the valleys of the Irrawaddie and the Salween); the Sabaing, who occupy the valley of the Sittawong, may be classed with this group. All the various tribes which are found among the mountain-regions and river-valleys of this province are probably the aborigines of the Indo-Chinese peninsula. Another ancient and aboriginal tribe inhabiting the delta of the Irrawaddie is the Mongs, called Talaengs by the Burmese. The Khamains, or inhabitants of Cambodia; Shans, called Penoms by the Cambodians, Kbo by the Siamese, and Moie by the Anamites—all these names simply mean savages. The whole chain of mountains which extends from the N. of Tonquin to the S. of Cochin-China is inhabited by wild primitive tribes speaking many different dialects. The savage Stiens also inhabit these mountain-regions. The Siamese, or rather the Thais ("free men"), are one of the most important of these Indo-Chinese nations. (See SIAM.) The Laos inhabit the interior; they are classed under two heads—Laou pouuk khon, "white" or "not tattooed" Laos, and the Laou pouuk dun, "tattooed Laos."

The Indo-Chinese languages are of monosyllabic character. On the primitive language of the Anamites was grafted the Chinese. Booddhism had specially selected the vernaculars of the day as the vehicle for its teaching: thus, all over Indo-China are found in use a stratum of words having no affinity with their languages, but which have been introduced by the early Booddhist missionaries. All the Indo-Chinese languages are distinguished by certain rising and falling accents, and a great number of words when thus modified express entirely different meanings. There are eight of these accentuations, properly speaking—the soft, the abrupt, the grave, the sharp, the circumflex, the broad, the rising, and the falling; only five are used in common. Without some knowledge of the musical inflections and modifications of sound it is impossible to understand any of the Indo-Chinese languages. All the other languages of this group were originally dialects. In this sense the Cambodian, Siamese, and Burmese represent the most widely diffused form of the Indo-Chinese languages. But there is a marked difference between the speech of the Siamese, the Cambodians, and the Burmese. The Burmese alphabet employs a great number of double and triple consonants: the *th* sound is used with a marked guttural breathing, which the Siamese and Cambodians render into *sh*. In all these dialects not only the words, but the vowels themselves, are so complicated by virtue of a system of tones, like those of music, that a single vowel has several distinct methods of utterance, and unless the word be pronounced correctly, not only as to sound but to tone, the meaning is entirely changed. The alphabets of the Burmese and Siamese are very different in character. The Burmese use a round character supposed to be derived from Ceylon. The Siamese use a very handsome upright character, borrowed from the ancient Cambodians, which is still used for their sacred books, and sometimes called Maghadhi and at others Pali. Pali means simply writing, not language. The Laos, in the N. of Siam, speak a dialect peculiar to themselves, but with many Siamese and Cambodian affixes, and the alphabet is like that of the Burmese. (See *Asiatic Journal, Siam and Cochin China*, by John Crawford; *Travels in Indo-China*, by M. H. Mouhot; and *Tourists in the Kingdom of Siam*, by Lieut. S. H. Poole.)

Mrs. A. H. LINGOWENS.

**Indo-Germanic Languages.** See LANGUAGE, by PROF. W. D. WHITNEY, PH. D., LL.D.

**Indo're**, a subsidiary or protected state of Hindustan, belonging to the family of Holkar, and consisting of sev-

eral almost insulated territories situated on the slope of the Vindhya Mountains along the river Nerbudda. Area, 4250 square miles. Pop. 815,614. The inhabitants belong mostly to the aboriginal tribe of the Bheels, one of the wildest and most savage of India. Cap. Indore, situated in lat. 22° 42' N. and lon. 75° 50' E., with 15,000 inhabitants.

**Indorsement.** See BILL OF EXCHANGE, by PROF. T. W. DWIGHT, LL.D.

**Indra.** The ancient Hindus, in the Vedic period of their religion, did not worship the Indian Triad or heroes, but deified and worshipped the sky, the sun, the dawn, fire, lightning, wind, and other elements. Indra was the chief of the deities then worshipped. His name is from the Sanskrit root *id*, to "see, discover, or discern." Indra denoted the sky, which, from overhanging the world, was supposed to discern all. It also appears from the name given to the sapphire, *Indra-nila*, or "Indra-blue," and from other considerations, that it was on account of the blue color of the sky that the stone received the name of the Hindu deity. The primitive Aryans of India believed that it was the sky which caused rain, and they therefore regarded Indra, or the sky, as the chief of the gods. From all that we find narrated about Indra, it is evident that his causing rain was regarded by Hindus as the most important evidence of his divine power. Water means wealth in the East, and Indra's compelling the fleeting clouds to pause over the rice-clad country, and drop their precious burdens on the earth, was esteemed as the chiefest of his godlike exploits. In offering him praise as the author of rain, Hindus fancied that the cloud which failed to bring rain was an *asura*, or demon. Such a cloud was particularly a *varitra* (from *eri*, to "hide or envelop"), because it spread over the face of the heaven and tried to obscure the face of the sun. Hindus pictured Indra's undertaking to cause rain as his going forth to do battle with this evil *varitra*; and they represented rain to be caused by his cleaving the demon-cloud with his *vajra*, or thunderbolt, and thereby slaying the *asura*. With reference to this feat, numberless songs were composed in praise of the sky-god; and inasmuch as Indra was completely victorious in every one of his contests with the cloud-demons, he gradually came to be regarded generally as the giver of victory, and in particular as the god who enabled the Aryan invaders of India to conquer the aborigines; and so his worship rapidly became more and more popular. In the epic and Puranic periods of the Hindu religion, Indra enjoyed great legendary fame, but he gradually lost his place in the Indian Pantheon as the chief of the gods. In Vedic times, however, he was supreme, or only shared his throne with *Agni* (fire), *Sûrya* (the sun), the *Maruts* (winds), and *Ushas* (the dawn). The hymns in praise of Indra are amongst the most spirited and beautiful in the *Rig-Veda*. It is impossible to introduce lengthy extracts into this place, but one famous one may be given. In the 32d Sûkta of the 1st Mandala of the *Rig-Veda* it is written as follows:

1. I declare the former valorous deeds of Indra—deeds which the thunderer has achieved. He cast the waters down to earth; he broke a way for the torrents of the mountains.
2. He drove the torrent which sought refuge on the mountain. *Tachas* the smith sharpened for him his far-whirling thunderbolt; the following waters quickly hastened to the ocean, like cows hastening to their calves.
3. Inasmuch, Indra, as thou hast divided the first-born of the clouds, thou hast destroyed the delusions of the deluders, and thou causing the sun, the dawn, the sky, to appear, thou hast not left an enemy to oppose thee.
4. With his vast and destructive thunderbolt Indra struck the dark, mutilated *Vanas*. As the trunks of trees are felled by the axe, so lies *Ahi* prostrate on the earth.
5. The mother of *Varuna* was bending over her son, when Indra struck her back with his bolt. So they lay, the mother above, the son below; and *Danu* slept with her son, like a cow with its calf.
6. Then Indra, the wielder of the thunderbolt, became the sovereign of all that is movable and immovable, of horned and of hornless cattle; and as he abides the monarch of men, he comprehended all things within him, as the circumference comprehends the spokes of the wheel.

As the sky, though changeable, constantly reverts to its perfection of cloudless beauty, so Indra was celebrated as the "ever-youthful" and "the unfading." As he was supposed especially to protect the Aryans, he was praised as "the discomfiter of those who neglect religious rites" and "lord of the devout." But as time went by the worshippers of Indra gradually regarded him as more a god of war than anything else; and so, by a natural transition, they passed on to anthropomorphize their deity, and imagined him at length to be a brave, imperious, impetuous monarch. In the *Atarvya Brahmana* (an ancient explanatory commentary on the *Mantras* of the *Rig-Veda*) Indra is regarded as the ruler of the inferior gods, and the



personification of all that a mortal king should be. Indra afterwards became less an object of worship than of admiration, and in the epic and Puranic period of Hindu literature he was made a favorite subject for the elaborate and extravagant eulogies of poets. These gradually invested him with a peculiar splendor, which again attracted to the god the languishing attention of Hindustan, and revived his *cultus*. He was now represented as enthroned in the east as one of the eight guardians of the world. He dwelt in an infinitely luxurious paradise, *Swarga*, the heaven of the inferior divinities, and the final blissful goal of all pious mortals who had attained sanctity by a life spent on earth devoted to the due performance of religious duties. It was here that the *Gandharvas* sang in chorus songs sweeter than any ever heard by man; and it was here that the lovely dancing-girls, the *Apsarasas*, displayed those blushing charms which the austerest of mortal hermits could scarcely resist. Here, too, rose the turrets of the most glorious of cities, *Amāvratī*; and here spread that most exquisite of gardens, *Nandana*, with its five all-yielding trees. Surrounded by all this happiness and beauty, Indra still sent the sweet rain upon the earth, and struck the cloud demons who refused to obey his behests with his unerring *vajra*. We now find him being represented in paintings and sculptures. He possesses innumerable eyes, as the sky-god who discerns all. These eyes are represented as thickly covering his body. He has four arms, perhaps typical of the four quarters of the sky. In one famous painting he is represented as riding on an elephant with three trunks. In another he is depicted as standing on an elephant, whilst a tree grows out of his head and peacocks nestle in its branches. The eyes in the tails of the peacocks may represent the stars of the firmament. Indra figures in four interesting drawings in Moor's *Hindu Pantheon*. Sculptures of the god are to be found in the caves of Elephanta and Ellora. The characteristics and attributes ascribed to Indra in Indian mythology are capitally reproduced by Sir W. Jones in his famous hymn to the god, who is represented as

"Mounted on the sun's bright beam,  
Darter of the swift blue bolt,  
Sprinkler of genial dews and fruitful rains  
O'er hills and thirsty plains."

The following lines may also be quoted, as they vividly bring before the reader the god himself, his appearance, his "robes of changing dyes" (perhaps the variable clouds), and the deities which act as his servants. The story to which the lines are a sequel is this: Indra on one occasion assumed the form of a shepherd-lad, that he might steal some pomegranate-flowers from a garden "to deck the dark tresses of his charming consort, Indrani." Whereupon,

"The reckless peasant, who these glowing flowers,  
Hopeful of rubied fruit, had fostered long,  
Sized, and with cordage strong  
Shackled the god who gave him showers,  
Straight from seven winds immortal gent flew:  
VARENA green, whom foamy waves obey;  
Bright VAIÑE, flaming like the lamp of day;  
KIVERA, sought by all, enjoyed by few;  
MURET, who bids the winged breezes play;  
STEEN YAMA, ruthless judge; and ISA cold;  
With NYERIT, mildly bold.  
They, with the ruddy flash which points his thunder,  
Rend his vain bands asunder  
Th' exulting god resumes his thousand eyes,  
Four arms divine, and robes of changing dyes."

These lines allude to a late period of the cultus of Indra, as he is represented as taking the form of a shepherd-boy. Still, the idea of Indra becoming occasionally incarnate is one which does not seem foreign to the spirit of even some of the Vedic hymns, in which he is lauded as the destroyer of certain chiefs who are actually mentioned by name. One feature of his earliest worship was the offering to him, by pious Brahmans, of the juice of the soma-plant. The later legends about Indra are not all creditable to him. The story of his seduction of Ahilya, the handsome consort of Gotama, is narrated in all its coarseness in the 28th chapter of the *Ramāyana*. Indeed, Indra became in Puranic times noted for his profligacy. He constantly sent *Apsarasas* (the beautiful dancing-girls of his paradise) to tempt ascetics. When the holy hermit, Viswamitra, had been engaged for thousands of years in practising the most rigorous austerities, Indra sent the most beautiful *Nandika* to him. The unfortunate sage was immediately overcome, "for, seeing her bathing, of surprising form, unparalleled in beauty, her clothes wetted by the stream exhibiting her fascinating symmetry of frame, he, subdued by the arrows of *Kundarpa*, approached her, and five times five years spent in dalliance with her passed away like a moment." At length, however, the ascetic exclaimed, "What! are my wisdom, my firm resolution, my austerities, all destroyed at once, and by a woman?" Seduced by the crime in which Indra delights, I am stripped of the advantages arising

from all my austerities." (*Ramāyana*, section 59.) Indra is also called by the names of *Sakra*, *Vajrapani*, *Sakakranta*, *Vatadhan*, *Vasava*, and *Makadenta*. R. C. CALDWELL.

**Indre**, department of Central France, on the Indre, a tributary to the Loire. Area, 2624 square miles. Pop. 277,693. Although a part of the surface is barren or swampy, considerable quantities of wine and wheat are raised for exportation. Among articles of industry are cutlery, earthenware, leather, and cotton cloths. Of 34,000 children between seven and thirteen years, 19,000 did not receive any school education in 1857. Cap. Châteauroux.

**Indre**, a river of France, chiefly in the department of the same name, flows into the Loire S. W. of Tours, after a N. W. course of 115 miles. It is navigable from Loches to the Loire, 40 miles.

**Indre-et-Loire**, department of Central France, on the Loire, along which high dykes have been built to prevent inundations. Area, 2332 square miles. Pop. 317,027. Wine and wheat are produced, truffles and fruits are raised, and the culture and manufacture of silk are steadily increasing. Of 39,809 children between seven and thirteen years, 8645 did not receive any school education at all in 1857. Cap. Tours.

**Induction and Abstraction** are the two forms of GENERALIZATION (which see). Abstraction comparing phenomena with respect to the similarity of their substance, and establishing a class; induction comparing phenomena with respect to the similarity of their cause, and establishing a law as the result of the generalization. As reduction is the opposite to abstraction, deduction is the opposite to induction. By abstraction the definition of a species is established; by reduction a specimen is referred to its species. By induction the law is established which governs certain phenomena; by deduction a phenomenon is explained as governed by a certain law. The establishment of the law of gravitation from the fact that apples fall to the earth is an induction; the explanation of the phenomenon of ebb and flood from the law of gravitation is a deduction. It must be noticed, however, that although these distinctions are of great importance as means of understanding thoroughly the logical operations of the human mind, yet in actual thinking they occur very seldom, if ever, in a perfectly unmixed state. In thinking we generally use the two opposite methods of operation at once, just as in seeing we use both the eyes, in hearing both the ears, in working both the hands, and in walking both the legs. It is true, in general, that inventions are the fruits of deduction, and discoveries of induction; and as it is the natural order that the law shall be found by induction before it can be applied by deduction, we find, as a general rule, that discoveries precede inventions. First came Oersted's discovery of electromagnetism, then Morse's invention of the telegraph. But was the invention of the lightning-rod a mere deduction? or was the discovery of the globular form of the earth a mere induction? With Ptolemy, who after Hipparchus assumed that the earth is a globe from the movements of the heavenly bodies, it is as impossible to reduce the reasoning process to a merely inductive or merely deductive method as it would be to say whether it is the right hand which washes the left or the left which washes the right.

The inductive process of reasoning has received its most thorough analysis from Stuart Mill in his *System of Logic*. He distinguishes between four different methods in which the inductive operation can be carried on—namely, the methods of agreement, of difference, of residues, and of concomitant variations—and he condenses the description of each method into a formal canon or rule of induction. Thus, the first canon, or the rule of the method of agreement, pronounces that if two or more instances of the phenomenon under investigation have only one circumstance in common, the circumstance in which alone all the instances agree is the cause of the given phenomenon. But as in many cases it would be a difficult and laborious, not to say endless and impracticable task, out of the millions of circumstances which may accompany a phenomenon in different instances, to eliminate those which are accidental, because they do not occur in all instances, and some of them which must be the cause, because it is ever recurring, it is necessary to follow another method in carrying on the operation of induction. In such cases it will be found more expedient to single out that one circumstance by the exclusion of which the phenomenon disappears, and which consequently must be its cause. The rule of this method, the method of difference, is expressed in the following canon: If an instance in which the phenomenon under investigation occurs, and an instance in which it does not occur, have every circumstance in common save one, that one occurring only in the former, the circumstance in which alone the two instances differ is the cause, or a necessary part of the cause, of the phenomenon. There are phenomena,



however—and as our knowledge extends they become more frequent—of which the causes are partly known, partly unknown. In such cases the method of residues must be resorted to, for which the rule is: *Subduct from any phenomenon such part as is known by previous induction to be the effect of certain antecedents, and the residue of the phenomenon is the effect of the remaining antecedents.* Finally, there are phenomena of which the cause cannot be found out by any kind of elimination, because the causal agency is universal. Thus, the laws governing phenomena caused by the earth's attraction or by heat cannot be ascertained by any of the three former methods of induction, because we cannot get out of the sphere of the earth's attraction, and because there is nothing in which heat is absent. In such cases the method of concomitant variations must be applied, the rule for which is: *Whatever phenomenon varies in any manner whenever another phenomenon varies in some particular manner, is either a cause of that phenomenon, or is connected with it through some fact of causation.* The precision and exhaustiveness of these rules are striking, but it is also obvious that real thinking seldom, if ever, follows any of these tracks exclusively. As induction and deduction generally walk together, hand in hand, so also the different methods of induction.

CLEMENS PETERSEN.

**Indulgence** meant originally a release from the temporal penalties which remain due for a sin after the sin itself has been remitted by confession and absolution, and was granted during the first centuries of the Christian Church not only by the pope, but by all the bishops, to infirm persons or to those penitents who showed extraordinary contrition. By degrees, the practice of remitting punishment for money was introduced, the bishops allowing offenders to buy off the canonical penalties by bestowing gifts for some religious purpose; and from this time the popes began to reserve for themselves the right of granting, or rather selling, indulgences. In the fourteenth and fifteenth centuries this right was extended in an enormous degree. After the establishment of the doctrine of OPERA SUPEREROGATORIA (which see) the pope arrogated not only the privilege of releasing from temporal penalties, but the power of forgiving sin; and this enormous extension was accompanied in the fifteenth and sixteenth centuries with the most scandalous practices. (See REFORMATION, TETZEL.)

**Indus**, the great river of Southern Asia which separates Hindustan from Afghanistan. It rises in the Himalayas in lat.  $31^{\circ} 20'$  N. and lon.  $81^{\circ} 15'$  E., on the northern side of the Kailas, at an elevation of 18,000 feet. After receiving the Gartope, it bursts through the Himalayas and flows through the lowland to the Arabian Sea. At Attock, the point where Alexander entered into India, 940 miles from its outlet, and at an elevation of only 1000 feet, it receives the Cabool and becomes navigable; 470 miles from the ocean it is joined by the Punjab, which is formed by the confluence of five large rivers; but at Migani, 8 miles N. of Hyderabad and 75 miles from the ocean, it divides and forms a delta whose breadth along the coast is 130 miles. It enters the Arabian Sea through a great number of mouths, of which the Koree is the widest and deepest, but even that one is not accessible for vessels of more than fifty tons, the channel being much encumbered by shoals and mud-banks. The Indus abounds in fish, but is much infested with crocodiles.

**Industrial Exhibitions.** See EXPOSITION, INTERNATIONAL AND UNIVERSAL, by F. A. P. BARNARD; and EXPOSITION, THE INTERNATIONAL UNIVERSAL, by PROF. W. P. BLAKE, A. M., PH. D.

**Indus'trial Schools**, a term which may have several applications, but of which the strict legal meaning in Great Britain is confined to institutions, established or recognized by the government, to which juvenile offenders may be sent by a magistrate. Attempts to ingraft the industrial feature upon voluntary schools have not been rewarded with much success, at least as regards their usefulness to the lower classes; and in the British revised code the grants formerly made to such schools were discontinued. It seems necessary to the usefulness of industrial schools that the children be wholly withdrawn from the control of parents, and their entire direction assumed by the school authorities, in which case they naturally become assimilated to reform schools or houses of correction, thus suppressing the element of spontaneity which alone can entitle industrial schools to a classification apart from disciplinary institutions. The number of industrial schools in England and Scotland in 1861 was only 39, with 3180 pupils.

**Industry**, tp. and post-v. of McDonough co., Ill., 8 miles from Macomb City. Pop. 378; of tp. 1533.

**Industry**, post tp. of Franklin co., Mo., 10 miles N. E. of Farmington. It has 4 churches, and manufactures of agricultural tools. Pop. 725.

**Industry**, a v. of York tp., Belmont co., O.,  $\frac{1}{2}$  mile from Powhatan Point, on the Ohio River. Pop. 58.

**Industry**, post-tp. of Beaver co., Pa., on the Ohio River and the Cleveland and Pittsburgh R. R. Pop. 796.

**Inebri'ety** [Lat. *inbriare*, "to make drunk"], in the present acceptance of the term, is used to denote the diseased condition of the system produced by the habitual use of alcohol. Its synonyms are *alcoholism*, *dyspsomania*, and *oinomania*. Alcohol introduced into the circulation acts upon, and to a certain extent destroys, the red corpuscles of the blood, and thus, secondarily, affects all the organs of the body. Its most common mode of introduction into the system is in the form of spirituous and fermented drinks; and in those addicted to its habitual use the principal lesions are chronic hyperæmia and subsequent softening of the brain, cirrhosis and fatty degeneration of the liver, fatty degeneration of the kidneys, and fatty degeneration of the heart. Formerly, inebriety was regarded as a crime, but within a few years science has shown it to be a disease, and institutions have been established for its treatment and cure. Statistics from these institutions have demonstrated—I. Inebriety is a disease, and is curable. II. Relapses may or may not occur. The patients in hospitals for the treatment of inebriates may be divided into three classes—viz. I. Those who by social indulgence, without hereditary taint, have become inebriates. These, as a class, are curable by the aid of an institution. II. Those in whom the disease is inherited, in which cases it manifests itself in paroxysms ("sprees") at variable intervals. These are more difficult to restore to health. III. Those who seem totally depraved in all their instincts, and exhibit no desire for restoration to health. These, as a class, are incurable, and should, for the protection of society, be placed under permanent restraint in institutions distinct from those of a reformatory character. Carefully prepared reports from hospitals for inebriates show that a very large percentage (between 50 and 60) of the patients treated in them are restored permanently.

WILLARD PARKER.

**Inequality** [Lat. *in*, and *æqualitas*]. An inequality is an algebraic expression indicating that one quantity is greater or less than another. The sign  $>$  is called the sign of inequality; when placed between two quantities, it indicates that the quantity at the opening is greater than the other. Thus, the expressions  $3 > 2$  and  $5 < 9$  are inequalities; the former is read *3 is greater than 2*, and the latter, *5 is less than 9*. The parts connected by the sign are called *members*; that on the left of the sign is called the *first member*, and that on the right the *second member*. Of two unequal quantities, that is algebraically the greater whose value is nearer to  $+\infty$ . Two inequalities are said to subsist in the *same sense* when the greater quantity is in the first member of both, or in the second member of both; they subsist in a *contrary sense* when the greater quantity is in the first member of one and in the second member of the other. Thus, the inequalities  $3 > 7$  and  $4 > 9$  subsist in the same sense, but the inequalities  $3 > 7$  and  $9 < 14$  subsist in a contrary sense.

Inequalities may be transformed in accordance with the following principles: (1) If we add the same quantity to, or subtract it from, both members, the resulting inequality will subsist in the same sense. (2) If two inequalities subsist in the same sense, and if we add them member to member, the resulting inequality will subsist in the same sense. (3) If both members of an inequality are multiplied or divided by the same *positive* quantity, the resulting inequality will subsist in the same sense. If both members are multiplied or divided by the same *negative* quantity, the resulting inequality will subsist in a contrary sense. (4) If both members of an inequality are positive, and if both are raised to any power, the resulting inequality will subsist in the same sense.

These principles enable us to reduce an inequality to another in which one member is the unknown quantity; the other member is then a *limiting value* of that quantity.

W. G. PEEK.

**Iner'tia**, or **Vis Iner'tiæ** [Lat., the "power of inactivity"], a universal property of matter by reason of which if in motion it will for ever continue in motion, or if at rest it will for ever continue at rest, unless operated upon by some external force.

**Ines de Cas'tro**, descended from one of the richest and noblest families of Galicia, when her cousin, Donna Constantia, married Don Pedro, the crown prince of Portugal, accompanied her as maid-of-honor. Ines was very beautiful: she was called "Ines with the heron-neck." At the first glance Don Pedro fell in love with her, and when, in 1344, Donna Constantia died, he secretly married her. In 1355, Don Pedro's father, the old king of Portugal, Alfonso IV., had her assassinated for political reasons; and



the passionate depth and wild character of the love which Don Pedro had entertained for her became apparent in his sorrow and in his revenge. When Alfonso died in 1337 and Pedro became king, the corpse of Ines was placed on the throne in royal attire and received royal homage; then it was solemnly entombed under a magnificent monument and with gorgeous processional pomp. Her assassins were put to death in a most cruel manner.

**Infal'libilist** [Lat. *in*, "not," and *fallible*, "capable of erring"], one who believes in the infallibility of the pope. The term is of recent origin, and was brought into use in 1870, during the Vatican Council, which at first was divided between *infal'libilists* and *anti-infal'libilists*, but at last decided that the pope was infallible—i. e. free from all error—in his official utterances as the head of the Catholic Church on questions of faith and morals. The anti-infal'libilists were divided into two parties—those who opposed the doctrine of papal infallibility from principle, as false (Bishops Hefele, Maret, Kenrick, Darboy), and those who opposed it only from expediency, deeming it *inopportune* or untimely and unwise to define and to declare the dogma; hence the latter were called also *inopportunist*, as distinct from the *opportunist*. (See INFALLIBILITY and VATICAN COUNCIL.)

PHILIP SCHAFF.

**Infal'libil'ity of the Pope.** Infallibility [It. *infallibilità*; Span. *infallibilidad*; Fr. *infaillibilité*; Ger. *Infallibilität*, *Unfehlbarkeit*] is exemption from error (inerrability), and corresponds to *impeccability*, or exemption from sin (sinlessness); the former is the perfection of knowledge, the latter the perfection of will or character; both are united in God and in Christ, but not in any human being in this world of sin and error. The word is chiefly used in connection with the Church and the bishop of Rome. All Christians believe that the word of God in the Bible is inspired, and hence infallible. The Greek Church holds, in addition to this, that the Church universal, as represented in a truly œcumenical council, is infallible, but restricts this to the first seven councils from 325 to 787. The Roman Church goes still farther, and declares the pope, even without an œcumenical council, infallible, not indeed in his individual but in his official character, whenever he speaks *ex cathedra*—that is, whenever he addresses the whole Catholic world on a matter touching Christian faith or morals. This view was formerly a disputed opinion, strongly opposed by the Gallicans and all liberal Catholics, but is now by a decree of the Vatican Council a dogma of faith which must be believed by every Catholic on pain of excommunication and damnation. The Vatican decree of July 18, 1870, thus states the new dogma: "Therefore, faithfully adhering to the tradition received from the beginning of the Christian faith, for the glory of God our Saviour, the exaltation of the Catholic religion, and the salvation of Christian people, the Sacred Council approving, we teach and define that it is a dogma divinely revealed: that the *Roman pontiff*, when he speaks *ex cathedra*—that is, when in discharge of the office of pastor and doctor of all Christians, by virtue of his supreme apostolic authority, he defines a doctrine regarding faith or morals to be held by the universal Church, by the divine assistance promised to him in blessed Peter—is possessed of that infallibility with which the divine Redeemer willed that his Church should be endowed for defining doctrine regarding faith or morals; and that, therefore, such definitions of the Roman pontiff are *irreformable of themselves*, and not from the consent of the Church. But if any one—which may God avert!—presume to contradict this our definition, let him be anathema!"

Papal infallibility was the chief topic of the Vatican Council; it was discussed under powerful opposition for several months, and carried at last by the influence of the pope and the Jesuits. When the vote was first taken in secret session (July 13, 1870), 151 bishops voted in the affirmative (*placet*), 88 in the negative (*non placet*), 62 voted with a qualification (*placet juxta modum*), and over 80, though present in Rome, abstained from voting. On the evening of the same day the minority, which included the ablest and most influential prelates (as Darboy of Paris, Schwarzenberg of Prague, Rauscher of Vienna, Dupanloup of Orléans, Förster of Breslau, Ketteler of Mayence, Strassmeyer of Bosnia, Hefele of Rottenburg, Kenrick of St. Louis), sent a deputation to the pope, which begged him on their knees to modify the proposed decree and to make some concession for the peace and unity of the Church; but Pius IX. surprised the deputation with the assurance that the Church had always believed in the unconditional infallibility of the pope. (He claims to be the infallible judge of the Church's teaching, according to the saying attributed to him, "I am the tradition.") In the secret session of July 16, on motion of some Spanish bishop, an addition was inserted, which makes the decree still more obnoxious by declaring the pope infallible *before and without the consent*

of the Church (*non autem ex consensu ecclesiæ*). On the 17th of July, 56 bishops opposed to the new dogma sent a written protest to the pope, declaring their firm adherence to their conviction, but also their reluctance to vote against him in his face on a matter affecting him personally, and asking leave to return home. On the evening of the same day the signers of this protest, and 60 additional members of the opposition, left Rome (taking advantage of the rumors of war), and by this cowardly act they gave an easy victory to the majority and the triumph of error. In the public session, held July 18, there were but 535 members present, and all voted *placet* except two (Bishop Ruffini of Sicily and Bishop Fitzgerald of Arkansas), who changed their vote before the close of the session. After the vote the pope, amidst a fearful thunderstorm and flashes of lightning, read by candlelight in St. Peter's cathedral the decree of his own infallibility. The day after, Napoleon III., his chief political support, declared war against Germany: this war in a few weeks swept away both his throne and that of the pope, and resulted in the prostration of France, the unification of Italy, and the rise of the German empire under the lead of Protestant Prussia. The proclamation of this new dogma is the cause of secession of the "Old Catholics" under the lead of Döllinger (heretofore the pride of the Roman Church in Germany) and other eminent Catholic scholars. It is also the cause of the renewal of the serious conflict between the pope and the emperor, since no independent government can treat with an infallible pope on terms of equality. It may yet lead to a religious war in Europe. The Old Catholic movement would have become much more formidable if some, at least, of the protesting members of the council had remained faithful to their convictions, but all of them submitted, even those who during the council had made an unanswerable argument against papal infallibility. As they all professed to believe in the infallibility of an œcumenical council, they had either to give up this faith and virtually become Protestants, or to admit the infallibility of the pope after it had been so decreed by the Vatican Council, which they admitted to be œcumenical. To a Protestant this very council furnishes the best argument against the infallibility of an œcumenical council, since it solemnly affirms what three other œcumenical councils positively denied—viz. the infallibility of the pope. Either the council is fallible or the pope is fallible, or both are fallible. It is impossible that both are infallible, since they contradict each other.

This new dogma is the apex of the pyramid of the Roman hierarchy. Logically, it is more consistent than the Gallican theory, as an absolute monarchy is more consistent than a constitutional monarchy. It teaches an unbroken and ever-active infallibility, while Gallicanism secures only a periodic and intermittent infallibility, which reveals itself in an œcumenical council. But neither theory can stand the test of history, and is a mere pretension. Papal infallibility especially is unknown to the Bible and unknown to the ancient Church, and was never heard of till the period of the forged decretals in the ninth century. It lacks every one of the three essential marks of catholicity (the *semper*, the *ubique*, and the *ex cathedra*). It is not taught by any of the Fathers, Greek or Latin, nor by any of the œcumenical creeds, nor any of the œcumenical councils. On the contrary, the sixth œcumenical council, which was held in Constantinople 680, and is universally acknowledged in the East and the West, condemned and excommunicated Pope Honorius I. (625-638) "as a heretic (Monothelite), who, with the help of the old serpent, had scattered deadly error." This anathema was solemnly repeated by the seventh and by the eighth œcumenical councils (787 and 869), and even by the popes themselves, who down to the eleventh century, in a solemn oath at their accession, endorsed the sixth œcumenical council and pronounced "an eternal anathema" on the authors of the Monothelite heresy, together with Pope Honorius, "because he had given aid and comfort to the perverse doctrines of the heretics." This papal oath was probably prescribed by Gregory II. at the beginning of the eighth century, and is printed in the *Liber diuinus* and *Liber pontificalis* down to the eleventh century. Even the editions of the Roman Breviary before the sixteenth century reiterated the charge of heresy against Honorius. Pope Leo II. strongly confirmed the decree of the council against his predecessor Honorius, and denounced him as one who "endeavored by profane treason to overthrow the immaculate faith of the Roman Church" (*quod in apostolica et apostolicorum non apostolicum traditionem doctrinam suam, sed per profana prodantia immaculatam fidem subvertendo, contempsit*). (See Mansi, *Concilia*, tom. xi. p. 74.) This case of Honorius is as clear as daylight, according to the triumphant argument even of Roman Catholic scholars before the passage of the decree, such as Maret, Gratry, Kenrick, and Hefele), and is alone sufficient to overthrow the colossal



claim as a historical lie ("si falsus in uno, falsus in omnibus").

But history knows of other heretical popes: Zephyrinus (201-219) and Callistus (219-223) were Paterpassians; Liberius (358) signed an Arian creed and condemned Athanasius, "the father of orthodoxy," who mentions the fact with indignation: Felix II. was a decided Arian; Zosimus (417) at first endorsed the heresy of Pelagius and Cælestius, whom his predecessor, Innocent I., had condemned; Vigilius (538-555) vacillated between two opposite decisions during the Three Chapter controversy, and thereby produced a long schism in the West; John XXII. (d. 1334) denounced an opinion of Nicholas III. and Clement V. as heretical; several popes taught the universal depravity of men in a manner that clearly includes the Virgin Mary, and is irreconcilable with the recent dogma of the immaculate conception; Sixtus V. issued an edition of the Latin Bible with innumerable blunders, partly of his own making, and declared it the only true authentic text. Bellarmine, the great Roman controversialist and infallibilist, could not deny the facts, and advised the printing of a new edition with a lying statement in the preface, charging the errors of the infallible pope upon the fallible printer, though the pope had himself corrected the proofs. The present pope started out as a political reformer and advocate of Italian unity, which he now detests as the worst enemy of the Church.

The Pseudo-Isidorian Decretals first set up the claim of infallibility, and by a monstrous forgery, long since exploded, put it with other falsehoods into the mouths of the oldest popes in barbarous French Latin and with glaring anachronisms. Other hierarchical fictions, as the legend of the donation of Constantine and his baptism by Pope Sylvester, arose in the same uncritical and superstitious age, and were readily believed. But there was no time when these claims were not resisted. The famous oecumenical Council of Constance (1414-18) asserted its superiority over the pope by deposing one pope (John XXIII.) for infamous crimes, and another pope (Benedict XIII.) for heresy, and electing a third one in their place (Martin V.). There is no escape here from the logical dilemma, either to admit the validity of the council or to invalidate the election of Martin V. and his successors; both alternatives are fatal to papal infallibility. After the Reformation the Jesuits became the unscrupulous and untiring champions of this doctrine, but they failed in their effort to commit the Council of Trent. All the Jansenists and the greatest modern champions of Romanism, as Bossuet, Möhler, and the principal popular catechisms used before 1870, deny the infallibility of the pope. The Irish bishops Doyle, Murray, Kelly, affirmed under oath before a committee of the British Parliament in 1825, and openly declared in a *Pastoral Address* to their clergy and laity in 1826, that the infallibility of the pope is "not an article of the Catholic faith." It was on this explicit testimony that the Catholic emancipation bill was carried through Parliament. The Vatican Council was convened chiefly by Jesuitical influence for the purpose of defining this new dogma and killing Gallicanism; but the arguments and facts were on the part of the opposition, which might have triumphed if its moral courage had been equal to its learning and ability. Liberal Catholicism is now crushed by authority. The Vatican system requires the slaughter of private judgment and individual conscience, and divides the allegiance between the pope and the home government whenever they come in collision (as may be the case in the questions of education, marriage, and the restoration of the temporal power). We must indeed respect the higher law and "obey God, more than man," but the pope, far from being God Almighty, is a mortal, sinful man; and the government which the apostles disobeyed was not the state, but the ecclesiastical government of the Jewish hierarchy, which forbade them to preach the gospel (Acts v. 29), and set a bad example to the Roman hierarchy.

**Literature.**—I. In favor of papal infallibility: Archbishop Carloni, *Elucidatione de dogmatica Romani Pontificis infallibilitate* (Rome, 1870, semi-official); Archbishop Manning, *Petri Privilegium* (London, 1871); also his reply to Gladstone (1874); Archbishop Dechamps, *L'infaillibilité et le Concile Général* (Paris, 1869); Weninger, *The Infallibility of the Pope* (German and French, 1869); J. H. Newman, *Letter to the Duke of Norfolk*, in reply to Gladstone's *Vatican Decrees* (London and New York, 1874), a very qualified defence of infallibility, with a reserve of the rights of conscience. Older champions of infallibility are Bellarmine, Liutta, Liguori, and Count de Maistre. 2. Against papal infallibility: (a) By members of the Vatican Council.—Bishop Maret (dean of the theological faculty in Paris), *Du Concile Général et de la paix religieuse* (Paris, 1869, 2 vols.); Archbishop Darboy, *La liberté du Concile et l'infaillibilité* (in Friedrich's *Documenta*, i. 129-186); Bishop

Hefele, the author of the best history of councils, *Causa Honorii Papæ* (Neap., 1870); and *Honorius und das sechste allgemeine Concil* (Tübingen, 1870; trans. by H. B. Smith in the *Presbyt. Quart. Rev.* for Apr., 1872, p. 273); Archbishop Kenrick of St. Louis, *Concilio in Concilio Vaticano habenda at non habita* (Naples, 1870; reprinted in Friedrich's *Documenta*, i. 187-226). (b) By Catholics not members of the council, now mostly Old Catholic seceders.—Janus (pseudonymous), *The Pope and the Council* (German and English, Leips. and London, 1869); Döllinger, *Ueber die Unfehlbarkeit-Adresse* (Munich, 1870); Reinkens, now Old Catholic bishop, *Ueber päpstliche Unfehlbarkeit* (Munich, 1870); A. Gratry, *Four Letters to the Bishop of Orléans* (Dupanloup) and *the Archbishop of Malines* (Dechamps), (in French, German, and English, 1870. Gratry recanted on his deathbed). (c) By Protestants.—W. E. Gladstone, *The Vatican Decrees in their Bearing on Civil Allegiance* (Lond., 1874), with a history of the council and the text of the decrees, by Philip Schaff (New York, Harpers, 1875); Gladstone, *Vaticanism, an Answer to Reproofs and Replies*, of Manning, Newman, and others (Lond. and New York, 1875). Comp. also the literature on the VATICAN COUNCIL. PHILIP SCHAFF.

**Infant**, in law, is a person who on account of youth and inexperience is incapacitated either wholly or in part from entering into contracts or performing specific acts. The incapacity may be natural or artificial, and is affected by rules of positive law. Thus, under some systems of law a person has not full capacity until attaining the age of twenty-five; under the rules of the common law full capacity is attained at the age of twenty-one; though by a special rule a marriage may be contracted by a male at the age of fourteen, and by a female at the age of twelve. Wills of personal property may be made at the same age. These rules were borrowed from the ecclesiastical courts, where questions concerning the validity of marriages and of wills of personal property were disposed of. This matter in the U. S. is to some extent regulated by statute. A promise to marry is not binding unless the promiser is of full age. By an ancient rule which is still law a person becomes twenty-one on the day preceding the anniversary of his birthday. This is on account of the legal proposition that the law recognizes no fraction of a day, and as full majority would be reached at the close of the preceding day, it is attained by this rule at any time on that day. In some states females attain majority at an earlier age than males. This diversity of rules in the different states or nations leads to interesting questions in private international law. (See INTERNATIONAL LAW, PRIVATE.) Thus, if a person not of age in a country where he is domiciled happens to be temporarily in a country where he is of sufficient age to make contracts, and does in fact assume to contract, the question will be whether the validity of his contract is to be tested by the law of his domicile or of the place where the contract is made or to be performed. Under the English and American law the law of the place where the contract is made is assumed to govern. In testing the validity of a will of personal property reference will be had to the law of the domicile, and of a like disposition of land to the law of the place where the land is situated.

The subject may be considered under the following principal divisions: I. The capacity of infants to make contracts, and to do other acts of a civil nature involving judgment and discretion; II. Their liability for wrongs (torts); III. Their responsibility for crimes; IV. Their rights in a court of equity; V. Their liability as property-owners to bear the legal burdens imposed on property.

I. It is a general rule that an infant's contract is not binding upon him. There has been great controversy upon the point whether his acts are void or voidable. The effect of this distinction is, that if the contract is void, it is incapable of confirmation by the infant on attaining majority. On the other hand, if voidable, the infant has the power of confirmation. There is a strong tendency in modern law to construe the act to be voidable rather than void, and there are but few contracts made by infants at the present day which are incapable of confirmation. This rule makes the subject of confirmation of much importance, and frequently questions arise as to the point whether it may take place by implication as well as by express agreement. It has often been decided by the courts that confirmation may be inferred in certain cases from acquiescence for a considerable time after majority, particularly where the fruits of the transaction are still enjoyed by the infant, as in the case of purchase of property or the execution of a lease. In the latter case the reception of rent would be strong evidence of confirmation. This doctrine would not be so readily admitted in the case of the sale of the infant's land, and there are authorities of high respectability which maintain that the title will not be perfect in this case, in the absence of direct confirmation, until there has been pos-



session by the grantee for the time required by the statute of limitations. (See LIMITATIONS, STATUTE OF.) A person will not be liable to pay a debt contracted during infancy without a promise to pay made after majority.

Under these doctrines it is plain that an infant at his majority may, except in special instances to be hereafter mentioned, repudiate his contract at will. In doing this he must, in general, return to the other party what he has received from him. His infancy is to be used "as a shield and not as a sword." Should he repudiate the contract, it would seem that he would be under a legal duty to make restitution only in case the property was under his control. In other words, he must, on rescinding a contract, put the opposite party back in his original position, if that is in his power. If he makes a contract to serve another for a specified time, he may repudiate the contract, and still exact payment for what he may have done under it.

The principal exception to the voidable nature of the infant's contract consists in the fact that he may bind himself for "necessaries." This term refers to contracts for food, clothing, shelter, medical attendance, and proper instruction or education. There will, of course, be a wide range in respect to these articles, depending upon the infant's wealth and position in society. While the judges determine as matter of law the classes of things for which infants are liable, they refer special cases to the jury to decide whether, under all the circumstances, the expenditure was proper. There may, however, be cases of such a glaring character as to show that the goods could not on any theory be necessary, when the judge will dismiss the case. It should be added that while the infant may be bound by his contract in respect to such articles, it does not follow that he will be required to pay the price which is charged to his account or which he has agreed to pay. He can only be held for the real value of the goods, without reference to the price fixed, though that be stipulated by his note or bond. Under these rules, if an infant should borrow money with an intention expressed to the lender to purchase necessities, he could not be made to repay the money unless it were actually used for that purpose. These rules, being designed for the infant's protection, are liberally construed by the courts. The doctrines applicable to necessities would be extended to his wife and children, and he could contract for their support. There may sometimes be a question whether the price of supplies is to be paid by the infant or his parent. The true line of inquiry in such a case is, To whom was the credit given? If given to the parent, the tradesman cannot recover of the infant, though the parent should prove pecuniarily irresponsible.

Without pursuing this branch of the subject further, mention may be made of certain other cases in which the infant will be bound by his acts. It is a general rule that he will be bound whenever he voluntarily does that which he could have legally been compelled to do; *e. g.* if he could have been required, as a trustee, to execute a deed, his voluntary execution of it will be sufficient. The same rule will be applied if statute law gives him in special instances an exceptional capacity to act, as where he is authorized by law to enlist in the army or navy or required to support an illegitimate child.

In the following instances an infant is by the law of this country usually incapable. He cannot hold a public office or act as an executor or administrator until he is seventeen, and in some States until twenty-one (though he may be appointed), nor can the doctrine of estoppel be applied to him in a court of law, though it may be in some instances in equity; nor can he in general appoint an attorney or appear in court by an attorney, though a next friend or guardian may act for him, who may appoint an attorney; nor will the statute of limitations begin to run against him. The explanation of the last branch of this statement is, that if a cause of action should arise during his infancy, neglect cannot be imputed to him for failing to vindicate his rights by action. Accordingly, the statute of limitations, which is framed to prevent undue delay in litigation, will not apply to him until his infancy has ceased. The rule, however, does not extend to the case where the infant takes by succession from another a right which might during the ownership of his predecessor have been enforced by action.

II. *Liability of the Infant for Wrongful Acts or Torts.*—In this class of cases the ground of liability is a wrongful act and consequent damage to another. The reason for the infant's exemption from liability here fails. There is no longer any policy of the law to protect him from responsibility. The artificial rule of incapacity is dispensed with, and if an infant having sufficient discretion commits a wrongful act and causes injury, he will be liable to an action as though he were an adult. There will frequently be cases in which it will be difficult to draw the line between liability upon contract and responsibility for a tort. It is in a certain sense true that a wrong may arise out of a contract, and the inquiry

must be made as to the rule to be applied in such a case. For example, an infant may hire a horse, and from his youth and inexperience may treat the animal injudiciously by overdriving him or watering him when heated, and thus cause damage. To hold the infant liable in such a case would be substantially to break down all the safeguards which the law has established for his protection. On the other hand, if the infant simply used the contract as an opportunity or an occasion to commit a wrong, or if, in the case supposed, he wilfully abused the animal, the wrong could in no proper sense be said to arise out of the contract, and the infant would be responsible. Owing to this distinction a prolonged controversy has existed among jurists as to the point whether an infant is liable for fraud practised by him in the making of a contract. On the one hand, it is claimed that the fraud is so inseparable from the contract that the right to plead his infancy includes the right to exempt himself from responsibility for the fraud. On this view, the only remedy of the injured party would be to annul the contract on account of the fraud, and to demand a return by the infant of what he had received under it. This is the view prevailing in the English courts. On the other hand, it has been maintained in some of the American courts that the fraud is such a wrongful act as to give a substantive ground for an action of damages. The weight of reason would seem to be with the English view, and the opposite doctrine can scarcely be considered as established in this country. Courts of equity have held in some instances that an infant who has fraudulently represented himself as of full age, and has obtained property on that basis, is estopped from denying that he is of full age, and have thus by this artificial rule indirectly held him responsible for his fraud. This doctrine is not very satisfactory, and rests more upon authority than upon solid principle. The law upon the whole subject of the distinction between the infant's liability for a wrong, whether considered as connected with a contract or as independent of it, is in an obscure and perhaps transitional state, and only general and probable results can be given. A clear instance of liability may be found in the case of the wilful use of a chattel entrusted to him under a contract in a way prohibited by the owner, and consequent damage. An English illustration is the act of hiring a horse, with a prohibition by the owner against using it to jump fences, and the deliberate use of it by him notwithstanding, followed by damage. This is really an exercise of an act of ownership inconsistent with the contract of hiring, and substantially an appropriation of the chattel to the infant's own use, and thus the act is a wrong unconnected with the contract.

III. *Capacity of Infants to Commit Crimes.* The same act which when regarded from the point of view that an individual is injured constitutes a tort, may in reference to society be regarded as a crime. There is no good reason why if there is sufficient intelligence on the part of the infant he should not be responsible. The arbitrary rule established for his protection in the case of contracts should be discarded, and the sole point of inquiry should concern his actual capacity to understand the nature and consequences of the act done. The criminal law, however, contains the arbitrary rule that under seven years of age he cannot commit a felonious crime. When he is between seven and fourteen years of age there is no presumption either in his favor or against him; his actual capacity is fully open to investigation. When fourteen years of age and upwards he is presumed to be capable, and the burden is cast upon him to produce evidence of incapacity. For physical reasons a male infant under fourteen years of age is conclusively presumed in England to be incapable of committing the crime of rape. This rule has been discarded in the State of New York, and perhaps elsewhere, on the ground that puberty is attained here at an earlier age than in England. The older law-books are disfigured with accounts of children of tender years who have been executed for capital crimes. The more humane policy of modern times is to sentence juvenile criminals to houses of refuge or correction, where educational and disciplinary measures are resorted to with a view to eradicate, or at least to ameliorate, their vicious dispositions.

IV. *The Position of an Infant in a Court of Equity.*—Infants are favorites of this court, and are frequently under its special protection as being its wards. The court has abundant power to protect them by means of its ability to punish for contempt those who interfere with its orders. In that court the authority of a parent is regarded rather as a trust than as a power, and the court may for good reasons withdraw a child from its parent's custody, and give it over to persons deemed capable to train and educate it. (See PARENT AND CHILD.) When the property of an infant is before this as well as other courts, a guardian for the purposes of the litigation *ad litem* may be appointed



to look after his interests. He at the same time will not be allowed by his negligence or inattention to affect injuriously the infant's estate, and any untoward admissions in an action prejudicial to his rights will not be regarded. The validity of his marriage settlements frequently come before this court. It is a well-settled rule of the English law that a female infant may on the eve of marriage, by a proper settlement, bar herself of all claim of dower in her husband's land. This may be done under a statute as early as the reign of Henry VIII., known as the "statute of jointures." The same general rule prevails in this country. Her right to part with her *own real estate* in this way is much more restricted, and a settlement having that effect may be avoided by her after attaining majority, and after the termination of the marriage, and, according to the views of some jurists, even during its continuance. The same rule would be applied to the case of a male infant making a settlement of his real estate. The power of both classes of infants in respect to personal property is much less restricted. The whole subject is at present regulated in England by statute.

V. An infant considered as an owner of property is liable to the burdens incident to ownership. Thus, he would be bound to pay taxes or other assessments of a legal nature. His land can be taken under the rules of eminent domain in the same manner as that of an adult. There would be a distinction between property cast upon him by a rule of law—e. g. by descent—and that which he has acquired by his own act. In the first case, the law would make him competent to bear the burden, and he could only shift it off by a sale. On the other hand, where he had acquired it by his own act, he could repudiate the transaction, and thus relieve himself from liability. But even in this case, so long as he remained owner his liability to such burdens would continue. (Reference may be had for further information to the treatises of Bingham and Macpherson on *Infancy*; Forsyth on the *Custody of Infants*; Chambers on *Chancery Jurisdiction*; and to the treatises of Reeve and Schouler on the *Domestic Relations*, as well as to more general works, such as Kent's *Commentaries*, and Story on *Equity Jurisprudence*. See also *GUARDIAN AND PARENT AND CHILD*.) T. W. DWIGHT.

**Infanta'do**, a district in Spain which formerly constituted the personal domain of the *infantes* or royal princes, and which gave title to a dukedom, created in 1465, which was held by several of the most powerful of the Spanish nobles. It was composed of the four villages of Peñas de San Pedro, Alcocer, Salmeron, and Valdeolivas, situated in the province of Guadalajara, about 50 miles due E. from Madrid.

**Infan'te** [Lat. *infans*, "an infant"], in Spain and Portugal the official title of the princes of the blood-royal, the princesses being called *infantas*. The heir-apparent to the throne, however, was not called an *infante*; in Spain his title was *príncipe de Asturias*, or simply *el príncipe*, "the prince;" and in Portugal, until the separation of the American colony, he was called the prince of Brazil. The name *infante* was also applied in Spain at an early period to the children of the nobility, and the "seven infants of Lara," who were killed in an attempt to rescue their father, the *señor* or lord of Lara, from Moorish captivity in Cordova, are famous in Spanish ballad-poetry and romance.

**Infante** (JOSÉ MIGUEL), b. in Santiago de Chili in 1778, was one of the leaders of the revolutionary movement of 1810, which resulted in the independence of Spanish America: a member of several of the *juntas* of government established by the insurgents; was president of the provisional juntas of 1823 and 1825; member of the "congress of plenipotentiaries" in 1831, and chief-justice in 1843. Infante was the founder of one of the earliest political newspapers of Chili, and was prominent in organizing the common-school system of his country. D. in Santiago Apr. 9, 1844.

**Infanticide**, Law concerning. Infanticide, at common law, consists in the doing of any act whereby the death of an infant child is caused after it is fully born alive. It is to be distinguished from the killing of a child within its mother's womb, which is now known as feticide. When the death of the new-born infant is occasioned by an unlawful act, as distinguished from mere accident or unavoidable casualty, such act will constitute the crime of felonious homicide (see *HOMICIDE*), and may be either murder or manslaughter, according to the circumstances of the particular case. (See *MURDER, MANSLAUGHTER*.) In every instance, however, the death must occur after the actual birth of the child, or no crime is committed. If means be used for the procurement of an abortion upon the person of the mother, either by the administering of medicines or by the use of instruments, or in any other way whatever, and the *fœtus* is destroyed before birth, the act is neither

murder nor manslaughter at common law. This defect in the law has, however, been generally remedied in recent times by the enactment of statutes for the prevention and punishment of abortion. (See *ABORTION*.) The doctrine of the common law is that when a child is fully born he first becomes a human being within the scope of that rule in the law of homicide which requires that the person killed shall be "a reasonable creature in being," in order that the act of killing may be felonious. The infant is said to be actually and fully born when every part of it is wholly produced or separated from the body of its mother in a living state. It is not necessary that the umbilical cord be severed, nor that the child should ever have breathed before being killed, if it was fully delivered and alive. On the other hand, if it be proved that the child did breathe before its death, this will not be sufficient evidence that its birth was complete, as breathing sometimes begins during the progress of the delivery. It is only requisite to constitute criminal infanticide that death occur after actual birth. The injuries may have been inflicted previously. Thus, if a child is born alive, but subsequently dies from the effect of bruises which it received while in the womb, the person inflicting the injuries is chargeable with murder or manslaughter. But if the death occur during the progress of the delivery, though a portion of the child's person has been removed from its mother's body, no crime is committed. It is not, however, necessary that the full period of gestation should be completed, for if a person intending to procure an abortion does an act which causes a child to be born before the expiration of the natural time, and it dies in consequence of its exposure to the external world or from the injuries it has received, he will be guilty of murder. (See the works of Bishop, of Wharton, of Russell on *Criminal Law*; Wharton on *Homicide*; Archbold's *Criminal Practice*. For the various medical tests employed to determine the cause of a child's death, and whether it has occurred before or after birth, such works may be consulted as Wharton and Stillé's *Medical Jurisprudence*; Beek on the same subject; and also Taylor.) GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Infant Je'sus, Daughters of the**, an order of nuns in the Roman Catholic Church. Founded at Rome by Anna Moroni of Lucca for the industrial instruction of poor girls; it was first acknowledged in 1673 by Clement X. No convent can have more than thirty-three members, that being the number of years Jesus was on the earth. There was also an older order called "Sisters of the Good Jesus," which appears to have been long extinct.

**Inf'antry** [Lat. *infans*, "child" or "servant," applied to servants who went on foot, and *infanteria*, to foot-soldiers generally] is that portion of a military establishment armed and equipped for marching and fighting on foot, in contradistinction to artillery and cavalry. It is the oldest of the "three arms" into which armies are conventionally divided; was the favorite of the Greeks, the Gauls, the Germans, and the Franks, and was that mainly with which Rome conquered the world. Under Grecian and Roman civilization it attained pre-eminence as the *arm of battle*, but fell into contempt and comparative desuetude early in the Middle Ages, and did not emerge from that obscurity till the decline of the feudal system. It steadily increased in power from the first years of the fourteenth century, and is now recognized as constituting the principal strength of military organizations. This importance results from the fact that it can be used everywhere, "in mountains or on plains, in woody or open countries, in cities or in fields, on rivers or at sea, in the redoubt or in the attack on the breach." It is the self-sustaining arm in the field of battle, and is moreover less expensive, man for man, than its auxiliaries.

**Ancient Infantry**.—The primitive formation of heavy infantry was massive, as is shown in the solid squares of 10,000 men portrayed in Egyptian history, and this order was gradually reduced in depth through the Persian and Dorian formations till it reached the phalungial systems of Sparta, Thebes, and Athens. These systems became homologous under the Macedonian empire, and the phalanx as it existed under that domination is now described. The foot-soldiers were divided into three classes—the *hoplites*, or heavy infantry, in complete armor and carrying the sarissa, a spear over twenty feet in length; the *peltastes*, or light infantry, with shorter spears and less complete armor; and the *psilæ*, or sharpshooters, who wore no armor and carried only missile weapons. The *phalanx*, comparable, in size at least, to a modern division, consisted nominally of 4096 hoplites, organized into two *tetarchies* (or brigades), each consisting of two *chiliarches* (regiments or battalions), and these in turn divided into four *syntagmata* (battalions or companies). The *syntagma* combined sixteen files, each file (*lochos*) containing sixteen men; and thus in line of battle the phalanx presented a nominal front of 256 men and a depth of 16 men. In open order, as for the march,

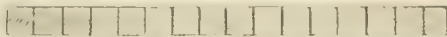


there were intervals of about six feet between the files: in close order, as in advancing to the attack, the spaces between ranks and files were reduced to about three feet; and in the locked, or defensive order, the men closed shoulder to shoulder on the front rank, overlapping their shields; and in this order presented an almost impenetrable hedge of steel to the enemy. The peltastes had a similar formation, though of less depth and under different denominations, but it is not clear that the pelta had any systematic organization. Four of these elementary phalanges, with their complement of light infantry and cavalry, formed the grand phalanx, or army corps.

But a rival system, substantially anticipated in the Hebrew armies of Joshua, reappeared in Roman infantry. The *legion* was coetaneous with the foundation of Rome, and, in so far as it combined all the constituent elements, was a prototype of the corps d'armée of to-day. Originally, legionary infantry was massed according to the phalangeal method, but as early as 340 B. C. that formation had been superseded by a system of heavy lines so divided into tactical units, called *manipuli*, that while each line and each unit could act separately, they could execute combined movements with celerity and precision. The complement of infantry for each legion gradually increased from 3000 to 6000, and in the details of equipment and organization changes were frequent. As existing in the First Punic war, and consisting nominally of 1200 *pedites*, the heavy infantry was formed in three lines—in the first line 1200 *hastati*, young and inexperienced warriors; in the second, 1200 *principes*, men in full vigor of life; and in the third, 600 *triarii*, the veteran troops. Each line was divided into ten *manipuli* (companies), the first two lines being in ten ranks and the third in six ranks; and in each company the space between ranks and files was about three feet, the men in rear of the front rank standing opposite the intervals of the rank next in their front. To this force was attached a corp of 1200 *velites* (skirmishers), who probably had neither company organization nor fixed position in the legion. At this period all of the heavy infantry were equipped in complete armor, and were armed with the short straight sword; the *hastati* and *principes* also carried heavy javelins, and the *triarii* had long spears. The *velites* wore no armor, and used none but missile weapons. Prior to this period the long spear had been borne by the *hastati*, and the *pilum*, a heavy javelin, by the *triarii*; hence the name of the first line, and the designation of that and the second line as *ante-pilani*. These misnomers obtained, however, till these classifications of heavy infantry ceased. In the Second Punic war the *manipuli* of a legion were grouped into ten *cohortes* (battalions), consisting each of a company of *hastati*, one of *principes*, and one of *triarii*, with probably a corresponding proportion of *velites*. About 100 B. C. the heavy infantry, ceasing to be divided into classes, are armed and equipped alike, the *velites* disappear from the legion, separate corps of light infantry are formed from the auxiliary forces, and the cohort, becoming the tactical unit, resembles more closely the modern battalion. This was the formation employed by Marius and Caesar, and maintained till about the time of Hadrian; and subsequent modifications did not destroy the distinctive features of the system.

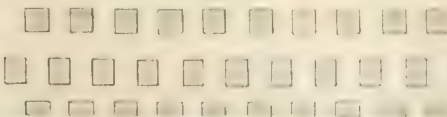
The contrast between the rival systems of antiquity is confined to the heavy infantry, or troops of the line, and is, briefly, that of large masses comparatively inert, with smaller force-units of corresponding mobility. The phalanx, though equal to a modern division in numbers, was, tactically speaking, simply a huge battalion, and its usual figure was that of an oblong rectangle (Fig. 1). This for-

FIG. 1.



mation could change, and extend or contract its front, and form columns, squares, wedges, etc. It was peculiarly formidable in defensive attitude, and was overwhelming in an onslaught over favorable ground and for short distances; but there seems to have been no provision for maneuvering by fractional parts except to form masses of greater depth, and the phalanx engaged at all was engaged as a whole. On the other hand, the tactical units of the legion never exceeded 600 men, and these could be maneuvered separately, in groups, or as a whole. The formations most characteristic of the Roman system were the manipular ar-

FIG. 2.



ray in quincunx order (Fig. 2), and the later formation in two or more lines of cohorts, with small intervals in each

line for the passage of light troops; and from either of these orders, columns, continuous lines, hollow and solid squares, etc., were readily derived. The manipular system gave great flexibility to the legionary infantry, but at the expense of its powers of resistance, and the later cohort formation as arranged by Caesar (Fig. 3) was a partial reversion to the

FIG. 3.



phalangeal order. Modern criticism is pronounced in favor of the Roman cohort, but in its renaissance infantry was again displayed after the rival methods of Alexander and Caesar; and in comparing the two systems there is danger of overestimating the effect of purely tactical combinations upon the fortunes of ancient armies. At Marathon an Athenian line only four deep and at "double time" successfully charged great odds in dense masses; at Leuctra the Spartan line, eight deep, is pierced by the Theban column; Greeks in phalanx conquer the Persians in like order, but finally succumb to the Roman cohort, but that in turn was annihilated by the barbarian hosts in phalangeal array; and it is significant in this connection that while Pyrrhus and Hannibal adopted Roman weapons, they did not discard the massive formation.

In the Middle Ages infantry continued to constitute the principal strength of the dominant powers of Europe till the feudal system was established. In the seven days' battle of Tours (A. D. 732) we find the heavy battalions of the Franks defying the fury of the Saracenic cavalry, and for ever turning back the northern tide of Moslem invasion; this, however, was its last creditable appearance for several centuries. During the period of its abasement, war was pre-eminently the occupation of mankind, but military science was in abeyance. Armies worthy of the name ceased to exist, and all discipline disappeared: cavalry became the principal arm, and for over 400 years the man-at-arms in comparative security trampled the despised infantry, then a tumultuous mob that pillaged or fed as fortune served their mounted masters. But feudalism forced royalty into alliance with the commons; to curb the noble the king armed and disciplined the peasant. "Communal" militia was organized, and soon proved superior to the baronial followings, and as early as 1214 some of the German infantry is described as "very good, and trained to fight on the level *even against cavalry*." In the next century Flemish infantry with crossbow and partisan overthrows the chivalry of France at Courtrai (1302), the Austrian man-at-arms comes to signal grief on the Swiss pike at Morgarten (1315), Sempach (1386), and Nafels (1388), and the English knight dismounts to fight beside the victorious archer at Cressy and Poitiers (1346-56). The prestige thus re-established, though often challenged, was never lost; corps of pikemen and archers became essential elements in all military organizations; and in the standing armies raised about the middle of the fifteenth century these troops attained such steadiness and dexterity that cavalry, in its last crustacean security, soon faded but indifferently in disputing precedence with infantry; and when the weapons of the latter delivered missiles through the heaviest plate-armor that man and beast could bear, the issue was decided. Cavalry was still important, but was relegated to an auxiliary position.

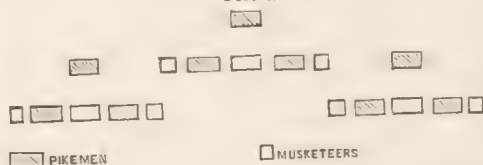
From the fall of the Western empire till about the battle of Pavia (1525) details of military formations are exceedingly meagre. While systematic arrangements obtained, there appears to have been adherence to the systems of Greece and Rome. At Casilinum (A. D. 551) the Franks in phalangeal wedge are defeated by the cohorts of Narsee; at Tours they are victorious in massive square; at Hastings the Anglo-Saxons adopted a similar order; at Bouvines (1214) the Germans were in hollow square; the *début* of Swiss infantry is in Grecian wedges and squares; while the Spanish infantry, equally famous a few years later, first appears in the Roman order, and, like its prototype, exhibits a partial reversion to the Greek method when confronted with the Swiss copy. The principal infantry weapons, offensive and defensive, during this period were straight swords, pikes, axes, spiked clubs, longbows, halberds, crossbows, partisans, helmets, mail-jackets, corselets, and shields. As in former periods, the use of missile arms is almost exclusively confined to light troops.

Modern infantry is conveniently assumed to date from the general introduction of firearms—not because that event at once revolutionized military methods, but because from that period there is authentic record of the gradual revival of military science. Firearms were in general use



when the battle of Pavia occurred, but for many years these weapons were unwieldy, uncertain of aim, and limited in range. They did not entirely supersede the bow till about the middle of the sixteenth century, and the musket did not become the sole arm of civilized infantry till, at the beginning of the eighteenth century, it became, with the socket bayonet, a pyro-ballistic pike. In the infantry "bands" organized by Francis I. in 1534, and promptly imitated by other nations, the arquebusers and archers, in equal proportion to each other, constituted two-fifths of the entire force; in 1562, "regiments" of about 3000 men become common, and, the bow disappearing, the proportion of firearms is soon increased to one-half. At the beginning of the Thirty Years' war "battalions" of about 500 men had been organized, which in extended order presented a line of contiguous company squares, ten or twelve ranks in depth, with the light infantry (then musketeers) on the flanks. But notwithstanding the steadily increasing destructiveness of artillery and small-arms these battalions were still habitually massed for action into close columns of twenty, and even thirty, files; and these unwieldy imitations of the phalanx suffered an additional incumbrance in the immediate proximity of the enemy from the huddling of their own musketeers within the protection of their pikes. The impotence of this system was rudely exposed by the genius of Gustavus Adolphus, who seems to have been the first to awaken Europe to the value of infantry fire. His innovations consisted simply in so adapting his battalion formation and grand tactical combinations as to develop the full force of his own fire with the least possible exposure to that from the enemy. To accomplish this result, he formed battalions of mobile dimensions, reduced the depth of his ranks to six men, increased the proportion of firearms to about three-fifths, lightened the musket, shortened the pike, discarded useless armor, and introduced the cartridge and cartridge-box. Moreover, his men were taught to use the spade as well as their legs. His usual order of battle was in two lines, resembling the quincunx system of the Romans (Fig. 4). The

Fig. 4.



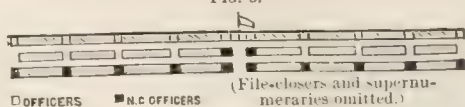
superiority of the Swedish system was so forcibly demonstrated at Breitenfeld and Lutzen (1631-32) as to be generally and speedily adopted.

About 1670 the bayonet was generally introduced, and the proportion of pikemen was correspondingly reduced, till in 1675 it did not exceed one-fourth in any of the principal armies. The socket bayonet appeared in 1699, and within six years the pike virtually disappeared from the battle-field; and while all infantry is armed with the same weapon, the distinction between heavy and light corps, originating in the incompatibility of the ancient wielded and missile weapons, remains nominal. With the discarding of pikes came a reduction of lineal formations to four ranks, but the distance between the ranks was variable; in them the elbow-touch was not preserved, and the cadence step, common from the most remote period of Egyptian history till the extinction of classic civilization, was not yet revived. This contrivance for securing mobility in cohesive order was adopted by Marshal Saxe, whose battalions thereupon astonished both friend and foe by the aggressive use of their legs.

Frederick the Great is generally considered as the next reformer of military methods, and the manœuvring of his battalions and their evolutions in line of battle certainly reconciled celerity with precision of combination to a degree till then comparatively, if not totally, unknown. Attaching greater importance to the fire of his infantry than to their use of the bayonet, he increased the volume of fire by extending the battalion in three ranks, and by thorough drill so accustomed his troops to the use of their weapons and to steadiness in marching that in unwavering lines, advancing or retreating, they could pour well-sustained volleys upon the enemy. His battalion, two of which constituted a regiment, consisted of six companies, five of fusiliers, and one of grenadiers, and its nominal strength was 690 men, rank and file. Each battalion was divided for tactical purposes into eight divisions, and each company into four sections, but, unfortunately, his division embraced sections of three different companies (Fig. 5). A force of supernumeraries accompanied each battalion to fill vacancies in the ranks. The Seven Years' war made the Prussian infantry the archetype for Christendom, and from the

Peace of Paris to the present day but trifling differences have existed in the organizations of different nations. The English were probably the first to adopt a habitual forma-

Fig. 5.



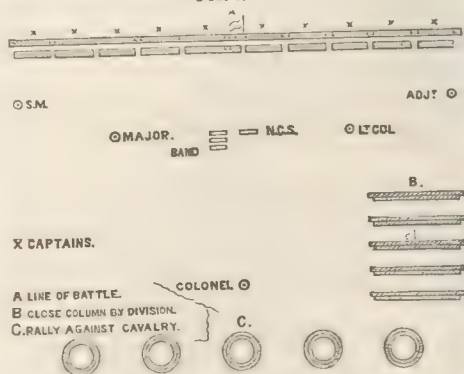
tion in two ranks, and the propriety of reduction to one rank is now seriously discussed, and is provided for in the U. S. tactics.

The division of infantry into light and heavy troops, that had become nominal about the year 1700, was revived, first by placing the new arms, as muskets were improved in range and accuracy, in the hands of picked men from each battalion or in special corps (fusiliers, grenadiers, etc.), and subsequently by the introduction of rifled arms, which as first employed were deemed unsuitable for "troops of the line." Corps of riflemen were accordingly organized under various denominations (chasseurs, tirailleurs, etc.), were trained in gymnastic exercises, and specially drilled for marching and fighting in open order as sharpshooters. But in the present day the distinction is again nominal. The rifle is universal, and all infantry is really light infantry.

The present organization of infantry is in COMPANIES, BATTALIONS, and REGIMENTS (which see); for tactical purposes the companies are generally divided into platoons, the battalions into wings and divisions; and for like purposes the battalions are grouped into BRIGADES and DIVISIONS (which see). Regimental organizations are purely administrative; in the armies of Europe they generally consist of two or more battalions, and the nominal battalion strength, rank and file, ranges from 500 to 1000 men.

In the army of the U. S. the infantry is organized into twenty-five regiments, each consisting of one battalion of ten companies. To each regiment there is a colonel, lieutenant-colonel, major, adjutant, quartermaster, sergeant-major, quartermaster-sergeant, chief musician, and two principal musicians, and to the two "colored regiments" a chaplain each. Each company has a captain, two lieutenants, five sergeants, four corporals, two musicians, two artificers, a wagoner, and, under the organic law, from 50 to 100 privates, but under temporary restrictions in the annual appropriation for the army the number of privates averages only 34, which gives a regimental strength, rank and file, of about 480 men. The companies are permanently designated by letters of the alphabet, and are so posted in the battalion as to have the senior captain on the right, the next in rank on the left, the third in the centre, and so on. The lieutenants, when not commanding subdivisions, and the sergeants, when not acting as guides, constitute the "file-closers," and are stationed in rear of their respective companies. The various distinctive formations of our battalion and of a company are indicated in Figs. 6 and 7. The individual soldier is armed with a breech-

Fig. 6.



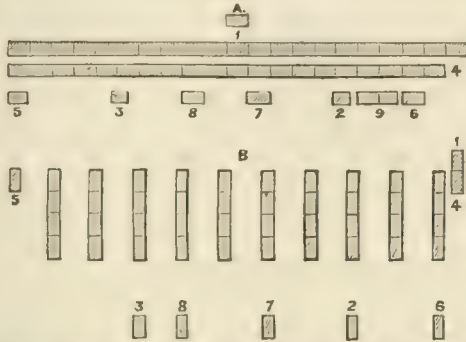
loading rifle and triangular bayonet, and is now experimenting with a contrivance designed to combine the dangerous qualities of the bayonet with the protective virtues of the spade. His uniform is distinguished by light-blue trimmings, and in heavy marching order he carries a knapsack with complete change of clothing, a blanket, great-coat, several days' rations in haversack, a canteen of water, and 60 rounds of ammunition.

Theoretically, the proportion of infantry in all properly organized armies should be from two-thirds to three-fourths of the permanent establishment, but as efficient infantry can be created more readily than serviceable artillery or



cavalry, this proportion is rarely maintained in a peace establishment. In the U. S. service the proportion of the three arms is about—artillery one-eighth, cavalry three-

FIG. 7.



A, in line; B, column of fours. 1, captain; 2, first lieutenant; 3, second lieutenant; 4, first sergeant; 5, second sergeant; 6, third sergeant; 7, fourth sergeant; 8, fifth sergeant; 9, musicians.

eighths, and infantry one-half, but the exigencies of this service demand a constant interchange of duties between the three arms.

ROBERT N. SCOTT.

**Infant Schools** were originally charitable institutions that sprang up in the early part of the present century, simply to relieve the mothers of the laboring classes of the care of their little children when they are away at day labor. Their value was merely that they kept the children out of the streets and physically comfortable. They got the name of *schools* because among the devices for keeping them quiet by circumventing their spontaneous activity, they were taught to march and some gymnastic exercises, and to sing in rhyme or intone the multiplication table, the names of the days of the week, of the months of the year, and other things of that kind. The best thing taught in the infant schools was to sing hymns, for music is the natural language of piety, and little children thus get the notion of religion and some of its most suggestive symbols into their "chambers of imagery." Some of the disciples of Pestalozzi, and especially Wilderspin, endeavored to develop something educational out of these charitable institutions, introducing some object-teaching. But they were not even the germ of the *kindergarten* (see FROEBEL and KINDERGARTEN), because they were not founded on any study of the nature of childhood, and their method was simply *routine*, which is the opposite of *cultivating*; so far from preparing children for the schools of instruction, as the kindergarten education does, their substitution of memorized words for observed things renders children less susceptible of being taught the way to discover facts and truth. Our countryman, Mr. A. B. Alcott, in articles written in the first *Journal of Education* published in America—which was edited by William Russell in Boston in the years 1826-29—pointed out the radical defect of the infant school method of dealing with children's minds. He made experiments of a more vital one. His wonderful success in touching into activity the moral sense of the neglected children in the cellars of Broad street, gathered by some charitable ladies of Boston into an infant school in 1826, attracted the attention of the cultivated classes, and led to the establishment of a school, of which a volume called the *Record of a School* gives an account, and which contains a genuine study of childhood and a high appreciation of Mr. Alcott. But in the last edition of this book the author is seen to have become the disciple of Froebel's broader and more natural method, whose scope involves all that is good in the infant school, corrects its errors, and supplies its deficiencies.

ELIZABETH P. PEABODY.

**Infanzona'do**, a district comprising 72 villages in the plain-country of the Spanish province of Vizcaya or Biscay; it was considered as the noblest region of the Basque country, and its representatives enjoyed a preference at the *junta*. The name is supposed to imply that this territory was once the domain of the *infanzones*, literally, the "great infants"—of the royal family. The territory is divided into the five *merindades* of Uribe, Busturia, Araratia, Bedia, and Marquina.

**Infection.** See CONTAGION.

**Infidel** [Lat. *infidelis*, "unfaithful," "unbelieving"]. A term applied, usually with something of reproach, (1) to disbelievers in the Christian religion, whether atheists or deists (see ATHEISM, DEISM); (2) to non-believers, such as Mohammedans and heathens, but this use of the word is antiquated and now infrequent; while (3) the skeptic or doubter (see SKEPTICISM), as a non-believer, is also to some

extent liable to the reproach of infidelity; and in popular parlance the term free-thinker is synonymous with infidel. (See FREE-THINKERS, by O. B. FROTHINGHAM.)

**Infinite** [*in*, negative, and *finis*, "end"]. In music, certain canonical compositions which have no proper close are called infinite (or without termination), because each part, on arriving at the last note, immediately returns to the first and proceeds as before, the number of repetitions being at the pleasure of the performers and terminated by an arbitrary signal. The real ending should always be on the chord of the tonic or one of its inversions, and this also on a principal accented part of a bar or measure. Sometimes a final cadence is expressly added to the canon, or is a part of its construction, and forms the proper termination. The canon is, in such case, said to be *finito*. Röhner remarks that "an infinite unrestricted canon is easily made finite, and a finite made infinite; it is required only to add a cadence in the one case, and to take it away in the other."

WILLIAM STANTON.

**Infinite**, in philosophy. As a philosophical term, "infinite" expresses the form of Being which is self-related and contains no implied contrast to other being. If the term is used to express a contrast with the finite or indefinite, and the infinite is regarded as a "beyond" to the finite, the thought of the infinite is inadequate, and the conception is really that of one finite over against another. The infinite must be conceived as containing the finite within it as an essential element of its self-relation. There are three significations in which the term "infinite" is employed, corresponding to the three stages of theoretical reflection: (a) the dogmatic, (b) the skeptical, (c) the speculative. I. As merely negative of the finite, in which case the finite expresses concrete reality and fulness of relations, while the infinite expresses a merely abstract and negative notion, "conceived only by thinking away the very conditions under which thought itself is realized." The infinite in this sense is, according to Sir William Hamilton, "the unconditionally unlimited;" the absolute, defined as "the unconditionally limited," being the other species constituting the genus of the "unconditioned." Such an infinite, being indeterminate, and devoid of all properties or attributes, and without distinction or difference from anything else or within itself, is an empty abstraction. The very thought of it involves self-contradiction; the form of its definition places it in relation or contrast, as excluding the finite, while the content of its definition denies all relation or determination whatsoever. The attempt to conceive such a thought results in a sort of ideal oscillation between the determined and undetermined—the thought of the Indefinite, or Infinite Progress. II. The "infinite progress" is the form under which the infinite is most commonly thought. The infinite divisibility of space, its infinite extent, the infinite regress of causes or conditions in the search of a First Cause, the doctrine of moral perfectibility, etc., furnish practical examples. The mind passes from one phase to its opposite, and returns again only to repeat the process; for it finds in each phase its other, and endeavors analytically to separate them. Each cause, inasmuch as it begins to act, must have another cause to explain the occasion of its action at this particular time; each space divided furnishes two spaces which are in all respects like the first space, and capable of division again; beyond any space which we may conceive or picture in our minds there is still other space; whatever is, is finite and imperfect, and therefore ought to be reformed or improved. In the thought of the infinite as a progress there is an unconscious dual activity in the mind, in which the imagination and reflection take part. The famous "antinomies" of Kant arise in this way. The finite is pictured to the mind, and the pure reflection transcends the picture or image, and defines for itself the logical conditions of the finite, but immediately applies these conditions to a finite realization and renews its mental image. Sir William Hamilton held that "all that is conceivable in thought lies between two extremes, which, as contradictory of each other, cannot both be true, but of which as mutual contradictories one must be true." His proof is "by application to the phenomena." In regard to space, for example, he finds, on the one hand, that we are unable to conceive space as bounded, for then it would be surrounded by space; on the other hand, we cannot conceive it as infinite, for we are unable to "realize in thought" unlimited space by "transcending in fancy" the finite, or even by "exhausting imagination" in the attempt to image it. In this we have the representative faculty failing to produce an adequate picture of infinite space. Since even mental pictures must be finite, a successful picture of space as a whole would prove its finitude, and thus contradict the inference of pure reflection, which pronounces space infinite, on the ground that any limitation of space must be made by



space itself and thus continue it instead of ending it. Since, however, an image or picture of space is impossible, the two results harmonize, and there is no antinomy. III. Under the thought of the "infinite progress" lies, therefore, the thought of the positive infinite. Spinoza called this the *infinitum actu vel rationis*, to distinguish it from the *infinitum imaginationis*, already described. The infinite recurrence of the same limits implies the necessary self-relation of the process. To affirm that beyond every conceivable boundary or assignable limit there is still more space, implies an insight into the self-limiting or self-continuing nature of space. If it related to something else, it were finite; to be infinite, it must be its own limit or *alterum*. The highest example of this is to be found in conscious being, wherein the subject is its own object, knowing and known being identical. Aristotle makes the Infinite and highest truth to be *unipens, unipensum*. Dr. Noah Porter (*The Hum. Int.*, p. 657) gives this standpoint clearly: "The 'antinomies' of Kant and the 'essential contradictories' of Hamilton, each of which seems necessary to the mind, and each of which excludes the other, are all made by the mind itself in the attempt to illustrate the infinite by the finite. The antinomies of Kant are incompatibilities between an image and a relation which the image exemplifies, or between two images adduced to illustrate different relations, or between two concepts which are not both necessary to the mind. The solution of them is to be found in the restatement of the conceptions between which these incompatibilities are said to exist." "When Hamilton says we must conceive of space as a bounded or not bounded sphere, he introduces the image of an object existing in space and limited in space, in order to illustrate space itself, and confounds the one with the other. To introduce the image of an extended object to show that space exists and holds some relation to every extended object, is legitimate, but to substitute the limited—i. e. an extended object—for the true unlimited—i. e. space which makes extension possible—and then to be embarrassed by the incompatibilities of our own creation, is to fall into the very serious error of confounding the image with the notion (*an schauung* with the *Begriff*) against which Hamilton expressly cautions his pupils." While nominalists and materialists have generally denied the possibility of knowing the infinite, for subjective or objective reasons, most realists and idealists have claimed a knowledge of it more or less adequate. W. T. HARRIS.

**Infinities and Infinitesimals.** In mathematics, an *infinite quantity* is a quantity greater than any assignable quantity of the same kind, and an *infinitesimal* is a quantity less than any assignable quantity of the same kind. To illustrate the meaning of the terms infinite and in-

finitesimal, let us take the fraction  $\frac{a}{x}$ , whose numerator is a finite constant—that is, a quantity that contains a definite number of known units—and whose denominator is variable. As  $x$  diminishes, the value of the fraction increases; when  $x$  becomes exceedingly small, the value of the fraction becomes exceedingly large; in all cases we can give to  $x$  a value so small as to make the fraction greater than any assignable quantity of the same kind. The value towards which the fraction tends as  $x$  tends toward 0 is said to be *infinite*, and is denoted by the symbol  $\infty$ . Again, as  $x$  increases, the value of the fraction diminishes; when  $x$  becomes exceedingly great, the value of the fraction becomes exceedingly small; in all cases we can give a value to  $x$  so great that it will make the fraction less than any assignable quantity of the same kind. The value towards which the fraction tends when  $x$  tends towards infinity is said to be *infinitesimal*, and is often, though not properly, denoted by the symbol 0. These relations are expressed by saying that a finite quantity divided by an infinitesimal is infinite, and a finite quantity divided by infinity is an infinitesimal; that is,  $\frac{a}{0} = \infty$  and  $\frac{a}{\infty} = 0$ . Neither an infinite nor an infinitesimal can be expressed in terms of a finite unit.

The terms infinite and infinitesimal, as above explained, are purely technical, and their signification must not be confounded with their absolute or popular meanings. Thus, the 0 or naught of common language is an absolute negation of quantity, whereas the infinitesimal, or the 0 as we have described it, is a quantity, but it is a quantity so small that it is inappreciable in comparison with any finite quantity.

Infinities and infinitesimals, according to their technical signification, may be compared with each other; that is, they may have definite ratios. Thus, if we take the ex-

pression  $\frac{a}{x}, \frac{2a}{x}, \frac{3a}{x}$ , etc.,  $x$  being the same in all, and then if we suppose  $x$  to become infinitely small, there will result

a series of infinities of which the second is twice the first, the third three times the first, and so on. Again, if we suppose  $x$  to become infinitely great, there will result a series of infinitesimals in which each bears a definite ratio to every other one. The principle here enunciated is the basis of the infinitesimal calculus; thus, the ratio of the infinitesimal increment of the variable to the corresponding increment of the function is a definite ratio, and is called the differential coefficient of the function. The ratio of these simultaneous increments can be found from the relation between the function and its variable, and conversely the relation between the function and variable may be found from the ratio of their infinitesimal increments.

The terms infinite and infinitesimal are purely relative, so that we may have infinities that are infinitely great with respect to other infinities, and infinitesimals that are infinitely small with respect to other infinitesimals. For, let us take the continued identical equation,  $\frac{1}{x} = \frac{x}{x^2} = \frac{x^2}{x^3}$ , etc.;

if we suppose  $x$  to be infinitely great with respect to 1, then will  $x^2$  be infinitely great with respect to  $x$ ,  $x^3$  will be infinitely great with respect to  $x^2$ , and so on; if we suppose  $x$  to be infinitely small with respect to 1, then will  $x^2$  be infinitely small with respect to  $x$ ,  $x^3$  will be infinitely small with respect to  $x^2$ , and so on. Infinities and infinitesimals may be either positive or negative. Thus, if  $a$  divided by  $x$  is a positive infinite or infinitesimal, then will  $-a$  divided by  $x$  be a negative infinite or infinitesimal.

Infinities and infinitesimals are subject to definite rules, and the resulting calculus is as rigorous and true as the calculus of finite quantities. In fact, many of the processes of geometry are based on the ideas of infinities and infinitesimals as above explained. Thus, if we inscribe a regular polygon in a circle, and then bisect the arcs subtended by each side of the polygon, and join the points of bisection with the adjacent vertices of the polygon, there will be inscribed a second regular polygon having twice as many sides as the given one; this polygon will coincide more nearly with the circle than the first. If we form a third regular polygon in the same manner, having twice as many sides as the second, it will coincide still more nearly with the circle than the second, and so on indefinitely. If we conceive this process of bisection and formation of polygons, each having twice as many sides as the preceding one, to be continued, the varying polygon will continually approach the circle, and finally, when the number of sides of the polygon becomes infinite, the polygon will coincide with the circle. Hence, we say that a circle is a regular polygon having an infinite number of sides, and consequently whatever can be predicated of regular polygons can also be predicated of the circle. Thus, the area of a regular polygon is equal to its perimeter multiplied by one-half of its apothem; but the perimeter of a circle is its circumference, and the apothem of a circle is its radius; hence, the area of a circle is equal to its circumference multiplied by one-half of its radius. W. G. PECK.

#### Inflammable-gas Engine. See GAS-ENGINE.

**Inflammation** [Lat. *inflammo*, *inflammationem*, to "kindle," *flamma*, "flame"], a morbid process characterized by heat, redness, pain, and swelling. The predisposing cause may be anything which tends to influence injuriously the animal economy—plethora or anæmia. When a part has once been the seat of inflammation, it is very liable to be affected again under the slightest exciting cause. Age is a predisposing cause of inflammation; in infancy the parts most subject to become inflamed are the bowels, pharynx, larynx, and brain, whereas during adult life these parts are seldom affected, the favorite seat then being the lungs, heart, urinary apparatus, etc. Sex exerts a certain influence; a female is more apt to suffer from peritonitis, phlebitis, or cellulitis in consequence of the parturient act. So the temperament, food, occupation, climate, etc. all influence, to a greater or less extent, the susceptibility of the individual to be attacked by inflammation. The exciting causes may be divided into the constitutional and local; the former includes all those agents which are capable of rendering the blood impure, as poisonous gases, cold, heat, etc. The local cause is generally an injury of some kind, either chemical or mechanical. Every vascular part may be the seat of inflammation, and usually in proportion to the amount of its vascularity. It also seems necessary that nerves should be present. Cartilage contains no nerves and but few vessels, and is therefore rarely the seat of inflammation. Epidermis, hair, and the nails are never inflamed, being destitute of blood-vessels, nerves, and lymphatics. Inflammation may extend from one part to another in one of the following ways: By continuity of tissue; thus we find that in inflammation of the arachnoid the inflammatory action after a few days extends to the brain-substance and causes delirium; through the agency of



the blood-vessels, they carrying the products of the inflammatory action to healthy parts, and exciting therein a diseased action; and through the nervous system; but the last way is probably more theoretical than borne out by fact. The inflammation more likely arises *de novo* than that it is produced through nervous sympathy.

Inflammation is generally divided into the acute and chronic varieties; the former runs a rapid course and is attended by well marked symptoms—pain, heat, redness, and swelling. These have been given as the symptoms of inflammation from the time of Hippocrates. The swelling is caused by enlargement of the vessels, and more particularly from serous effusion, which takes place into the adjacent tissues; at a later period we have plastic exudation, which in the end tends to lessen the size of a part. The redness is a leading feature, and is due to enlargement of the vessels and an increase of the coloring-matter of the blood. Pain is not essential to the disease—pneumonia and encephalitis are not painful diseases—but external inflammations are always attended with pain, which is due to pressure upon the ultimate sensitive nervous filaments. Serous membranes stand next to fibrous structures of joints in the severity of inflammation, although we may have serous membranes inflamed without pain, as in puerperal peritonitis. The heat is a direct result of hyperæmia. It is chiefly felt in external inflammations; the part receives more blood, and is consequently of a higher temperature than the rest of the surface, but it never rises above the heat of the blood. Acute inflammation is always attended by more or less fever, which may be ushered in by a chill. The pulse runs up to 100–120, the respirations are increased in number to 25 or 30 per minute, and the temperature is raised to 102°–104° F.; the secretions are suppressed, and there is headache and sometimes delirium. Many attempts have been made to ascertain the exact changes which take place in a part attacked by inflammation by artificially producing an inflammation in the web of a frog's foot or the wing of a bat, and closely watching the changes under a powerful microscope; these observations have led to the following conclusions: In inflammation the first change is in the ganglionic system of nerves, but of this system we know nothing except its effects. This nervous system influences the various determinations of blood, as seen in blushing and the local temporary engorgement of nervous women; as also congestions, which are not mechanical in their cause, but occur from a passive state of the vessels. Next we will notice the changes which are seen to occur in the blood-vessels. There is at first active congestion of the part, and this condition is caused by internal or external irritation. Soon stagnation is observed to take place at points. In the natural state the red blood-corpuscles never touch the walls of the capillaries, but in inflammation this rule no longer obtains, and they begin to adhere to the walls and to each other. This is known as the *stasis*; as it increases the vessels continue to dilate, and very soon after the stasis is established the vessels begin to exude their contents, which makes its appearance amongst the tissues. This exudation is not a coagulation of the blood as seen outside the body; it is serous at first, but is soon followed by an effusion of lymph or liquor sanguinis, which, according to the old theory, might be organized into false membrane or degenerate into pus, it depending on the tissues involved and the constitution of the patient. At the present time, however, Cohnheim's theory of the formation of pus is the one generally received—viz. that the corpuscles are identical with the white blood-corpuscles, which are exuded through the walls of the vessels. In process of time the false membrane becomes smooth. It has not yet been ascertained whether nerves are formed in the tissues or not. Two theories are given to account for the formation of vessels in these new productions—viz. Vogel's and Hunter's. Vogel believes that he has seen the membrane itself produce the blood, and afterwards the vessels to contain this blood, and he says that finally these new vessels communicate with the old ones. Hunter believes that the new vessels are given off from the old ones. After vessels have been formed in these new tissues contraction commences, and both the membrane and the vessels become smaller and firmer. This contraction sometimes proves a serious matter, as in the contraction of bands around the intestines, especially in the neighborhood of the rectum; the effects of the contraction are also seen about the pericardium, causing at times hypertrophy of the heart; the pleura suffers least from it.

The duration and character of the inflammation vary with the condition of the part affected and the constitution of the patient. When once fairly established, it may destroy life by exhaustion or by interfering with the function of some important organ, as the lungs or heart. It may also terminate in resolution, suppuration, or mortification. Resolution consists in the restoration of the affected part

to its normal condition, without suppuration having taken place. It is by far the most favorable termination of inflammatory action. Suppuration consists of the formation of a fluid called pus, as described above; it is a yellowish liquid, in which float numerous small round granular corpuscles. When the pus is thin, dirty, and acid, it is called *ichor*. When suppuration continues for any length of time, it gives rise to a fever known as hectic fever. This is diurnal in character, commencing with a chill, followed by a fever, and then sweating. The chill lasts from half an hour to an hour, the fever from one to two hours. In a great many cases the three stages are not well marked, one, or even two, of them being often times omitted. The inflammatory action may be so intense as to deprive the part of its proper supply of blood, and so cause ulceration and mortification (see GANGRENE); this condition is attended by a symptomatic typhoid fever, the symptoms of which are—dry tongue with sordes, trembling, restlessness, delirium, *muscæ volitantes*, pulse feeble, small, and frequent, involuntary evacuations.

*Treatment of Inflammation.*—We have local and constitutional means for combating this condition: sometimes one alone will do the work, but generally we employ them conjointly. The first thing to be done is to remove the cause, if discoverable; if not, the bowels should be freely moved once a day, and the skin and kidneys be made to act by the administration of diaphoretics and diuretics. Careful attention should be paid to the diet and regimen of the patient, and heat and moisture applied to the inflamed part, either in the form of poultices or spongipeline or the hot-water bath. If the patient be plethoric, it will be a great benefit at times to bleed him to the amount of about sixteen ounces. This practice has been greatly decried of late, but practitioners are too apt to swing from one extreme to the other; from the practice of almost bleeding a person to death for the most trivial ailment they have come to discard the lancet altogether. How the benefit arising from the moderate abstraction of blood from a robust, healthy individual who has been stricken down with pneumonia or any acute inflammation, can be questioned, is a mystery. Surgeons, however, are not so averse to local blood-letting, which may be done by scarifications with a lancet, by wet or dry cupping, or leeches. It seems to afford instant relief to the patient by removing pressure and consequent irritation of the inflamed part. Cold evaporating lotions continuously applied are a great relief. They cause the capillaries to contract, and thereby diminish the afflux of blood.

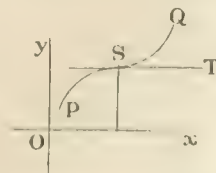
EDWARD J. BERMINGHAM.

**Inflection** [Lat. *inflecto*, *inflēam*, to "bend"], the general term comprising all the various modifications of a word (declension, conjugation, etc.) by which modifications of the idea (plurality, past and future tense, etc.) are expressed. In the monosyllabic languages any change which the idea undergoes is expressed by the addition of an independent word; in the agglutinative, these additions do not remain independent, but combine with the primitive signification and form composite words; but in the inflectional languages a change of the end of the word—with or without some phonetic change in the root itself—suffices to express the various modifications of the idea. It must be observed, however, that these inflectional endings are not merely arbitrary signs; they were originally independent words themselves. Thus, the endings *abundant* in the nominative singular of many nouns in the Greek and Latin languages is a remnant of the personal pronoun of the third person; and the endings forming the oblique cases were originally pronouns indicative of some direction of motion—*whence* (dative and ablative), *whither* (accusative), and *whence* (genitive). Or, to take an example from a conjugation, the endings *bat* and *rit*, indicating the past tenses in the Latin language, are simply phonetic modifications of the auxiliary verb *fiat* and *fuit*. But as the laws of phonetic change are very different in the different languages, and imperfectly known in them all, and as a still greater uncertainty prevails with respect to the laws of phonetic decay, the whole subject of inflection is as yet very obscure.

**Inflex'ion.** A point of inflexion is a point at which a

curve from being concave in any direction becomes concave in the opposite direction. Thus, in the curve P S Q, the concavity is turned downward from P to S and upward from S to Q, hence, S is a point of inflexion. In passing a point of inflexion the radius of curvature of the curve changes sign by passing through  $\infty$ , but this requires

that the second differential of the coordinate should change sign





by passing through 0; hence, we may determine the number and positions of the points of inflexion on a curve whose equation is given by the following process: Differentiate the equation of the curve twice; then from these equations and the equation of the curve find the value of the second differential of  $y$  in terms of  $x$ , and place the result equal to 0; from the resulting equation find the values of  $x$ ; these will indicate the positions of all the points that can by possibility be points of inflexion. Then test these values of  $x$  as follows: substitute each value of  $x$ , first diminished by, and secondly, increased by, an infinitely small quantity for  $x$  in the second differential of  $y$ , and see if the results have contrary signs; if so, the corresponding value is the abscissa of a point of inflexion; if not, it does not correspond to a point of inflexion.

W. G. PEEK.

**Inflorescence** [Lat. *inflorescere*, to "begin to blossom"], the term which botanists use to designate the arrangement of flowers upon a plant. Flowers and branches are evolved from buds. These two kinds of buds agree in the positions which they occupy; consequently, flower-buds, like leaf-buds, may terminate the stem or branches or may rise from the axils of leaves. The former are called *terminal*, the latter *axillary*. When one flower only occupies the summit of the stem, it is *terminal and solitary*; when only one occurs in the axil of a leaf, it is *axillary and solitary*. If several flowers are developed near each other on a stem or branch, so as to form a cluster, the contiguous leaves are generally unlike ordinary foliage, and are known as *bracts*. The stalk which supports a flower or a flower cluster is its *peduncle*, and the stalk of each flower of a cluster, its *pedicel*. When flowers have no supporting stalks, they are *sessile*. The *axis of inflorescence* is the name given to that part of the stalk on which the flowers of a cluster are arranged. When it bears sessile flowers, it is called the *rhachis*; when it is very much shortened and thickened, the *receptacle*. All forms of inflorescence are referred to two types, or to a combination of the two. These plans are known under the following names: (1) *unilateral*, *umbel*, *corymb*, or *corymbose*; (2) *determinate*, or *centrifugal*; (3) *mixed*, in which the main axis develops in one way, and the separate flower clusters in the other.

1. *Labiata* inflorescence is characterized by the springing of flowers from axillary buds, while the terminal bud of the stem develops as an ordinary branch, by which the main axis may be indefinitely prolonged. The simplest case is that in which the flowers are axillary and solitary. Many such solitary flowers may appear as the main axis lengthens. If approximated, and the leaves are diminished to bracts, they form a flower-cluster of the indefinite sort. Such clusters are simple when the peduncle is unbranched, compound when the peduncle branches to support smaller clusters of the same kind. Simple, indefinite clusters may have (1) the flowers borne on pedicels along the sides of an elongated axis (*raceme*); (2) along a shorter axis, the lower pedicels lengthened (*corymb*); (3) clustered on an axis which is so short that all the flower-stalks appear to spring from the same point (*umbel*). If the flowers are sessile and arranged along a lengthened axis, the cluster is a *spike*; if the axis is very short, a *head*. The *ament* or *catkin* is a peculiar sealy and usually drooping spike. The *spadix* is a fleshy spike or head with inconspicuous flowers, the whole frequently enveloped by a showy bract, a *spathe*. The *raceme*, *corymb*, and *umbel* may become compound. If the two former branch irregularly, they form a *panicle*; if this is crowded into a compact cluster, it is sometimes called *thyrsus*. The little clusters of a compound umbel are *umbellets*. When several bracts are grouped closely together at the base of a cluster, they constitute an *involucre*; if they occur at the base of partial clusters, *involucres*.

2. *Definite Inflorescence*. In this the main stem, or each successive independent branch, is terminated by a flower. When a blossom is evolved from a terminal bud, growth of the stem or branch is of course arrested, and all further growth depends upon the development of other axes or branches from axils below, which in turn are arrested in the same way. The simplest definite inflorescence is that of a solitary and terminal flower. When several branches from the axils underneath have been successively terminated by blossoms, the cluster so produced may be distinguished from one of the indefinite kind by the reversal of the order in which the flowers expand. The upper flowers bloom earlier than those which are below. Such a cluster is a *cyme*. Cymes may be simple or compound. The clusters of a compound cyme are termed *cyathes*. A very compact cyme is called a *fascicle* or *glomerule*. Cymes of an anomalous character result from the suppression of the central flower or one of the side branches.

3. *Mixed Inflorescence*. Indefinite and definite inflores-

cence may occur in the same plant, and in two ways: first (as in *Compositae*), by centrifugal development of the branches which bear the heads, while the flowers of each head expand centripetally; second, the reverse of this, has the main axis (as in *Labiata*) producing, in centripetal order, clusters which develop centrifugally.

The following table exhibits the principal sorts of inflorescence at one view:

A. *Indefinite*, from axillary buds.

Simple:

Flowers on pedicels:

On the sides of a lengthened axis, *raceme*.

On a short axis, lower pedicels lengthened, *corymb*.

On an extremely short axis, *umbel*.

Flowers sessile:

On an elongated axis, *spike*.

On a very short axis, *head*.

With their varieties, *spadix* and *catkin*.

Compound:

Branching regularly, *compound raceme*, *corymb*, and *umbel*.

Branching irregularly, *panicle* and *thyrsus*.

B. *Definite*, from terminal buds:

Open, mostly that topped, *simple* and *compound cyme*.

Contracted, *fascicle*.

C. *Mixed*.

G. L. GOODALE.

**Influenza** [It.; as if produced by the influence of the stars], an essential, infectious, epidemic, febrile disease, characterized by a variable degree of constitutional disturbance, especially nervous depression, and having a local expression in irritation and catarrhal inflammation of the air-passages and their appendages. The name "influenza" is Italian, indicating "the influence" of a prevailing atmospheric cause. In France it is termed *la grippe*, from *agrippe*, to "seize," indicating the sudden, precipitate onset of the epidemic and of the individual attack. It is also termed epidemic catarrh, epidemic bronchitis, and, better, epidemic catarrhal fever. It is described as first prevailing in Europe in the tenth century, and later in the years 1311, 1387, and 1403. But its certain and undoubted record begins with the epidemic of 1510. Since that time to the year 1875 there have been ninety-two epidemics, of variable severity and at irregular intervals. These epidemics are singularly uniform in identity of characteristics and in obedience to law of origin and diffusion. The disease appears suddenly in the E. or N. E., usually in the N. of Europe, exceptionally in the Indies or Northern Asia, and travels to the W. It travels in cycles, invading the whole of Northern Europe, often extending to America, and exceptionally felt in the equatorial regions and the southern hemisphere. Unlike cholera, its diffusion does not depend on human commerce. Its progress is rapid, a great wave from E. to W. precipitating itself upon communities and countries with a suddenness warranting the names popularly applied to it—"lightning catarrh," "le petit courrier," "la grippe." Less often it appears coincidentally at places far removed, as at the Cape of Good Hope and London in 1836. In its zone of progress it often appears simultaneously at many isolated foci, from which it seems to radiate until disseminated over vast areas. Its influence is not confined to the continents, but is immediately exerted at mid-sea upon all who sail into the districts of atmospheric infection. Appearing in a community, it attacks a majority of its members, of both sexes, of all ages and social position, and with a rapidity precluding the idea of communicability. No nationality is exempt, and as a rule only a fractional part of the population escapes its effects. It would appear to attack preferably women, next adult males, and lastly children. In some epidemics children are exempt. During the prevalence of influenza the animal vitality is lowered, the type of other diseases is modified, assuming adynamic or typhoid forms, and tending to a greater general mortality. Influenza is not confined to man, but often extends its epidemic influences to the domesticated animals, especially the horse, and is known as the *epizootic*. In England the epidemics of 1728, 1732, 1733, 1737, 1743, 1803, 1831, and 1837 were accompanied by the epizootic among cows, horses, and dogs. The pestilential epizootic extending throughout the U. S. in 1872-73, attacking in New York 16,000 horses, was an epidemic of influenza, prevailing with less severity among men. The influenza is first recorded in America in 1577. The chief epidemics in Europe have extended to this country. The most noticeable ones are that at the close of the war of 1812, that of 1843, of 1872, and the recent season 1874-75, in which pneumonia has existed as a frequent and fatal complication. Of the intimate nature of the subtle atmospheric or telluric cause of influenza nothing is definitely known. Schönbein regarded an excess of ozone in the air as producing bronchial irritation. Prout attributed the disease to selenium-rotted hydrogen. Much has been written



of its concurrence with the appearance of comets and meteoric showers, and the opinion is in favor that electrical and magnetic disturbances of the atmosphere are related to the epidemics. The advocates of the "germ theory of disease" regard influenza as due to the wide dissemination, by air-currents, of animalcula or cryptogamic vegetable products—malarial emanations. Ehrenberg describes "dust fog currents" in the higher strata of the atmosphere, from which many genera of animalcules may be collected. The epidemic of influenza occurs at all seasons of the year, often in the spring, and in both warm and cold, in dry and damp or foggy weather. The usual duration, in one locality, of an epidemic is from four to six weeks, exceptionally much longer. There may be local recurrences in the same season, but as a rule the victims of the first are exempt from the second attack.

As regards the disease, it is thought that a specific poison is absorbed and circulates in the blood, irritating the nerve-centres, producing prostration and febrile disturbance, and causing hypersecretion and inflammation of the mucous lining of the air-passages. The symptoms vary in severity in different epidemics and in individual cases. The onset is sudden, announced in severe cases by a marked rigor, more often by chill and shivering alternating with flashes of heat. Then follow general lassitude, debility, nervous prostration, soreness and stiffness of the limbs, pains in the neck, back, and loins, headache, frontal oppression, pain in the orbits, cheek-bones, and root of the nose, injection and sensitiveness of the eyes, with copious flow of tears—often heated, the "fiery tears" of the early records—sneezing and tingling, followed by watery and often acrid discharge from the nose, soreness of the tonsils, Eustachian tubes, and ears, experienced in swallowing, hoarseness, a short, frequent, harassing cough, with slight expectoration, and a slight fever of the remittent form, having its exacerbation towards evening. The fever is seldom pronounced, but the restlessness, irritability, exhaustion, and mental depression are marked, and usually disproportionate to the bronchial complication. In other cases there is soreness, tightness, and pain beneath the sternum, dyspnoea, sense of suffocation, and danger of capillary bronchitis or pneumonia. These unfortunate complications are the chief causes of death from influenza, and occur mainly in the aged, in invalids, and in delicate children. The usual duration of mild cases is from three to five days, of grave cases from seven to ten days. The termination of the disease is often as sudden as its onset, and frequently occurs with a critical and profuse perspiration or diarrhoea. The mortality from uncomplicated influenza in healthy persons is very slight. Influenza has no pathology indicative of its specific nature, and presents only the lesions of the associated catarrh—tumefaction and redness of the mucous lining of the nose, the tear-duct, and eyelids, the frontal and maxillary sinuses, of the throat, Eustachian tube, and membrana tympani, of the larynx and bronchial tubes, and the lesions of pneumonia when it exists. The majority of cases are mild and require no treatment. A purge at the outset may shorten their duration. More marked cases require a preliminary purgative, a low diet, the avoidance of exposure to cold, resort to hot draughts, as of lemonade or elder-bloom tea, to stimulating foot-baths, to the use of Dover's powder, Tully's powder, spiritus Mindereri, or other remedies to secure free perspiration, and the relief of bronchial congestion by inhalation of steam, by ammonia, or by stimulating expectorants. Headache and distress in the nose and orbits, due to irritation of the Schneiderian membrane and its processes, may be relieved by the inunction of oil or grease or by the insufflation of warm anodyne solutions. Quinine in doses of five grains three times a day, if taken at the beginning, may cut short the attack. When the bronchitis tends to become capillary, quinine or tincture of bark is indicated to support the strength, ammonia to favor the liquidity and discharge of mucus, and the oil-silk jacket to favor free secretion. The extensions of pneumonia may be limited by arterial sedatives, carbonate of ammonia, quinine, and anodyne poultices or fomentations. It is essential to proper treatment to remember that blood-infection is primary and bronchitis or pneumonia is secondary; the constitutional disease will admit of no depressing remedies, and the speedy termination of the inflammatory complications will follow supporting measures. During epidemics of influenza the aged and feeble should keep within-doors in well-warmed rooms, and partake of quinine, ammonia, and guarded but nourishing diet, as measures of prevention. E. DARWIN HUDSON, JR.

**Information**, in law, a written charge or accusation made against a defendant in a suit or proceeding which is directly instituted against him in behalf of the state or government by the attorney-general or other proper law-officer representing the government. It is so called because it is founded upon information given, or supposed to be given,

by the prosecuting officer. This form of legal process is employed in proceedings of various kinds, being used either as a mode of criminal prosecution, a form of civil remedy, or a particular method of instituting a suit in equity in certain cases. These various modes of legal procedure may be considered separately.

I. In criminal prosecutions the proceeding by information at common law is, in cases of misdemeanor (except misprision of treason), a mode of remedy which may be adopted, if deemed desirable, in place of an indictment, which is the usual method of prosecuting in cases both of felony and of misdemeanor. The difference between an information and an indictment is that in the former the accusation or charge is presented directly by the attorney-general or prosecuting officer, while in the latter the accusation proceeds directly from a grand jury, upon whose oath it is based. (See INDICTMENT, GRAND JURY.) They do not, however, differ materially in form and substance. There must be the same degree of particularity and precision in stating the offence charged, the same observance of the ordinary rules of pleading. It is only in some merely formal and comparatively unimportant statements at the commencement and the close that a diversity exists in the general nature of the contents; and whether the prosecution be instituted in the one way or in the other, the charge must be tried before a petit jury. Criminal informations in the English law are either such as are partly at the suit of the Crown and partly at that of a subject, or such as are wholly at the suit of the Crown. The former are brought upon certain penal statutes at the instance of common informers. The latter are of two kinds: (1) Those filed *ex-officio* by the attorney-general, or, in the vacancy of his office, by the solicitor-general, solely in behalf of the Crown; and (2) those filed by the king's coroner and attorney in the court of king's bench, usually called the master of the crown office, at the relation of some private person or common informer. These two varieties of proceeding by information in the name of the king alone may be resorted to in all cases of misdemeanor (with the single exception already mentioned), but in practice are commonly employed when the offence is of a particularly grave and serious character, or has an especial tendency to disturb the administration of the government, or when a more speedy mode of prosecution is desired than a proceeding by regular indictment. In both these classes of cases the prosecuting officer in early times possessed authority to file an information at his own option, without obtaining permission from the chief court of criminal jurisdiction, the king's bench; and this independent prerogative is still retained in regard to such informations as are included within the first class, where the Crown is the actual prosecutor. But in relation to informations presented at the instance of some private person, in which the Crown appears only as the nominal prosecutor, the practice has been changed. It had become customary to institute a proceeding of this kind as a matter of course at the application of any one; and, as no penalty was imposed upon the applicant in case the accusation proved groundless, this method of prosecution was often adopted for purposes of vexation and oppression. To remedy this evil a statute was passed in 1692 (4 and 5 Will. and M. ch. 18), providing that informations should not be filed at the suit of a private person except by leave of the court, and on such persons giving security to the party proceeded against for costs.

In this country several of the States have retained the English practice of prosecution by information, though the extent of its application and the mode of procedure are variously modified by statute. Thus, informations may be presented for all offences declared to be misdemeanors, as distinguished from felonies, in New York, Connecticut, Massachusetts, New Hampshire, and a few other States. The officer by whom it is usually provided that the information shall be filed is the attorney-general of the State. This mode of procedure is, however, much less frequent in this country than the proceeding by indictment. In Pennsylvania and a few other States there can be proceeding by information where an indictment lies. In the Federal courts informations have sometimes been resorted to in cases of illegal exportation of goods, smuggling, etc., but have never been especially authorized by any laws of Congress. By the provisions of the U. S. Constitution no offence which is capital or infamous can be prosecuted by information, but only by indictment.

II. The use of an information as a form of civil remedy is most common in the proceeding which is technically known as an "information in the nature of a *quo warranto*." The ancient common-law writ of *quo warranto* has been superseded by this more convenient practice. (See *QUO WARRANTO*.) The object of such informations is to inquire by what authority or warrant the defendant exercises certain official or corporate powers, or asserts a right to certain fran-



chises or offices which are alleged to be unlawfully claimed or to have been forfeited. Thus, for example, an information may be presented against an unincorporated association for assuming corporate powers; against a lawfully organized corporation for non-user, long neglect, or misuse of its franchises or powers, or for a violation of its charter or the provisions of any law; against any person for a usurpation of or intrusion into a public office, or for the exercise of any franchise not conferred upon him by law, or for the performance of official duties after his office has been forfeited, or after the term for which he was appointed or elected has expired. This is a common form of procedure against corporations to deprive them of their franchises and obtain their dissolution, on the ground that corporate powers have been forfeited by misfeasance. The remedy by information in these cases was originally a criminal proceeding, in analogy with its use in the prosecution of offences strictly criminal, and it still remains so in form. Its object was to secure the imposition of a fine upon the defendant if convicted, as well as an ouster from the office or franchise unlawfully claimed. But in substance it is a civil proceeding, the purpose of which is to try and determine the defendant's right to the franchise, and to secure its forfeiture if wrongfully exercised. In England, informations in the nature of a *quo warranto* may be presented in three ways: they may be filed (1) by the attorney-general of his own authority, and in the exercise of an independent discretion; (2) by the master of the crown office under the permission or direction of the court of king's bench; and (3) by the proper officer upon leave of the court at the relation of some person or persons who desire to prosecute the defendant. The first two modes of presentation are the same as those which have been already mentioned as appropriate to the prosecution of misdemeanors in criminal procedure. The third is a form of practice established by the statute of Anne, ch. 20. It affords the means of determining controversies between private parties in regard to the right to corporate or other franchises, public offices, etc. The Crown or state, represented by the attorney-general or other officer, is only the nominal prosecutor, the party at whose instance the proceeding is instituted being the actual prosecutor. It is provided by the statute that this party shall be technically designated in the proceeding as the "relator," because from him the relation proceeds upon which the information is based. At common law no such party as a relator is known in a proceeding upon information. This form of practice was originally introduced by the statute. Informations at the suit of a private person can be presented only by leave of the court, which will be granted, not arbitrarily nor as a matter of course, but in the exercise of a sound discretion. Permission will usually be granted when the right upon which the suit is based is disputed or uncertain, or depends upon a point of doubtful law, or where there is no other remedy.

In several of the American States the proceeding by information in the nature of a *quo warranto* is still in use, and corresponds very closely with the English practice. The suit is usually instituted by the attorney-general of the State of his own authority, or by the private prosecutor or "relator," who employs the name of the attorney-general in the proceeding as a matter of form. When the suit is at the instance of a private person the case is regularly entitled "The People" (or "The Attorney-General") "*ex rel.*" (*ex relatione*, "from the relation of") A. B. *vs.* C. D., A. B. being the relator and C. D. the defendant. The power to file an information of this kind in some States depends upon special statutes corresponding with the English statute of Anne, while in others the same practice is adopted, irrespective of any statute, as part of their common-law system of procedure. It is the usual rule that the leave of the court shall be obtained in cases of this kind, as in England. In New York informations in the nature of a *quo warranto* were in use until 1848, but the Code of Civil Procedure adopted in that year abolished the proceeding, substituting in its place a special form of civil action, which nevertheless accomplishes the same results by a very similar mode of practice.

Another instance of the use of the proceeding by information as a form of civil remedy is found in the common-law practice in England of filing an information in the court of exchequer for the recovery of money or other chattels claimed by the Crown, or to obtain damages for any injury committed upon the lands or the possessions of the Crown. The attorney-general institutes the suit of his own authority and at his own discretion. The most common informations of this kind are the information of intrusion and the information of debt, the former being presented for any trespass upon the lands of the Crown, the latter upon any contract for moneys due to the Crown or for forfeitures under penal statutes. In the U. S. in-

formations are not unfrequently employed in the Federal courts for the recovery of penalties and forfeitures, as, *e. g.*, in cases of violation of the revenue laws. These are usually civil proceedings *in rem*. (See *IN REM*.)

III. The method of instituting suits in equity by means of an information exhibits much the same form of practice as in the common-law courts. In England the suit may be wholly in the interests of the Crown, in which case it is instituted directly by the attorney-general or solicitor-general of his own authority, or it may concern the rights and interests of other parties than the Crown. In cases of this latter kind the government officer sometimes acts at his own discretion, but generally upon the relation of the party whose rights are involved, who is then termed the "relator." When the interests of idiots or lunatics are concerned the attorney-general may exhibit informations in their behalf *ex-officio*, representing the Crown as *parens patrie*. It is the common practice in England to regulate the administration of charities by proceedings upon information. As the Crown has the general supervision of charities, the attorney-general may act of his own authority, no relator being necessary. Generally, however, he only proceeds at the instance of some relator, who is made responsible for costs in case the information has been improperly filed. There has been some discussion among jurists upon the point whether the power of the attorney-general to file an information for the purpose of establishing or administering a "charity" was a regular part of English jurisprudence, or was derived from the statute of 43 Eliz. ch. 4, concerning charities. The inquiry has assumed importance in some of the States in which that statute has not been re-enacted or recognized. Careful investigation shows that the information has its roots in equity as well as in strict common law. The authorities are collected in Dwight's *Argument in the Rose Will Case* (New York, 1863, pp. 257-270). Informations were used for this purpose in this country during the colonial period. An interesting illustration is Cullen's charity in the court of chancery in the province of New York Sept. 7, 1707. There was a legacy "to the poor of the city of New York and of Albania" (Albany), which was enforced in their favor by the attorney-general. The proceedings and information are found at length in the same volume (pp. 344-351). In the U. S. informations may be employed as a mode of instituting equitable suits in some of the States, but the practice is not so common as in England. (On this whole subject see Cole on Informations, Angell and Ames on Corporations, Bishop's *Criminal Procedure*, Daniel's *Chancery Practice*, Tudor on *Charitable Uses*, Boyle on *Charities*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Inform'er.** This word is employed in law as a technical designation, denoting a person who brings suit or prefers an accusation against another for the violation of some penal statute. It is sometimes provided in a statute of this kind that the whole or a certain portion of the penalty recovered from the person who shall be convicted of violating its provisions shall be given to any one who will sue for the same, or who will give information of the offence to the proper prosecuting officer. The party by whom the proceeding may be instigated is sometimes termed not merely "informer," but "common informer," because he may be any member of the community. The object of such legislation is to elicit the active efforts of the people generally in the detection and punishment of wrongdoers by the prospect of a reward. Actions brought by an informer under such a statute, when the penalty is recoverable partly for himself and partly for the benefit of the state, are technically termed *qui tam* actions (*qui tam*, Lat., "who as well"), because the plaintiff is described in the suit as one *who sues as well* for the king or commonwealth as for himself. This peculiar Latin phrase was adopted at a time when legal pleadings were expressed in that language, and these words formed the commencement of the allegation in which the plaintiff described the character in which he appeared in the action. Statutes authorizing *qui tam* actions are more common in England than in this country.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Infusoria** [Lat. *infundio*, *infusum*, to "pour over," to "make an infusion,"] because these organisms were first observed in infusions. If organic substances, either animal or vegetable, are soaked in water, the liquid dissolves portions of the solid matter, forming an "organic infusion." If this be exposed to the air, a scum or pellicle forms upon the surface, which, when examined under the microscope, is found to be composed of minute molecules. Presently these molecules unite to form short filaments called *bacteria*, or, if the segments are of considerable length and jointed, they are known as *vibriones*. When perfectly developed, these two organisms exhibit vibratile movements. After a while they disintegrate, and there result small spherical bodies moving actively through the fluid, which are called *monads*.



These are often ciliated and possess a mouth. Two theories explain this growth: (1) These organisms are produced spontaneously, and are not derived from any pre-existing



Infusoria in mud of the Antarctic Ocean, greatly magnified.  
(Capt. James Ross.)

germs: (2) they originate from germs of extremely minute size, disseminated through the atmosphere and in various solid substances, which develop into these fungus organisms under favorable conditions. Elaborate experiments have been instituted to show whether these organisms will germinate in infusions which have been subjected to great heat and deprived of air, with results favoring the second theory, though observers are not yet agreed. It is established, however, that the bacteria and vibrios are algae, or the simplest kind of plant, while the monads are animals, sometimes the larval forms of the higher Infusoria. They are never generated except in organic solutions. Later writers restrict the name of Infusoria to the higher division of the Protozoa, excluding the forms already specified. They possess a mouth, rudimentary digestive cavity, and vibratile cilia or contractile filaments. They are extremely minute, and their bodies consist of three distinct layers. Generally, they have the power of swimming about freely, while some are fixed in the adult period, and others constitute colonies by budding. The outer layer is a transparent cuticle. The central mass is a soft, semi-fluid substance, capable of receiving particles of food, and is known as sarcode. An intermediate layer is of firm and consistent sarcode. The Infusoria are divided into the three orders of Ciliata, Suctoria, and Flagellata. They are most abundant in fresh water in every country upon the face of the earth wherever organic matter is held in solution. They also occur in the ocean. The higher forms are to be sought for on the stems of aquatic plants, not in artificial infusions.

C. H. HIRNCOCK.

**Ingalls** (ROSS, J. B. at Denmark, Me., 1820; graduated from the U. S. Military Academy in 1843, and entered the army as brevet second lieutenant of rifles; transferred to the dragoons 1845, and to the quartermaster's department, with the rank of captain, in 1848, rising through successive grades to be (1871) colonel and assistant quartermaster general U. S. A. From the date of his graduation Ingalls served with his regiment on quartermaster duty almost constantly on the frontier, participating in the war with Mexico and various expeditions, up to 1860, when he was ordered to Washington, D. C., where, on the outbreak of civil war in 1861, he was at once called upon to assume responsible duties as chief quartermaster of the rapidly arriving volunteers, in providing for the embarkation of the Army of the Potomac to the Virginia Peninsula, in transferring the vast supplies of that army from the York to the James River, and as chief quartermaster of that army in the subsequent evacuation of the Peninsula, the establishment of a new base of supplies at Aquia Creek, and, as chief quartermaster of the armies of the Potomac and of the James, of establishing a dépôt of supplies at City Point and supply of those armies. His duties, constantly increasing in magnitude and responsibility, were discharged with great ability and despatch. Brevetted lieutenant-colonel to major-general. At the close of the war served at head-quarters of the army, and in 1867 at New York City as chief quartermaster of military division of the Atlantic.

G. C. SIMMONS.

**Ingauni** [Gr. Ἰγγαυοί], a Ligurian tribe inhabiting the sea coast and mountains W. of Genoa in the first and second centuries B. C. Their capital was Albium Ingaunum, now called Albenga. They bore a prominent part in the

long-continued wars between the Romans and the Ligurians, and in the Second Punic war they were effective allies of the Carthaginians. They were routed in a great battle by the proconsul *Emilius Paulus* B. C. 181, losing 15,000 killed. From this time little more is heard of the Ingauni, but they were still recognized as a separate tribe in the time of Strabo and Pliny.

**Ing'bert**, or **Sanct Ingbert**, town of Germany, in Rhenish Bavaria, on the Rohlach, has large coal, iron, and quicksilver mines. Pop. 8433.

**Ingelmunster**, town of Belgium, province of West Flanders, 7½ miles N. of Courtrai, noted for a victory gained by the French over the allied English and Huno-verians, May 10, 1794. Pop. 5900.

**Ing'elow** (JEAN), daughter of William Ingelow, b. 1830 at Boston, England; has published several volumes of verse (1863, 1867, 1871), besides prose works of fiction, including *Tales of Oris* (1860), *Stories for Stories* (1864), *Home Thoughts and Home Scenes* (1867), *Off the Skelbigs* (1872), etc. Immediately on the publication of her first volume of poems she was recognized as an original poet, and her fame has grown wider ever since. Sometimes her poems have something scattered and romantically vague in the total representation of the idea, as is the case in one of her most celebrated poems, "High Tide on the Coast of Lincolnshire." But the details both of human character and of nature are often painted with a most exquisite delicacy, as, for instance, in "The Letter L;" and there is always in her verses a genuine warmth and noble naturalness, connected with simplicity and grace.

**Ingemann** (BERNHARD SEVERIN), b. May 28, 1789; studied at the University of Copenhagen; travelled 1818-19 through Germany, France, Switzerland, and Italy, and was appointed in 1822 professor of Danish literature and language at the Academy of Sorø, which position he filled till his death, Feb. 24, 1862. In 1811 he published his first volume of poems, and afterwards attempted almost every kind of fiction; his collected works comprise 39 volumes. But he became eminent only in two directions. Inspired by Walter Scott, he treated the most brilliant and romantic period of the history of Denmark in a series of romances—*Valdemar Seier* (1826), *Erik Menved's Burdom* (1828), *Kong Erik og de Freedluse* (1833), and *Prinds Otto og hans Samtid* (1835); and these romances, though inferior to their model in historical truth and in power of characterization and description, became truly popular. There exists perhaps no Dane who has not read them; they were also translated into German and English, and are frequently found among the Scandinavians in the West. An equal impression he produced by his hymns and religious songs, of which some morning and evening songs were unsurpassable for tenderness and purity of feeling.

CLEMENS PETERSEN.

**Ing'enhoutz** (JAN), b. at Breda, Holland, in 1730; studied medicine, and after practising in Holland went to England in 1767; travelled in France and Italy, and returned to London, where he devoted himself to scientific research, and became a fellow of the Royal Society, in whose *Transactions* he published several important essays. To Dr. Ingenhoutz is ascribed the first medical use of carbonic acid and the invention of the plate electrical machine; he discovered that plants when exposed to light exhale oxygen, and when deprived of light exhale carbonic acid. He d. at Bowood, the seat of the marquis of Lansdown, Sept. 7, 1799.

**Ing'ersoll**, town of Oxford co., Ont., Canada, on the Thames and the Great Western Railway, 19 miles by rail from London, has a heavy trade in grain and lumber, important manufactures of farm implements, woollen goods, cheese, and lumber, 1 branch bank, and 2 weekly newspapers. It has fine public buildings, and is rapidly increasing in importance. Pop. of sub-district, 4022.

**Ingersoll**, tp. of Midland co., Mich. Pop. 402.

**Ingersoll** (CHARLES ANTHONY), A. M., b. at New Haven, Conn., in 1798; held a high rank at the bar, and after holding various important offices was appointed judge of the U. S. district court by President Pierce. D. Feb. 9, 1860.

**Ingersoll** (CHARLES JARED), b. in Philadelphia Oct. 3, 1782, was a son of Jared Ingersoll (1749-1822). He received a collegiate education; became a lawyer, and was a member of Congress 1815-16 and 1841-47; U. S. district attorney 1815-29, and held various important offices. He wrote *Chionara*, a poem (1800), *Indiscreet's Letters* (1810), *Historical Sketch of the Second War with Great Britain* (4 vols., 1815-52), and several other works, chiefly historical and poetical. D. in Philadelphia Jan. 14, 1862.

**Ingersoll** (CHARLES ROBERTS), LL.D., b. at New Haven, Conn., Sept. 16, 1821; graduated at Yale College in 1840, and at the Yale Law School in 1844, since which time he has been a practising lawyer in his native city, which he



has several times represented in the general assembly of the State. He was elected governor of Connecticut by the Democratic party in 1873, was re-elected in 1874, and again in 1875.

**Ingersoll** (JARED), LL.D., b. in Connecticut in 1749, and graduated at Yale in 1766. He studied law in London, and settled in Philadelphia, where he became a prominent lawyer. He was a member of Congress 1780-81; a member of the convention which framed the U. S. Constitution in 1787. He afterwards held many important public positions; was often attorney-general of Pennsylvania; and at the time of his death was presiding judge of the district court for Philadelphia co., Pa. D. Oct. 31, 1822.

**Ingersoll** (JOSEPH REED), LL.D., D. C. L., a son of Jared Ingersoll, b. in Philadelphia June 14, 1786; graduated at Princeton in 1804, and became a prominent lawyer of Philadelphia. He was a Whig member of Congress 1835-37 and 1842-49, and U. S. minister to England 1840-53. He published a memoir of Samuel Breck (1863) and *Stresson a Folly and a Crime*. D. in Philadelphia Feb. 20, 1868.

**Ingersoll** (RALPH ISAACS), LL.D., b. at New Haven, Conn., in 1788; graduated at Yale in 1808; studied law, and took high rank at the bar of his native city; was the Democratic leader in the Connecticut legislature in the tempestuous session of 1819, and afterward until 1825, when he was chosen to the lower house of Congress, remaining there four terms, and taking high rank in the practical machinery of legislation. In 1833 he declined a re-election in order to devote himself to his profession, which he continued to do with great ability and success for the remainder of his life, refusing all temptations to accept political appointments, except on one occasion in 1846, when, at the personal solicitation of Pres. Polk, he accepted and filled for two years the post of minister to Russia. D. at New Haven Aug. 27, 1872.

**Ing'ham**, county of S. Central Michigan. Area, 576 square miles. It is level, fertile, and well timbered, and produces coal and iron ore. Cattle, grain, and wool are staple products. Lumber, carriages, brick, and saddlery are leading articles of manufacture. The county is traversed by various railroads, centring at Lansing, the capital of Michigan, which is in this county. Cap. Mason. Pop. 25,268.

**Ingham**, post-tp. of Franklin co., Ia. Pop. 293.

**Ingham**, tp. of Ingham co., Mich. Pop. 1392.

**Ingham** (BENJAMIN), b. at Ossett, Yorkshire, England, June 11, 1712; was educated at Batley School and at Queen's College, Oxford, where in 1733 he became associated with John and Charles Wesley, the founders of Methodism. He was ordained and accompanied John Wesley to Georgia in 1735, remaining two years in America, returning with Wesley, and accompanying him in his visit to the Moravians in Germany. So strong was his attraction to that body of Christians that he wished to assimilate the rising Methodism to their type, and he actually founded in Yorkshire several congregations of what might be called Moravian Methodists, otherwise "Inghamites," and in a few years there were in England 84 of these societies. In process of time Ingham, who had married a sister of the earl of Huntingdon, removed to Abberford and evangelized the whole surrounding region, being elected a bishop or general overseer by the Church he had founded, which was long in fellowship with Methodism, but in 1759 and the succeeding years three-fourths of the societies, and finally Ingham himself, went over to the SANDEMANIANS (which see). He d. in 1772.

**Ingham** (CHARLES C.), b. in Dublin, Ireland, in 1796; belonged to an artistic family, and early developed a genius for painting; gained a prize from the Dublin Academy when only twenty years of age; came to the U. S., and with a brother attained the first rank of portrait-painters in New York City, where he was one of the founders of the National Academy of Design. D. in New York City Dec. 10, 1863.

**Inghira'mi** (CHEVALIER FRANCESCO), b. at Volterra, Italy, in 1772, was sent in boyhood to Naples to study at the military school; the examination of the Museo Borbonico determined his vocation for the study of antiquities. His *Monumenti Etruschi*, in 10 vols. (1821-27), is the most complete account of Etruscan antiquities. He wrote also *Galleria America*, in 3 vols. (1827-28), *Museo Etrusco-Christiano*, in 4 vols. (1833), a *History of Tuscany*, in 16 vols. (1841-45), and numerous other works which gained him a European reputation. D. at Florence May 17, 1846.

**In'gleby** (CLEMENT MANSFIELD), b. Oct. 29, 1823, at Edgbaston, near Birmingham, England; studied at Cambridge; became professor in philosophy in 1855 at the Midland Institute of Birmingham, and foreign secretary to the Royal Institute of Literature in 1870. He wrote *The Shak-*

*peare Fabrications* (1859), *View of the Shakespeare Controversy* (1861), *Introduction to Metaphysics* (1869).

**In'glis** (DAVID), LL.D., D. D., b. June 8, 1825, at Greenlaw, Berwickshire, Scotland; educated in the University of Edinburgh, where he graduated in 1841, and completed his theological studies there in 1844; in 1846 was ordained pastor of the Presbyterian church of Bedford, Westchester co., N. Y.; in 1849 accepted a call to St. Gabriel street church, Montreal; and in 1851 became pastor of the McNab street church, Hamilton, Ont. After a pastorate of sixteen years he removed to Toronto, having been called by the General Assembly of the Presbyterian Church of Canada to the chair of systematic theology in Knox College. From Toronto he removed in 1872 to Brooklyn, L. I., and became pastor of Reformed (Dutch) church on the Heights. He was the author of *Tri-Centenary and Thanksgiving Sermons*, *Righteousness Eartheth a Nation*, *Systematic Theology in its Relation to Modern Thought*, etc. D. Dec. 15, 1877.

**Inglis** (HENRY DAVID), b. in Edinburgh, Scotland, in 1795; travelled extensively in various countries in Europe, and under the pseudonym of "Derwent Conway" published some very entertaining works—*Tales of Ardenne*, *Solitary Walks through Many Lands*, *January through Norway*, *Sveeden*, and *Denmark*, *Tour through Switzerland*, etc., *Spain in 1840*, *New-God Blues*, or *Pedon of Peñarol*, *January throughout Iceland in 1844*, *The Tyrol*, and *Rambles in the Footsteps of Don Quixote*. The works of Mr. Inglis are filled with information which is generally sought in vain in works of travel; they have been frequently reprinted, and have become, in a measure, authoritative. D. in London Mar. 20, 1835.

**In'golstadt**, town of Bavaria, in the province of Upper Bavaria, on the Danube. Its fortifications, which were destroyed by Moreau in 1800, were rebuilt in 1830, and are considered very strong. It has some manufactures of leather and paper. It was once the seat of a famous university, which was founded in 1472, transferred to Landshut in 1800, and thence to Munich in 1826. Pop. 15,025.

**In'graham**, tp. of Mills co., Ia. Pop. 318.

**Ingraham** (DUNCAN N.), b. Dec. 6, 1802, at Charleston, S. C.; entered the U. S. navy in 1812 as midshipman; rose to the rank of captain, and rendered himself famous in the Martin Koszta affair at Smyrna in 1853; for his conduct in this matter he was voted thanks and a medal by Congress. Afterwards he was appointed chief of the ordnance bureau of the naval department, which position he held until South Carolina passed her ordinance of secession in 1860; he then resigned his commission in the U. S. navy and took service under the Confederate States, in which he rose to the rank of commodore. A. H. STEPHENS.

**Ingraham** (JOSEPH H.), b. in Portland, Me., in 1809; early engaged in mercantile pursuits, but afterwards became an instructor in Washington College, Miss. He published *The South-west*, by a Yankee (1836), which was followed by a considerable number of romances, some of which had a very wide popularity. He afterwards took orders in the Protestant Episcopal Church, and was in charge of a parish at Holly Springs, Miss., where he had also a boys' school. Besides the above works he wrote *The Prince of the House of David* (1835), *The Pillar of Fire* (1859), and *The Throne of David*. D. in 1861.

**In'gram Cross-Roads**, tp. of Lauderdale co., Ala. Pop. 511.

**Ingram's**, tp. of Johnston co., N. C. Pop. 1326.

**In'gres** (JEAN DOMINIQUE AUGUSTIN), b. at Montauban, France, Sept. 15, 1781; d. at Paris Jan. 14, 1867. His father, a painter and sculptor, had him instructed in music, but the passion for painting was early awakened; he studied under M. M. Roque and Biant, and at nineteen entered the studio of David; at twenty-one gained the second grand prize; at twenty-two gained the first grand prize for the painting of *Achilles in his Tent receiving the Ambassadors of Agamemnon*, in the Ecole des Beaux-Arts; in 1806 visited Rome, took up his residence there, and sent thence to Paris several canvases, which were not received with special favor. Between 1814 and 1832 many works were finished and sent to the exhibitions at the Louvre, historical pieces mostly from classical and modern story—*Virgil reading the Æneid to Augustus*, *Francesca de Rimini*, *Philip V. of Spain bestowing the Golden Fleece on the Marquis de Berwick*—but none of his works had the reputation in Paris that they had in Italy. M. Ingres's fame dated from works executed in Florence—*The Entrance of Charles V. into Paris* and *The Vow of Louis XIII.* The artist received the decoration of the cross from the king, and was made successor of Baron Denon in the Academy of Fine Arts. *The Apotheosis of Homer* (1827) and *The Martyrdom of St. Symphorian* excited much controversy among the critics. Sensitive to assault, the artist left France for Italy, where he



was made director of the Villa de' Medici. In Italy his productive period returned. *The Venus Anadyomene, Jesus among the Doctors, Molière in his Library, Roccus in Court Costume, Jean d'Arc at the Conversion of Charles VII.* were among his more celebrated compositions. Under the Third Napoleon, Ingres painted on the ceiling of the Hôtel de Ville a great picture, *The Apotheosis of Napoleon I.* with the legend, *In opus rediit Ingres*. At the Exposition of 1855 the artist's works were displayed in a room devoted exclusively to them. A museum at Montauban bears his name. He received a grand medal from the jury of the International Exhibition, was made an officer in the Legion of Honor (1811), commander (1815), high officer (1830), senator (1862), and was also elected member of the imperial council of public instruction. O. B. FROTHINGHAM.

**In'grians**, a Finnish or Ugrian race, inhabiting Ingria, or Ingermanland, a portion of Russia now mostly included in the government of St. Petersburg. They are mainly Lutherans, very poor and ignorant, but the process of Russifying in manners and religion is going on. The true Ingrians (Vod) are estimated to number 17,800, but there are reported in the district 42,973 Savakot and 29,344 Auramones—Finnish peoples allied by language with the Karelians rather than with the Ingrians and the true Finns.

**Inhamban', Inhamba'na, or Inhambane**, a Portuguese town of Mozambique, lat. 23° 52' S., lon. 35° 51' E., near the mouth of the river of the same name. It has a trade by sea in wax, ivory, etc. Pop. 10,000.

**Inheritance.** See **HEIR**.

**In'ia**, a genus of toothed dolphinoid cetaceans of the family Inidae, which contains one known living species and several fossil genera. The *Inia Bolivienis*, of the rivers and lakes of the interior of South America, is from seven to fourteen feet long, is carnivorous and gregarious, and is caught for its oil. The females care tenderly for their young.

**Indjaya, The Logical School.** See **HINDU PHILOSOPHY**, by PROF. JOHN DOWSON.

**Injun'ction** [Lat. *injunctio*], in its more general sense, as a law term, is an order made by a court possessing equitable powers, addressed to a designated person, and commanding him either (1) not to commit some act which he threatens to commit, or (2) to desist from the further prosecution of some act which he has already commenced, or (3) to restore to its former condition something which has been interfered with and altered by his act. This judicial instrument for the prevention of wrong was, like many other remedies and forms of proceeding, borrowed directly from the Roman law, in which it was extensively used under the name of "interdict." Interdicts were commands issued by the prætor or other magistrate, in which he ordered something to be done or not to be done. The number of particular instances in which they might be used was very great, and indeed they might be resorted to for the protection of all species of property, public and private. The certainty and ease with which threatened wrongs could be prevented by their means, and a restoration of rights could be effected, raised the remedial department of the Roman law to a high position of practical efficacy which has been surpassed by no modern system of jurisprudence. The primary division of interdicts was into three classes: (1) Prohibitory, which prohibited something from being done; (2) restoratory, which commanded something to be restored; and (3) exhibitory, which directed some person or thing to be produced and exhibited. In this last class was one, *de libero homine exhibendo*, which was used to prevent a freeman from being restrained of his liberty by any person whatsoever, and which therefore bore some resemblance to our writ of habeas corpus.

The only species of injunction for a long time used by the English and American courts as a part of the equitable relief administered by them resembled and was borrowed from the prohibitory interdict of the Roman jurisprudence, since it merely forbade the commission of some act; but a modified form has been recently introduced under the name of "mandatory injunction," which is similar in its design and effects to the restoratory interdict. The ancient common law furnished no remedies which were directly preventive; its reliefs, in all ordinary private controversies, were either (1) the recovery of money as a compensation for the wrong complained of, or (2) the recovery of a specific tract of land, or (3) the recovery of a specific chattel. The court of chancery, untrammelled by the arbitrary and technical forms and doctrines of the law-courts, and administering a remedial system which those tribunals could not or would not administer, was able to introduce a preventive mode of relief, and from the very outset the injunction became the most potent instrument in building up its peculiar jurisprudence. The first im-

portant and constant use to which it was put was the restraining the prosecution of suits in courts of law. As the doctrines of equity are often quite different from those which prevail at law, and since from the same facts and circumstances involved in a given controversy it frequently happens that the law would regard one party as possessing the legal right, while equity would look upon the other as the one entitled to relief, it necessarily follows that the courts of law would decide such controversy when brought before them in favor of one litigant, and the court of equity would render its decree in favor of his antagonist. If, therefore, the person who held the legal right should bring an action in a common-law court, he would necessarily recover a judgment, while at the same time if his adversary should prosecute his demand in chancery, a decree would be rendered in his favor establishing his claim in direct antagonism to the decision made by the court of law. In this manner an unseemly conflict might have arisen and been perpetuated between the two classes of tribunals, had the chancellor not possessed the preventive instrument of injunction which enabled him to enforce his own decrees and uphold his own jurisdiction. The prohibition was not, however, directed against the courts of law nor the judges thereof personally, but against the suitors before those courts. The theory of the court was, that it was unjust and inequitable for the suitor in the particular case to make use of his strict legal remedies. The mandate of the court was accordingly addressed to him to refrain from doing an act which in right and conscience he ought not to do. By the use of the injunction the chancellor, when a proceeding was instituted before him to establish an equitable right, forbade the opposing party from commencing or carrying on any action in a court of law based upon the same facts and circumstances, and thus a conflict of jurisdiction in all cases was prevented. In this manner and for this purpose an injunction to stay the prosecution of suits at law became, from the very commencement of his judicial functions, an ordinary remedial instrument in the hands of the chancellor, and by its means alone was he finally enabled to establish his jurisdiction and to create the system of equity jurisprudence as a co-ordinate branch of English law.

The question as to the power to interfere by injunction being decided favorably, the court of chancery at length established the following general principle, which determined the occasions in which it would resort to such preventive remedy. In all cases where the courts of law can furnish an adequate relief for the wrong done or about to be done, equity will not interpose its restraining power, but will leave the injured party to his legal action. By the term "adequate relief" is meant the recovery of a judgment at law which is considered a sufficient satisfaction for the wrong done or contemplated; and it embraces, in general, all those cases in which pecuniary compensation can be awarded in the form of debt or damages, and those in which the thing itself, land or chattels, can be restored to the rightful possessor. The most important occasions to which this principle does not apply, and in which, therefore, an injunction will be granted in order to prevent a threatened wrong or to restrain the further commission of an inequitable act, are the following: (1) To restrain proceedings at law. This general class embraces many particular instances. Among the grounds for such interference, the most important are when the legal right and the proceedings to enforce it are affected by fraud, mistake, or accident; when they require a long accounting; when the litigation is vexatious; when the controversy involves the rights and duties of trustees, partners, executors, administrators, sureties, mortgagors, and mortgagees, or requires the marshalling of assets, or depends upon the effects of an equitable set-off or assignment. In these, and in certain other similar instances, the litigant parties and their attorneys and agents will be restrained from carrying on proceedings not only in courts having full common-law powers, but also in tribunals of an inferior or special jurisdiction. In addition to this use of the injunction, it is also resorted to in certain well-defined classes of cases to prevent the commission of acts which would be permanently injurious to property that no adequate relief could be given by the common-law remedy of damages. It is true that in all the instances about to be mentioned some pecuniary compensation could be obtained, but from the very continuous and lasting nature of the wrongful act done, repeated and perhaps innumerable suits at law would be necessary, unless it could be stopped at once by some preventive relief. The classes of cases thus described, in which a wrong will be prevented because the law can give no sufficient remedy, are as follows: (2) to restrain the commission of waste, which is necessarily a permanent injury to the land wasted; (3) to restrain continuous or repeated trespasses upon land. Although an injunction will



not be granted to prevent violence to the person nor to chattels, nor single acts of injury to lands, yet if the trespass to land is continuous, so that it becomes analogous in its effects to waste, courts of equity will now interfere, by a liberal use of the injunction, both to prevent the further wrong and to compel a restoration of the premises to their original condition; (4) to restrain the creation and maintenance of nuisances; (5) to prevent the infringement of patents and copyrights, and the unlawful use or piracy of trade-marks; (6) to restrain the breach of covenants or agreements in a few special instances. In general, the breach of an agreement will not be enjoined, but in a few cases, where the injury would be of such a character that damages would be no adequate relief, courts of equity will interfere by injunction. In some cases an injunction is used as a means of enforcing an agreement. Thus, where a party has agreed that he will *not* do a particular thing, an injunction will cause him to fulfil his contract; (7) to restrain a disposition of their property by debtors so as to hinder, delay, or defraud their creditors; (8) to restrain assignments and transfers of property which would interfere with the settlement of bankrupts' estates. These are the most important and usual cases in which the power of equity tribunals to issue an injunction is now firmly established. There are some other special and exceptional instances which it is not necessary to enumerate.

In respect to their effects, injunctions are either prohibitory or mandatory. In the former class the order of the court is negative, and commands the party *not* to do the specified act; in the latter, it is affirmative, and commands the party *to do* the specified act. The object of a mandatory injunction is generally to compel the defendant to remove some structure which he has wrongfully erected, and which is a nuisance or a trespass, and to restore the premises to their original condition.

In respect to their form and the manner of granting them, injunctions are either final and perpetual or interlocutory and temporary. Final injunctions are granted after the hearing and decision of the cause, and form a part of the decree which determines the rights of the parties. Interlocutory or temporary injunctions are orders made at the commencement of the action or during its pendency, on the application of the plaintiff. Their object is to prevent the defendant from so interfering with or disposing of the subject-matter in controversy as to render a final decree against him ineffectual.

The reformed system of procedure which has been adopted in many of the U. S. has to a great extent obviated one most important use of the injunction as above described. According to that procedure, equitable defence can be set up and maintained in legal actions; the whole matter in dispute, the legal and equitable rights and claims of the parties, can be presented and adjudicated upon in one controversy, and the holder of the equitable right is no longer forced to institute a separate suit in chancery and to enjoin the adverse action brought against him in a court of law. Whenever this procedure prevails, therefore, the employment of the injunction to restrain the prosecution of suits at law is in most cases no longer necessary or proper. With this single exception the preventive remedy of injunction is freely used by our courts, although in most of the States the same tribunals are clothed with both equitable and common-law powers and jurisdiction.

JOHN NORTON POMEROY.

**Ink** [Fr. *encre*; Ger. *Tinte*; Lat. *atramentum*]. Any colored fluid used in writing or printing is an ink. The essential difference in composition between writing inks and printing inks leads to a natural division of the subject. We will consider first writing inks, and subsequently printing inks.

**I. WRITING INKS. Historical.**—Very little is definitely known of the composition of the inks used by the ancients, but it is generally conceded that the use of the stylus indicates the use also of carbon inks, not unlike, probably, the China or India ink which is still the almost exclusive atramental substance used among the Chinese and other Asiatic peoples. The use of iron salts is certainly very ancient. Dr. Blagden (*Phil. Trans.*, vol. lxxvii.) found that the faded characters of very ancient MSS. could be restored by the use of prussiate of potash and dilute muriatic or sulphuric acid, or less perfectly by infusion of galls, redeveloping the iron black. Pliny, Dioscorides, and other ancient writers give evidence, however, that carbon in the form of soot was the essential constituent of ancient ink.

**Black Inks.**—The black ink in common use in modern times is made from the action of infusion of gallnuts upon green vitriol, exposing the product to the influence of air, and holding the precipitate in suspension by gum, sugar, or mucilage. This fluid, the production of which is more particularly described beyond, is far from being chemically

perfect, and is open to the objections that it corrodes steel pens, is prone to mould in warm weather, and to deposit a sediment on standing. The writing is also liable to grow yellow or brown with age, and, when not carefully prepared, to destroy the paper on which it is used. But these difficulties are in great part capable of correction by skillful manufacture and the use of proper precautions. The fact that well-made iron inks stain the substance of the paper with a stain difficult of removal, and speedily growing darker with age up to a certain time, has rendered their use very general in spite of their acknowledged defects. The carbon writing inks are liable also to the objection that they are not true solutions, and usually are wanting in fluidity. The logwood chrome ink is a true solution, but open to some serious objections. Stephens' and Arnold's writing fluids are true solutions with an iron base, pale when first written with, but rapidly growing darker to a fine black, and possessing many excellences. The aniline dyes also afford some good black or blue-black inks, which have many good qualities. Some of these are mentioned beyond.

**Nutgall Iron Inks.**—Both gallic and gallo tannic acids, which co-exist in the infusion of galls, especially after considerable exposure to air, produce deep-black precipitates with ferric salts, but with ferrous salts whitish precipitates, becoming black by exposure to air. As gallic acid produces a much deeper black with ferric salts than tannic or tanno-gallic acid, we see why it is advantageous to leave the infusion exposed for many days to air, in order that the tannic may be changed to gallic acid. Gum arabic or gum senegal is added to retain the precipitate in suspension, prevents the formation of a sediment, and adds a certain degree of lustre. To prevent the growth of mould some essential oil, carbolic acid in small quantity, and rarely corrosive sublimate, are used. Other vegetables containing tannin are often substitutes for gallnuts, chiefly from motives of economy, but only with a loss of quality. Logwood is, however, used in certain inks, as giving not only tannin, but a peculiar color. Recipes without number exist in the technical books for the preparation of iron black ink, and each manufacturer boasts his own. Many of them are worthless, as containing too much acid or too little gall-infusion, too much gum or some other objectionable ingredient in excess, or some defect in manufacture. We will select a few only of the best, and such as have been prepared with some regard to the chemical character of the ingredients. Dr. Lewis, at the close of the last century, who seems to have been the first chemist to study ink quantitatively, found that equal weights of galls and sulphate of iron gave an ink which, although of a good color when used, subsequently became yellowish-brown; that as the quantity of sulphate was increased the inks were less durable in color; and that those in which the galls predominated were most persistent. The proportions which he found best by experiment were—

Powdered sulphate of iron.....	1 ounce.
Ground logwood.....	1 "
Bruised galls.....	3 "
Gum arabic.....	1 "
White wine, or acetic acid.....	1 quart.

He found that although water answered for all ordinary purposes, white wine gave a deeper-colored product, and the ink made with acetic acid was still blacker. Alcohol was injurious to the color, causing a deposition of the tinctorial precipitate. A decoction of logwood, substituted for water, improved the black both in richness and depth of tint. He directs the materials to be put into a glass, earthenware, or other non-metallic vessel, and the mixture agitated four or five times every day. In ten or twelve days it is ready for use—if placed in a warm situation considerably earlier; but if the ink is allowed to remain on the matériel it continues to improve for a lengthened period. When decanted it may be kept in good order with greater certainty if a few broken—not bruised—galls and two or three fragments of iron are placed in it. (*Muspratt*.) Dr. Ure, who made careful researches upon inks, gives the following directions for the best black ink: To make 12 gallons of ink we may take 12 pounds of nutgalls, 5 pounds of green sulphate of iron, 5 pounds of gum senegal, 12 gallons of water. The bruised nutgalls are to be put into a cylindrical copper of a depth equal to its diameter, and boiled during three hours with three-fourths of the above quantity of water, taking care to add fresh water to replace what is lost by evaporation. The decoction is to be emptied into a tub, allowed to settle, and the clear liquid being drawn off, the lees are to be drained. The gum is to be dissolved in a small quantity of hot water, and the mucilage thus formed, being filtered, is added to the clear decoction. The sulphate of iron must likewise be separately dissolved and well mixed with the above. The color darkens by degrees, in consequence of the peroxidation of the



iron, on exposing the ink to the action of the air. But ink affords a more durable writing when used in the pale state, because its particles are then finer and penetrate the paper more intimately. When ink consists chiefly of tannate of peroxide of iron, however black, it is merely superficial, and is easily erased or effaced. Therefore, whenever the liquid made by the above recipe has acquired a moderately deep tint it should be drawn off clear into bottles and well corked up. Some ink-makers allow it to mould a little in the casks before bottling, and suppose that it will thereby be not so liable to become mouldy in the bottles. The ink made by the recipe given above is much more rich and powerful than many of the inks commonly sold. To bring it to their standard a half more water may safely be added, or even 20 gallons of tolerable ink may be made from that weight of materials, as I have ascertained. Sumach and logwood admit of only about one-half of the copperas that galls will take to bring out the maximum amount of black dye. Watts has tabulated various recipes for the preparation of black ink, calculated for 1000 parts of water, as follows:

	a	b	c	d	e	f	g
Galls.....	225	187	133	125	66	62	31
Copperas.....	75	55	55	24	22	31	19
Gum arabic.....	25	73	55	24	19	31	8
	h	i	k	l	m		
Galls.....	50	174	50	60	42		
Logwood.....	...	...	100	20	21		
Copperas.....	32	87	16	20	21		
Sulphate of copper	...	...	...	...	5		
Gum.....	9	43	47	20	16		
Sugar.....	...	...	23	1000			
Vinegar.....	125	135					

Of the genuine inks (a-g), a, b, and c are too strong for ordinary use; d, e, and f are perhaps the best; g would be somewhat too pale. The rest (h-m) cannot be recommended, excepting for special purposes. Sulphate of copper deepens the color of the precipitate, but renders it more compact and heavy, and therefore more apt to settle down. A certain quantity of sugar renders the ink more fluid, and permits the addition of a larger proportion of gum. It likewise renders the ink adhesive when dry, so that a copy of the writing may easily be taken off by the copying-press. An ink containing logwood with the galls has been much used in Germany, and is made as follows: 1 kilo. of coarsely pulverized nutgalls and 150 grms. of logwood chips are exhausted with 5 litres of hot water; 600 grms. of gum arabic are dissolved in 2½ litres of water; and 500 grms. of sulphate of iron in some litres of water; each of these solutions being made separately. This done, the gall-logwood infusion is mixed with those of the gum and copperas; a few drops of essential oil of cloves or of gaultheria (wintergreen oil having been added, there is added as much water as will bring the bulk of the liquid up to 11 litres. While this kind of ink attacks and corrodes steel pens, it has the additional disadvantage that after a time the writing becomes yellow. Booth gives the following formulae: For superior black ink, take 12 pounds Aleppo galls, 4 pounds sulphate of iron, 3½ pounds of gum, and 18 gallons of water. For a fine eschquer ink, 10 pounds of Aleppo galls, 9 pounds of sulphate of iron, 10 pounds of gum, and 45 gallons of water. In both these cases it is directed that the bruised galls be exhausted by three consecutive boilings, each time diminishing the quantity of water, and supplying by fresh addition any loss by evaporation. The copperas and gum in solution are added to the strained decoction of galls whilst both are yet warm, and the whole is allowed to repose for several weeks, when the fluid is drawn off from the sediment. A few cloves, or some drops of creosote, are added to prevent any parasitic growth. The best fluid to dilute ink which has become too thick for use is a strong decoction of coffee, which improves the lustre and color of ink without decomposing it.

The imperfections inherent in the ordinary black ink from galls and iron salts became more manifest on the introduction of the steel pen, which, aside from its being corroded more or less rapidly, caused the ink to coagulate and deposit its coloring matter. These imperfections have been sought to be avoided by the introduction of various fluid inks, which are true solutions. The first of these in order of time was the fluid of Henry Stephens of London, who prepared a blue liquid which possesses the property of turning in a few hours after writing to an intense black. It has the advantage of perfect fluidity, flowing easily from the pen upon the paper, with which it forms a tenacious combination. These properties were imparted to the ordinary gallie ink by adding to it sulphate of indigo, which holds the coloring-matters in solution. These so-called *azurine inks* are more commercial name, by which means implying that they contain the azurine of indigo, consist of common ink mixed with a little free sulphuric acid, which,

like other acids, retards the oxidation of the ferrous precipitate (see IRON, SALTS OF), so that the writing becomes black only after exposure to the air; the change being, perhaps, accelerated by the neutralization of the sulphuric acid by the basic substances contained in the paper; the ink blackens very quickly when exposed to ammoniacal vapors. A certain quantity of sulphindigotic acid or its sodium salt (indigo carmin) is usually added, so that the ink may not appear too pale in writing. An ink of this kind may be prepared by exhausting 40 parts by weight of nutgalls with 112 parts water, and then adding 7 parts copperas and ¼ part oxalic acid. At the same time, 1 part of finely pulverized indigo-blue is dissolved in 4 parts fuming sulphuric acid; the solution after twenty-four hours is diluted with water, and mixed with a small quantity of carbonate of soda; the precipitate is collected, washed to remove the saline solution, then suspended in water; and this liquid is added to the former till the whole exhibits a rather deep greenish-blue color. Stark, after manufacturing and testing for fourteen years 229 different kinds of ink, states that he found nothing for durability of writing and general excellence to compare with gallnut-copperas ink, with a certain amount of sulphate of indigo. He gives as his final preference for the best ink: To each 1 gallon, 12 ounces of best gallnuts, 8 ounces of copperas, 8 fluid-ounces of sulphate of indigo, 4 to 6 ounces of gum arabic, and a few cloves. As metallic iron impairs the quality of all iron inks, he recommends that all legal and other important documents be written with a gold or quill pen. (*Civ. Eng. and Arch. Jour.*, Aug., 1855.)

*Chrome ink* is prepared by adding 1 part of chromate of potassa to 1000 parts of a saturated solution of logwood, made by boiling 22 pounds of logwood in a sufficient quantity of water to give 11 gallons of decoction; to this menstruum, when cold, the chromate is gradually added and the mixture well stirred. The addition of gum is injurious. If care is taken not to permit the proportion of chrome salt to exceed 1 part for 1000 parts of decoction of logwood, a deep blue-black writing fluid is formed which drops no deposit, like the ordinary gallate-of-iron ink. Paper written upon with it may be washed with a sponge or be left twenty-four hours under water without the marks being erased. Weak acids do not destroy the writing, nor do they even change the shade, whilst that made from galls is effaced, and the ink made with logwood and sulphate of iron is turned red. Runge, the discoverer of this ink, used it with steel pens for two years without their becoming rusty or obstructed by solid matter. It is not liable to turn mouldy, but, on the other hand, it is incompatible to use it with pens which are dipped in ordinary ink, and it is prone to gelatinize. A much-esteemed French fluid ink, "the black-violet ink of Rouen," is prepared by boiling 750 parts of logwood with 6000 parts of water, 35 parts of alum, 31 parts of gum arabic, and 15 parts of sugar-candy, leaving the mixture to stand for two or three days, and straining through a linen cloth. A chrome ink unlike Runge's chromate-of-potash ink has been proposed by C. Puscher in Nuremberg, 1867, thus: Take 10 loths of logwood extract with four times its volume of water, boiled till half the water is evaporated; 2 loths of chrome alum are then dissolved in half the same volume of water, and both solutions mixed and boiled for fifteen minutes, in which time it should be in solution. Add further 1 loth of gum arabic, and we have 25 loths of a clear deep violet-blue solution, which soon writes black. To convert this into a good copying ink, add 1 loth gum arabic and ¼ loth of glucose or glycerine. (*Wagner, Jahres-Bericht*, xiii, 1867.)

*Vanadium Black Ink*.—Berzelius advised the use of vanadate of ammonia with infusion of gallnuts. A surprisingly small quantity of the vanadium salt suffices to produce a perfectly black ink, so small, as Berzelius says, it will not be worth considering when vanadium is more generally known. The writing obtained with this ink is perfectly black. No sediment forms from it. It flows readily from the pen, and does not corrode steel; is not attacked by dilute alkalies, but is turned red by acids. Dr. A. A. Hayes (*Proceed. Am. Acad.*, 1870) has lately shown the vanadium compounds to be far more widely diffused than was before known. Although this ink came at first to be absolutely indelible, yet it strongly resists reagents which cause common ink to disappear.

An excellent *extemporaneous ink* is made as follows: Take of tannic and gallie acids each 20 grains, and dissolve in two fluid-ounces of water; also take crystallized green vitriol (sulphate of iron) and of acid sulphate of iron (ferrous sesquioxide), of each 15 grains, and 4 fluid-ounces of water, mix in a like quantity of water, best bottled; mix the two solutions, and add of madder root (madder) 24 fluid-drachms, of oil of cloves 2 drops. This is by no means a cheap ink, but is very permanent, and of a beautiful black color.



For travelling expeditions it is convenient to have ink in cakes and ink-powders; two of the following recipes for these are quoted from Watts's *Dictionary: Ink in Cakes*.—42 parts of good nutgalls and 3 parts of madder are boiled in about six times their weight of water; the filtered decoction is mixed with 5½ parts copperas and 2 parts pyroligneous acid, diluted with water) are then added; the mixture is evaporated nearly to dryness at a gentle heat and with constant stirring; and the pasty mass is then made into cakes and thoroughly dried. This ink, dissolved in 6 parts of hot water, is said to make an excellent copying ink, and in 10 or 12 parts water a very fine writing ink. *Portable Ink*.—At a recent meeting of the Polytechnic Association of Frankfurt, M. Böttger exhibited a new kind of ink which is convenient for travellers. It is prepared by saturating white bibulous paper with aniline black, and then pressing several sheets together, so as to form a compact block. Other aniline colors may be employed for making red, violet, green, and other inks. A piece of the prepared paper two or three centimètres square will furnish sufficient ink for a long correspondence by simply steeping it in a little water. *Ink Powder*.—A solid chrome ink may be made by triturating together to a fine powder 100 parts extract of logwood, 1 part neutral chromate of potassium, and  $\frac{1}{10}$  indigo-carmin; 1 part of this powder, added to 32 parts water, is said to make very good ink. A mixture of 4 parts pounded galls, 2 parts copperas, and 1 part gum arabic is also frequently sold as an ink-powder.

*Copying inks* are only concentrated common inks, to which more gum and sugar or a portion of glycerine is added. If the body is good, three or four legible copies may be taken from the same writing by the copying-press. A very much esteemed French copying ink is made thus: Take 30 grms. of extract of logwood, 7.5 grms. of crystallized carbonate of soda; boil this with 240 grms. of water, and add, while vigorously stirring, 30 grms. of glycerine. When the fluid has become cold, dissolve in it 1 gm. of neutral chromate of potassa, and add, lastly, 7.5 grms. of gum arabic, previously made into a thick mucilage with water. The paper upon which it is desired to transfer a copy need not be moistened if this ink is used. The following preparation is much recommended: 4 parts by weight of logwood extract are dissolved in a mixture of 60 parts vinegar and 70 parts water; and 3 parts copperas, 2 parts alum, 2 parts gum arabic, and 4 parts sugar are then added. This ink is at first more violet than the Rouen ink, which is also used as a copying ink. Another like preparation of American origin is as follows: Take  $\frac{1}{2}$  a pound of extract of logwood (Sanford's is best), 2 ounces of alum, 4 drachms of blue and as much of green vitriol, and 1 ounce of sugar; boil these ingredients with 4 pints of water, filter the decoction through flannel, and add to it a solution of 4 drachms of yellow chromate of potassa in 4 ounces of water, and finally 2 ounces of chemic blue in 2 ounces of glycerine. The chemic blue, also called "blue dye," is the solution of indigo in oil of vitriol, and otherwise used for dyeing wool. Letter-books, with paper kept moist by glycerine, have been prepared which are said to avoid the necessity of using a brush or sponge in copying letters. A good copying ink is said in the *Chem. Cent. Blatt* (for 1863, 352) to be obtained by using 15 grammes of logwood extract, 2 of alum,  $\frac{1}{2}$  each of green vitriol and blue vitriol, and 1 of sugar, boiled in 3 pints of water; strain and add  $\frac{1}{2}$  of chromate of potassa in 4 of water. Then add 2 of sulphate of indigo and 2 of glycerine. The indigo solution is made by treating  $\frac{1}{2}$  powdered indigo with 5 Nordhausen acid, and dilute with 3 pints of water.

*Native Vegetable Inks*.—The juice of *Coriaria thymifolia*, or ink-plant of New Granada, locally called *chauchi*, is at first of a somewhat reddish color, but becomes intensely black in a few hours. This juice can be used for writing without requiring any further preparation. It corrodes steel pens less than ordinary ink, and resists chemical agents better. All the old documents under the Spanish dominion in America were written with *chauchi*. Sea-water does not affect it. Experiments are being made in Europe to acclimate this ink-plant. The *Sequoia gigantea*, or "big trees," of the Sierra Nevada furnish a peculiar sort of tannin, highly colored and largely soluble in water, furnishing a strong deep reddish-black liquid which I find to be a quite tolerable natural ink when used alone, and with a steel pen the color is rendered much darker. This coloring-matter is found only in the cones, the seeds being implanted in it, and it also fills the spaces between the scales of the cone. A gum resin accompanies the tannin which is quite soluble in diluted alcohol. Boiling injures the color of this natural ink, which cold water suffices to exhaust. It is highly probable that observations to this end will discover other valuable native inks. (See beyond *Indelible Marking Ink from anacardium nut.*) The *Deutsche*

*Ind. Zeitung* gives the following recipe for an old and well-known natural ink: *Black Ink from Elder Berries*.—The bruised berries are placed in an earthen vessel, and kept in a warm place for three days, then pressed out and filtered. The filtered juice is of such an intense dark color that it takes 200 parts of water to reduce it to the shade of dark red wine. Add to the 12½ quarts of this filtered juice 1 ounce of sulphate of iron and the same quantity of crude pyroligneous acid, and an ink is prepared which, when first used, has a violet color, but when dry is indigo blue-black. This ink is superior in many respects to that prepared with galls; it does not become thick so soon, it flows easier from the pen without gumming, and in writing the letters do not run into one another. There is quite a list of plants whose seeds give a lasting black color as inks and dyes of silk and linen fabrics or hair. Such are *Amyris torifera*, *Camochladia intermedia*, *C. dentata* and *C. punctata*, *Cotula alba* (or *Eclipta erecta*), the seeds of which the inhabitants of Cochinchina use to color their hair of a permanent black. *Rauwolfia canescens* bears juicy berries, the juice of which alone can be used as ink, and leaves permanent stains on linen, etc.

*Colored Writing Inks*.—Ink may be made of almost any desired color, and the variety, richness, and permanence of colored inks have been greatly increased of late by the introduction of aniline colors, many of which may be used with great advantage, and have already a wide circulation under various trade-names.

*Red ink* is usually made from either cochineal or Brazil-wood, the latter being the more permanent. But some of the aniline reds are rapidly replacing the former sorts. The cochineal inks are the brightest, but at the same time the dearest and most fugitive. The best is a solution of pure carmine in caustic ammonia; it must be preserved in well-stopped vessels. Böttger recommends 1 part of good carmine, 120 caustic ammonia, and 1½ parts gum arabic. A cheaper but less brightly colored ink is made by drenching 12 parts of pulverized cochineal and 4 parts of carbonate of ammonia (or pearl-ash) with 32 parts hot water, then digesting and pouring off the clear liquid. Addition of cream of tartar and stannic chloride renders the ink more scarlet; cream of tartar and an equal weight of alum give it a crimson tint. *Brazil-wood inks* are made by boiling the wood in water, adding tin-salt (stannous chloride) or cream of tartar and alum to modify the tint, and thickening with gum arabic; e.g. 4 parts Brazil-wood boiled in 60 parts of water, the decoction boiled down to 36 parts, filtered, and mixed with  $\frac{1}{2}$  part of tin-salt and  $\frac{1}{2}$  part gum arabic; or 8 parts Brazil-wood, boiled with 2 parts alum and 2 parts cream of tartar in 120 parts water; the liquid concentrated to 6 parts by weight, and mixed with 2 parts gum arabic and 2 parts sugar. Reade's patent red ink (1847) is made as follows: Cochineal is first boiled in successive quantities of pure water till it ceases, or nearly so, to afford tinctorial matter. It is then subjected to ebullition with dilute ammonia, which dissolves the remainder of the tint-giving principle, leaving the animal matter nearly white. These aqueous and ammoniacal decoctions are then mixed in an earthenware vessel, and the coloring-matter is then thrown down by means of the double chloride of ammonium and tin. The compound thus formed is subsequently boiled in ammonia, and iodide of tin is then added till the required degree of brilliancy of hue is obtained: this completes the process, the degree of body required in the ink being given by an *ad libitum* addition of water. This ink, says the patentee, is greatly superior to the common solutions from peach and Brazil-wood, not only in permanent richness of color, but also in its freedom from acid, and consequent fitness for use with steel pens.

*Blue Inks*.—The most familiar blue ink is Stephens's patent blue writing fluid, which is 30 parts of soluble Prussian blue (Paris blue) dissolved in 4 parts of oxalic acid in 1000 parts of water. Common Prussian blue is digested in successive portions of hydrochloric acid until the solution ceases to react for iron with ferrocyanide of potassium. It is then washed completely neutral with water, gently dried, and carefully mixed with oxalic acid in fine powder, drenched with pure cold water added in small portions at a time, making a solution more or less dense according to the intensity of color desired. For a concentrated solution, 6 parts of Prussian blue, weighed before the acid treatment, will after digestion be taken up by 1 part of oxalic acid and a proportional amount of water. Stephens's Prussian blue ink fades in the light, but is restored in the dark—a fact familiarly known to dyers as true of textile fabrics dyed with Prussian blue. This blue ink resists the action of chlorine and strong acids, but it yields to oxalic acid and alkalis. Reade's patent blue ink is nothing more than soluble Prussian blue prepared by a costly reaction between ferric iodide and potassium ferrocyanide. Dr.



Normandy prepared also a blue ink from ferrocyanide of iron macerated in potassium binoxalate, but it is not better than Stephens's. Ohme's blue ink is also soluble Prussian blue. It is curious to see the recent revival of the soluble Prussian blue ink in H. N. Nissen's patent, which was nothing new. (*Waqee*, 1874.) The *aniline blue inks* are not quite equal to the color of a well-made Berlin blue ink, showing usually a little gray cast. But any one who knows the trouble it costs to make the Berlin blue ink, and how easily this aniline ink is made, will prefer the nearly equal indigo and blue-red aniline ink. To produce it take 1 part of *bleu de nuit* (bleu de Paris) in 200-250 parts boiling water. If it shows the coppery sheen on the paper, add more water. In use this ink holds like the fuchsine ink. The alkali blue (5 B. or 6 B.) furnishes a blue ink of a most delicate shade, but this ink is rather costly. Normandy's *purple ink* is a bog-wood ink, prepared as follows: To 12 pounds of Campeachy logwood add 11 as many gallons of boiling water; pour the infusion through a funnel, with a strainer made of coarse flannel, on 1 pound of hydrate or acetate of copper (verdigris) finely powdered; at the bottom of the funnel a sponge is placed; then add immediately 14 pounds of alum, and for each 17 gallons of liquid add 4 pounds of gum arabic or senegal; let these remain for three or four days, and a beautiful purple will be produced. The aniline purple and violet inks far exceed all others in brilliancy, are free from corrosive action, quite sufficiently permanent, and may be rendered practically indestructible. The same is true of the aniline green. *Violet aniline ink* is most easily made of all aniline inks. Take 1 part of violet blue aniline to 300 parts water. The solution is of a vivid and beautiful violet color, never lets fall a precipitate, flows smoothly, and dries quickly. It is greatly to be preferred to the common copying ink made from logwood, alum, cupric sulphate, sulphate of iron, and glycerine. A pen that has been used for such copying ink if dipped in aniline violet ink instantly impairs its color and granulates it. *Green aniline ink* is the finest color, but most costly, of all these brilliant inks. Take 1 part of methyl green (methyl iodide), soluble in water, to 100-110 parts of boiling water: this gives a shining blue green; if a yellow green is desired, add a little picric acid. It will by its remarkable beauty displace all existing green inks. *Chrome green ink*, after Winckler: Dissolve 180 grains of bichromate of potassa in 1 fluid-ounce of water; add to the menstruum, while warm,  $\frac{1}{2}$  an ounce of spirit of wine; then decompose the mixture with concentrated sulphuric acid until it assumes a brown color. The liquor is now evaporated till it is reduced in quantity to one-half, when it is diluted with 2 ounces of distilled water, filtered, mixed with  $\frac{1}{2}$  an ounce of alcohol, subsequently with a few drops of strong sulphuric acid, and then allowed to rest till after some time it assumes a beautiful green color. It is finally adapted for use by the addition of a small quantity of gum arabic. *Yellow aniline ink* is not to be commended. The mixture of 1 part picric acid in 120-140 parts water is almost never used. Much yet remains to be done to perfect and develop the aniline inks, for which ample materials already exist.

*Carbon and other materials called Indelible Writing and Marking Inks.*—The resistance offered by carbon to the action of chemical agents is well known, and it is hence the basis of the most permanent and unchangeable inks, chiefly printing inks, as carbon cannot be brought into solution. All inks on this basis must be, like China or India ink, sediments held in suspension by some vehicle, and consequently less fluid than is desirable for easy and constant use with a pen of modern construction. Hence, we find Oriental nations writing chiefly with a pencil of camel's hair, and the ancient nations with a stylus of split reed. The elaborate engrossing on parchment in both ancient and modern times, in inks of all colors and in gold and silver sizing, is performed with like implements and the use of colors held up in vehicles of various kinds, and always of a certain consistence unsuited to use in an ordinary pen. Nevertheless, the ingenuity of practical chemists and manufacturers has devised numerous carbon and other indelible or permanent inks, of which we will mention some of the most important. *Indian Ink or China Ink.* This well-known pigment is prepared from finely divided carbon, chiefly lampblack or the soot of the oil of sesamé, formed into cakes by the use of some glutinous or adhesive substance, such as gum-water or glue. Merimée says in his work (*De la Peinture à l'Inde*) the Chinese do not use glue in the fabrication of their ink, but certain vegetable juices, which render it more brilliant and more indelible on paper. Other authentic accounts of the manufacture of this famous ink by the Chinese state in substance as follows: The basis of all the different kinds and qualities of India ink is lampblack, the best of which is obtained from pig's-foot and other oils, and sometimes from resins, while an inferior sort is made from pine wood. The materials are burned in a furnace

about 100 feet long, along the sides and top of which the smoke condenses. That most remote from the fire and nearest the top is the finest, and is carefully kept separate from the rest. Glue made from the skin of the buffalo of the country is soaked in water for a time until it is much swollen, and afterwards completely dissolved. The lampblack is then introduced and worked in until it forms a soft paste. When the materials are thoroughly mixed a quantity of the oil of peas is added, and the temperature maintained for a time at from  $110^{\circ}$  to  $140^{\circ}$ , until the paste is homogeneous in character. It is then removed and separated into little cakes, which are allowed to remain for some time drying and becoming mellow, after which they are strongly compressed in wooden moulds, on the interior of which are engraved the characters which are seen upon the cakes. The surface of the cakes is finally coated with a kind of animal wax, which gives a polish and prevents the ink from staining the hands. The peculiar odor of India ink is produced by adding to it, during the process of preparation, a mixture of Borneo camphor and musk. Only the finer qualities, however, receive this addition. Merimée (before quoted) gives the following directions for preparing this ink with glue. A concentrated infusion of gallnuts is turned into a solution of glue. The elastic, resinous-looking product (artificial leather) is immediately washed clear of the mother-liquor by hot water, and is then dissolved in a thin solution of clarified glue. Filter this solution, and concentrate to the proper degree for incorporating it with purified lampblack. Infusion of galls renders the ink permanent on paper, otherwise it might be removed mechanically. Provost says that lampblack purified by potash ley, when mixed with a solution of refined glue and dried, formed an ink which was preferred by artists to that of China. Rittault in his treatise on the *Manufacture of Colors* gives the following formula for the preparation of China ink, by which this color, it is said, is now largely produced in Europe and sold as the original article: Calcined lampblack, 100 parts; boghead shaleblack, in impalpable powder, 50 parts; indigo-carmin, in cakes, 10 parts; carmine lake, 5 parts; gum arabic (first quality), 10 parts; purified oxgall, 20 parts; alcoholic extract of musk, 5 parts. The gum is dissolved in 50 to 60 parts of pure water, and the solution filtered through a cloth. The indigo-carmin, lake, lampblack, and shaleblack are incorporated with this liquor, and the whole ground upon a slab with a muller, in the same manner as ordinary colors; but in this case the grinding takes much longer. When the paste is thoroughly homogeneous the oxgall is gradually added, and then the alcoholic extract of musk. The more the black is ground the finer it is. The black is then allowed to dry in the air until it has acquired sufficient consistency to be moulded into cakes, which in their turn are still further dried in the air out of the reach of dust. When quite firm these cakes are compressed in bronze moulds, having appropriate designs engraved upon them. The moulded ink is then wrapped in tin-foil with a second envelope of gilt paper. The ink which has been prepared in this manner possesses all the properties of the real Chinese article. Its grain is smooth, it flows very well, mixes perfectly with many other colors, and becomes so firmly fixed to the paper that other colors may be spread over it without washing it out. The *indelible ink of the Academy of Sciences of Paris* was prepared in 1835 by a commission called for by the minister of finance, charged with the duty of discovering a truly indelible writing ink for use on the public securities, bank-notes, etc. The result was an ink formed by dissolving China ink in dilute hydrochloric acid. It appears, therefore, that the Academy ink described below from Prof. Johnson is in a sense the same as this, substituting an alkaline for an acid vehicle, both very dilute. Either of these vehicles will serve to penetrate the paper and prevent the easy mechanical removal of the coloring-matter. The alkaline vehicle has the advantage of not attacking steel pens, and of overcoming a certain metuenousness of surface found on some highly-finished papers or imparted by the fingers of some persons in the act of writing. I do not find mention of these inks in any of the cyclopedias. The little manual *Roret of MM. Champour et F. Malepeyre (Nouveau manuel complet de la fabrication des encrex, Paris, 1866)* gives the report of the commission of the Academy, but it does not speak of the alkaline menstruum. The *Academy ink*, so called, is China ink held in solution by about 1 per cent. of potassic hydrate. Prof. S. W. Johnson, who has used this ink for some time, informs me that it is made either by rubbing up the India cake in potash water, or more easily by placing a small lump of the India ink in a bottle with less than its bulk of stuck potash and a little water. The ink slowly dissolves in the strong potash lye, and is then largely thinned with water. This ink holds up its carbon in the vehicle almost without precipitation, flows freely from the pen, writes perfectly black, and is completely



unalterable by time or chemical agents. A good permanent writing ink may be made extemporaneously by mixing any good ink with a little genuine China ink. It will resist washing with a camel's hair brush and the action of oxalic acid, chlorine, etc. It writes well also with a pen, and may be used on both paper and textile fabrics. The vanadium ink already mentioned is a good indelible ink. Other indelible carbon inks are made as follows: Traill (*Edinbg. Phil. Trans.*) says: Gluten, obtained in the ordinary way, is kept from twenty-four to thirty-six hours in water, and is then digested in acetic acid having the specific gravity 1.033 or 1.034, in the proportion of 3 parts of gluten to 20 parts of the acid. By the aid of a gentle heat a grayish-white, saponaceous fluid, which may be kept for some time, is obtained. From 8 to 12 grains of the finest lampblack and 2 grains of indigo form the coloring-matter for each fluid-ounce of the vehicle, with which it must be thoroughly incorporated. An agreeable aroma may be communicated by digesting bruised cloves, pimento, or cinnamon in a portion of the original acid. This ink may be used with a steel pen, but should not be left in it. It resists water, chlorine, and dilute acids, but it is not calculated for writing on parchment. Henry Stephens's carbon ink has become famous, and is made by boiling shell-lac, or common resin, in carbonate of soda, potassa, or ammonia solution, in about equal proportions, until all the resin is dissolved. This solution is then mixed with finely-levigated lampblack until it has the proper consistence. This alkaline liquid may also be mixed with other colors to form an indelible ink. Dr. Normandy has suggested an indelible writing ink which cannot be obliterated or defaced by any known chemical agent: 24 pounds of Frankfort black must be ground with mucilage—formed by adding 20 pounds of gum to 60 gallons of water—and the mixture strained through a coarse flannel, or passed through a funnel the tube of which is closed by a sponge; 4 pounds of oxalic acid are then added, together with as much decoction of cochineal and sulphate of indigo as will give the required shade. Bossin's indelible ink is made of 2 parts of powdered acetate of copper, 4 parts of sal-ammoniac, 1 part of lampblack, and 20 parts of water, well mixed together. They make a good indelible ink, which, however, must always be shaken before using. Scott has patented (1840) an indelible ink in which gas-carbon (*i. e.* carbon from the burning of coal-tar) and indigo or Prussian blue in very fine powder are incorporated in a logwood and gallnut ink.

*Indelible Marking Inks.*—Dr. Büttger (*Bayrisches Ind. und Gewerb-Blatt*, Dec., 1872) states that the juice of the anacardium nut (*Anacardium Orientale*) contains an oily matter which by exposure to air gradually assumes an intense black color; this color is acted on neither by acids, alkalies, chlorine, nor cyanide of potassium. The powdered nut is treated in a closed glass bottle with gasoline, and after so digesting some time is left exposed to air for spontaneous evaporation. The remaining fluid, which is thickish, is used either by writing or stamping by a die upon linen or cotton. The color is at first dirty brown, but it gradually becomes intensely black—an effect produced instantly by moistening the linen or cotton with liquid ammonia. The same author also gives the following formula for an *indelible aniline black writing ink* (*Dingler*, Jan., 1873): 3.65 grammes of aniline black are rubbed fine in a porcelain mortar with 60 drops of hydrochloric acid and 22 grammes of alcohol. This solution is mixed with a hot solution of 1.82 grammes of gum arabic in 85 grammes of hot water. This ink does not attack steel pens, and is not acted on by strong mineral acids or by alkalies. If the aniline black solution is diluted with shell-lac solution (21 grammes in 85 of alcohol), an aniline black lake is obtained which is suited for coloring wood and leather. An indelible marking ink, described by Jacobson (*Jahres-Berich.* xii. 63), is prepared from aniline by mixing the two following solutions: (a) cupreous solution—8.52 grm. of crystallized chloride of copper, 10.65 grm. of chlorate of soda, and 5.35 grm. of chloride of ammonium are dissolved in 60 grm. of distilled water; (b) aniline solution—20 grm. of hydrochlorate of aniline are dissolved in 30 grm. of distilled water, and 20 grm. of a solution of gum arabic (1 of gum to 2 of water) with 10 grm. of glycerine are added. By mixing in the cold 4 parts of the aniline solution with 1 part of the cupreous solution, a green liquid is obtained which can be used immediately for tracing characters upon linen; the marks, however, alter after the lapse of a few days. It is necessary to keep the solutions separate until required for use. If the fluid does not flow easily from the pen, it may be diluted without fear of diminishing the intensity of the tint, which, at first green, gradually darkens and becomes black. Heat causes the change to take place instantaneously; a steam heat is sufficient, and is better for the fabric than a hot iron. Afterwards the linen is washed in warm soap and water.

*Indelible Blue Molybdenum Ink.*—Roder directs (*Polyt. Notizblatt*, 1856, 112) to dissolve five parts of oxide of molybdenum in the smallest necessary quantity of muriatic acid; also dissolve 2 parts of extract of licorice and 6 of gum arabic in 240 parts of water. Mix the solutions, and write with them on the linen to be marked. After writing, moisten with a solution of chloride of zinc in water. This is an ink not only indelible in ordinary washing, but in acids and alkalies. It is said this ink cannot possibly be removed, except by destroying the article written upon. In fact, it is an utterly indelible blue dye, while the so-called indelible silver inks may be removed by cyanide of potassium, and other chemical agents. *Nitrate of silver marking inks*, although commonly called indelible, yield readily to the solvent power of cyanide of potassium (ammonia and chlorine). One of the best is *Redwood's*, made as follows: Dissolve 1 ounce of nitrate of silver and 1½ of crystallized carbonate of soda in separate portions of distilled water, and mix the solutions; collect the resulting precipitate on a filter, edulcorate it well with distilled water, and introduce it, while still moist, into a Wedgewood-ware mortar; add 8 scruples of tartaric acid, and triturate the whole until effervescence has ceased: next add a sufficient quantity of ammonia to dissolve the tartrate of silver; mix in 4 fluid-drachms of archil, 4 drachms of white sugar, and 12 of finely-powdered gum arabic; and pour in as much water as will make 6 ounces of mixture. By this process the nitric acid, which is essential to a good marking ink, is retained, and the tartrate of silver formed is soluble in half the quantity of ammonia ordinarily required when nitrate of silver is the basis of the ink. This fluid requires no preparation on the cloth, and becomes instantly dark on application of a gentle heat. It does not attack the most delicate tissues. M. Kuhr (*Cosmos*, June, 1869) recommends the following preparation: 1 part of hypophosphite of soda and 2 parts of gum arabic are dissolved in 16 parts of distilled water. The tissue, linen or cotton, to be marked is thoroughly moistened with this liquid, and then left to dry. After having become well dried, the following liquid, composed of 1 part of nitrate of silver and 6 parts of gum dissolved in 6 parts of distilled water, is used as marking ink with a quill-pen. The mixtures here described are stated to yield an indelible and very deep black-colored ink. Numerous other recipes for indelible ink from nitrate of silver might be cited, but these will suffice, especially as the more modern improvements in this art render them no longer of so much use as formerly. *Gold, platinum, palladium, iridium*, and other metals of the same class are used to produce indelible marking inks by using the chloride solutions. Merget, in his researches upon gases as developers in photographic work, has shown that the salts of this series of metals are reduced by certain gases in presence of moisture, and that vapor of mercury given off at as low a temperature as 40° C. will serve to reduce gold, etc. in the substance of tissues, paper, etc., producing indelible stains of a color corresponding to the metal. The dampness of the tissue must be preserved by a solution of ferric tartrate, ammoniac nitrate, or some other hygroscopic salt. (*Comptes Rend.*, xxvi. 1470.)

A good permanent ink may be made by mixing a strong solution of chloride of platinum with a little potash, sugar, and gum to thicken. The writing made therewith should be passed over with a hot smoothing-iron to fix it. An ink for writing on *zinc plant-labels* may be made by dissolving equal parts acetate of copper and sal-ammoniac in distilled water. When characters are written with this solution on a zinc plate the copper is precipitated, forming deep black, very durable marks. Ink for marking *copper and silver* vessels may be made by boiling sulphide of antimony in strong potash ley, leaving the liquid to cool and filtering from separated kermes. As this liquid does not act upon iron, steel pens may be used for writing with it on the metal. The characters on copper and silver are black and very durable; on tin, lead, and zinc less durable. *Ink for Writing on Glass.*—A solution of fluoride of ammonia is recommended as furnishing a ready means of writing with a pen of any kind upon glass, and is especially adapted for labelling bottles, cylinder-tubes, etc. in the laboratory, as well as for marking the degrees upon hydrometers and apparatus of similar construction.

*Removal of Ink-Stains.*—Dilute hydrochloric acid, dilute sulphuric acid, and oxalic acid will destroy and remove the color of most gall and logwood inks. Chlorine in solution or as bleaching-powder acts in a similar manner. Potassic, sodic, and ammoniac hydrate attack many colors, and, alternated with the acids, destroy stains which are not removed from paper and tissues by either alone. But the application of chemical agents to paper requires that it should be free from the binding of a volume. Ozone is a powerful bleaching agent, and has been recommended for removing stains from engravings. Büttger recommends the use of



pyrophosphate of soda to remove ink-flecks from colored goods which will not allow the employment of bleaching-powders and oxalic acid.

*Sympathetic inks* are those fluids which, when used to write upon paper, are invisible until brought out by heat or the influence of some chemical agent. Acetate-of-lead solution leaves no trace of the marks made by the pen until exposed to sulphuric acid vapor, when it suddenly develops an intense brown black indelible color. A weak infusion of galls leaves no sign of the writing until developed by a solution of iron. Even milk (mentioned by Ovid), will develop visible characters by gently heating the paper, or even by dusting it over with some dark powder. The same is true of sugar-water. Water made acid with dilute sulphuric acid, written with a quill or gold pen, is quite invisible till by a slight warming the evaporation of the water leaves the acid in a form sufficiently concentrated to char the paper in black characters. Dilute yellow prussiate of potash develops blue with a ferrie salt. The metal cobalt is remarkable for the fine blue-green tint it develops on paper written with a solution of its chloride, while the acetate of cobalt develops pink when held to the fire. A winter landscape-drawing may thus be made to show verdure and pink flowers, which disappear again on cooling. Nitrate of cobalt, with oxalic acid as a mordant, develops blue. Chloride of antimony develops yellow by decoction of galls. Subacetate of lead also develops yellow by hydriodic acid, and a dilute solution of cupric chloride forms a beautiful sympathetic ink, developing a fine yellow color by heat, and fading out again when cooled. Colorless arsenite of potassa solution develops a lively green when washed over with a dilute solution of a cupric salt. Chloride of gold turns to purple of Cassius when washed with stannous chloride. An acid solution of ferric chloride, so dilute as to be quite invisible when written on paper, becomes blood-red on washing with sulphocyanide of potassium, and again invisible by vapor of ammonia, and these changes can be alternated at pleasure. Linen stained with nitrate of silver or indelible ink may be bleached by first moistening the spots with tincture of iodine, which is followed soon after with solution of sodic hyposulphite. This removes the silver stain, and also the blue color due to the iodide of starch. Another method is by treating the spot first with cupric chloride (not too strong), and then with hyposulphite of sodium, and in any case washing well after in ample water.

Ink which has become faded out by age may often be redeveloped by tracing the characters with a pencil wet with gallic acid. If the ink was an iron ink, it will be thus plainly developed. Ink which has been too long written to allow of copying by the press may be rendered transferable again by using water slightly acidulated with hydrochloric acid with which to moisten the copy paper. This method, however, fails on very old writing—e.g. a century. Such documents, says M. Niepce du St. Victor, may be reproduced by using copy paper wetted with a dilute solution of glucose or honey instead of water. After pressing, this paper is exposed to the fumes of strong ammonia, which brings out clearly lines otherwise quite invisible. The fading out of old MSS. occurs chiefly when the writing is removed from the presence of light into a dark and damp place. An old MS. written in 910 A. D. is now preserved in the abbey of Cluny in France, and is to-day as fine a black color as can be seen, in spite of the ravages of time. An effort has been made by M. Carro to fix the relative age of old MSS. by the use of dilute HCl. (1:10), which has the power of changing the color of log-wood inks red, and alters also the gallnut inks, while it has no effect on carbon ink. But some of the ancient MSS. of the sixteenth and seventeenth centuries changed red by this treatment. But such methods are very unsatisfactory, and may be completely illusory.

*Lithographic Writing Ink.*—The lithographic art is described under LITHOGRAPHY. Two kinds of ink are used in this art—one, called lithographic crayons or chalk, forms the pencil with which the artist traces his designs. The composition of these crayons has received much attention, as the success of the art depends upon them. The composition of which they are formed must be firm enough to hold a fine point to secure delicacy in drawing, and yet adhere strongly to the stone. The French crayons of Bernard and Delarue of Paris are made of best quality wax 4 parts, dry white tallow soap 2 parts, white tallow 2 parts, gum lac 2 parts, lampblack 1 part, copal varnish 1 part. The wax is melted over a gentle fire, the lac broken small, added as it melts, then the soap in fine shavings, the tallow, and lastly the copal and lampblack, stirring all the time with a spatula. It is cast in brass cylindrical moulds. Another preparation is as follows: For 14 ounces of shell-lac take 2 ounces of soap, 3 ounces of white wax, and about 1 ounce of tallow; add about 3 tablespoonfuls of a strong

solution of gum sandarach, and when ready color with lampblack. The lithographic printing ink is described under LITHOGRAPHY; its composition is similar to the crayon ink, but it is made thinner, and acts as an emulsion.

11. *PRINTING INK* Fr. *Encre d'imprimerie*; Ger. *Buchdruckschmelze*.—Printer's ink is a carbon ink in an oily and resinous vehicle. The carbon is lampblack, sometimes ivory-black, and with a little indigo or Prussian blue. The oil is generally boiled and burned linseed oil, or in some European countries nut oil. In addition to these chief ingredients, rosin and turpentine are used, more rarely balsam copaiba, and lastly soap (common yellow rosin soap) is a very essential ingredient. The preparation of these ingredients requires care, and every manufacturer has his own methods and technical secrets in the manufacture of his ink, which printers in these days seldom or never make for themselves. The conditions required of a good ink are chiefly—(1) that it distribute itself easily and well over the rollers and type; (2) it must give a sharp and clean impression, without adhering to the type tenaciously or blurring the paper with excess of oil; (3) it must dry rapidly on the paper, but remain soft upon the type and rollers; this is especially important for the rapid-moving printing-machines of modern times and the exigencies of great newspapers, printing 50,000 to 100,000 impressions in two or three hours; (4) it must be black, and not brown in color; and, lastly, it must be proof against all the ravages of time and the power of chemical agents. It is not, however, to be understood that even the best printer's ink is incapable of being removed by means of chemical skill, as such is not the case. The linseed oil is clarified from the fatty matters, and the pure oil is boiled with great care at a carefully regulated temperature; and during the boiling the best pale yellow soap is added to give it consistency, and the required dyes are also now mixed with it. The best black is that obtained from the smoke of naphtha, the combustion being carefully regulated. This black is ground up carefully with the drying oil, which has assumed the character of a varnish, and the ink is complete. The oil demands particular attention. It is clarified from the fatty and useless matters, and is better if old, and must not only be long boiled, but burned by setting fire to the vapors floating over it, the flames being extinguished by a tight-fitting metallic cover shut over the boiler, which should never be more than half full. The following account of Savage's process (of England) is condensed from Ure by Watts: 10 or 12 gallons of the oil are set over the fire in an iron pot capable of holding at least half as much more, for the oil swells up greatly, and its boiling over into the fire would be very dangerous. When it boils, it is continually stirred with an iron ladle; and if it do not itself take fire, it is kindled with a piece of flaming paper or wood; for simple boiling, without the actual inflammation of the oil, does not communicate a sufficient degree of the drying quality required. The oil is suffered to burn for half an hour or more, and the flame being then extinguished by covering the vessel close, the boiling is afterwards continued with a gentle heat till the oil appears of a proper consistence; in this state it is called varnish. Mr. Savage in his work on the *Preparation of Printing Ink* (London, 1832) says that good varnish for printing ink cannot be made without allowing the oil to burn. The German practice appears, however, to be somewhat different; for in the *Handwörterbuch der Chemie* (Ed. vii. p. 391) it is stated that the oil should be heated only till the vapor which rises from it can be set on fire with a piece of burning paper, but will cease to burn of itself after a little while, or at least will be easily extinguished by putting on the cover; further, that if this temperature be exceeded there is great danger of the oil getting into a state of violent combustion, which cannot be extinguished even by covering the vessel, and may occasion an enormous loss of oil. It is necessary to have two kinds of this varnish, a thicker and a thinner, from the greater or less boiling, to be occasionally mixed together as different purposes may require, that which answers well in hot weather being too thick in cold, and large characters not requiring so stiff an ink as small ones. The thickest varnish, when cold, may be drawn into threads like weak glue, by which criterion the workmen judge of the due boiling, small quantities being from time to time taken out and dropped upon a tile for this purpose. It is very viscid and tenacious, like the soft resinous gums or thick turpentine. Neither water nor alcohol dissolves it, but it mingles readily enough with fresh oil, and unites with mucilages into a mass diffusible in water in an emulsive form. The oil loses from one-tenth to one-eighth of its weight by boiling into the thick varnish. For letter-press printing ink the additional soap to the varnish is indispensable, to enable the ink to be taken up clearly from the types by the moistened paper without smearing. The



soap used for the purpose is yellow resin soap; it is cut into thin slices, well dried, rubbed to coarse powder, and incorporated by small portions at a time with the varnish, which is then once more placed over the fire, to expel any remaining moisture. The coloring-matter of black printing ink is the best lampblack, previously calcined to free it from empyreumatic oils and resins. Its somewhat brownish color is corrected by the addition of a little Prussian blue or indigo.

The ink used by copper-plate printers differs in the oil, which is not so much boiled as to acquire the adhesive quality. This would render it less disposed to enter the cavities of the engraving, and more difficult either to be spread or wiped off. (Ure.)\* The black is likewise of a different kind. Instead of lampblack or sublimed charcoal, the Frankfort-black is used, which is a residual or denser charcoal, said to be made from vine-twigs. Lampblack is said to give a degree of toughness to the ink which the Frankfort does not, but the goodness of the color seems to be the leading inducement for the use of the latter. One pound of a superfine printing ink may be made by the following recipe of Mr. Savage: Balsam of copaiba, 9 ounces; lampblack, 3 ounces; indigo and Prussian blue together, p. aq. 1½ ounces; Indian red, 3 ounce; turpentine (yellow) soap, dry, 3 ounces. This mixture is to be ground upon a slab with a muller to an impalpable smoothness.

Colored printing inks are made by using in place of carbon any desired color to mix with the varnish. Ink of any tint of color may thus be obtained, and by the use of the bronze powders, made now of almost all colors, every metallic effect required by ornamental printing may be readily produced. In the use of bronzes a nearly colorless size is used in place of ink, and the bronze powder is dusted on while the size is yet fresh. B. SILLIMAN.

**Ink'berry** (*Ilex glabra*), the popular name of an elegant shrub, generally from two to four feet high, with slender and flexible stems, brilliant, evergreen leaves, leathery and shining on the surface and of a lanceolate form, and producing small black berries. It is found on the Atlantic coast of North America, and is now much cultivated by florists.

**Inkerman'**, a small Tartar village in the Crimea, near the E. extremity of the harbor of Sebastopol. It is built on the ruins of an ancient city, supposed to be the *Ctenos* mentioned by Strabo, at the foot of a perpendicular hill, which rises several hundred feet above the valley of the river Tchernaya, and is covered with remains of walls and towers, while in the sides are numerous caves hewn in the solid rock, with traces of altars, chapels, and paintings. The heights of Inkerman opposite to this hill, across the valley of the Tchernaya, are memorable as the scene of one of the most desperate battles of recent times (Nov. 5, 1854), in which 14,000 allied English and French troops (chiefly the former) held their ground for many hours against 60,000 Russians, ultimately driving them from the field with great loss. The action began early in the morning by the Russians attempting to carry the allied positions by assault. The fifth volume of Kinglake's graphic *History of the Crimean War*, recently published (1875), is entirely occupied with the battle of Inkerman.

**In'land**, post-tp. of Cedar co., Ia. Pop. 1112.

**Inland**, post-tp. of Benzie co., Mich. Pop. 204.

**Inland Navigation.** See NAVIGATION, INLAND (CANALS, by J. J. R. CHOES, and NAVIGATION, INLAND (RIVERS AND LAKES), by W. E. MERRILL.

**Inlay'ing**, the ornamentation of surfaces of wood, metal, shell, stone, etc. with pieces of a different color. Marqueterie, Florentine work or *pietra dura*, damaskeening, mosaic-work, etc. are forms of this art. Italy, medieval Byzantium, Damascus, Russia, India, China, and Japan have all had schools of these arts, where most meritorious work has been done. Russia, Italy, and the East are the most important seats at present of the inlayer's art.

**In'man** (HENRY), b. in Utica, N. Y., Oct. 28, 1801; d. in New York Jan. 17, 1846. His earliest inclination was towards a military life; he had already secured a commission to enter the Academy at West Point, when the sight of Westmüller's *Danaë* determined his bent to another career. He studied with John Wesley Jarvis; went to Boston as a portrait-painter in 1822; in 1832 removed to Philadelphia; from thence, chiefly in order to be in the country, he went to Mount Holly, N. J.; returned to New York, but, being disabled by ill-health, was induced to visit England with commissions to paint for American friends portraits of Chalmers, Macaulay, and Wordsworth. In 1845, resisting strong professional and social temptations

to remain in England, where his success as an artist and his popularity as a man had been eminent, he returned to his native land, to sicken again and die. Inman's reputation was established early, and continued to increase. Among his sitters were Bishops McIlvaine and White, Dr. Hawks, William Wirt, Nicholas Biddle, Judge Betts, Col. Johnson, Horace Binney, Audubon, Chief-Justice Nelson, De Witt Clinton, Martin Van Buren, and William H. Seward. His portraits were life size, cabinet size, and in miniature. The subjects of his other pieces were various—*Brimm Wood*, *Rydal Water*, *Lake of the Dismal Swamp*, *Trout-Fishing*, *The Newsboy*, *Rip Van Winkle Awakening*, *Scene from the Bride of Lammermoor*, *Family Groups*, *Sterne's Maria*, *Mumble-the-Peg*, and others of unequal merit. He executed a great deal in crayon and with the pen, and did work in lithograph. He was a pleasing writer also of sketches and letters, a man of fine literary taste and poetic feeling. His best works are portraits, in private houses, not easily seen. They entitle their author to a very high rank among artists. O. B. FROTHINGHAM.

**Inman** (J. O'B.), son of Henry, as an artist known chiefly by delicate flower-pieces and genre pictures, pleasing in color and graceful in sentiment; has lived several years in Rome, where his work has elicited praise from critics.

**Inman** (THOMAS), M. D., a physician and botanist of Liverpool, England, was for some years professor at medical institutions in London; wrote numerous medical works, but is chiefly known as author of a very remarkable and learned but eccentric book, *Ancient Faiths Embodied in Ancient Names* (1863).

**Inn.** See HOTEL, by C. G. LELAND, A. M., and INN-KEEPERS, by J. N. POMERON.

**Inn** [Lat. *Ænus*], a river of S. Germany, and the largest Alpine tributary of the Danube, takes its rise in the Swiss canton of Grisons from the Lake of Longhino, nearly 7000 feet above the sea; flows N. E. through that canton, forming the valley of the Engadine; enters the Tyrol at Finstermunz; flows with great violence through Northern Tyrol by Innspruck; flows through Bavaria for about 90 miles to Braunau, whence it continues nearly N., forming the boundary between Upper Austria and Bavaria, and enters the Danube at Passau, after a course of 315 miles. It receives the river Salzach from the S.; is navigable as far as Innspruck for small vessels, and to Hall, 8 miles below, for steamboats. Engadine is the name of the Upper Inn in the Romansch language, spoken by a small remnant of an ancient nation near the head of this river. The Inn is broader than the Danube at their junction.

**In'nes** (THOMAS), b. in 1662, of a noble Scottish family; was educated in the College of Navarre in Paris; became a Catholic priest, and succeeded his brother Louis as principal of the Scotch college at Paris. He was the author of a highly esteemed ethnological work, *A Critical Essay on the Ancient Inhabitants of the Northern Parts of Britain* (1729), and divides with his brother Louis the reputed authorship of the *Memoirs of James II.*, published in 1816 by Dr. Clarke. D. at Paris Feb. 9, 1744.

**In'ness** (GEORGE), b. in Newburg, Orange co., N. Y., May 1, 1825; took lessons in art; came to New York at sixteen, and studied engraving; was prevented by ill-health from pursuing his object; returned to his home in Newark, N. J.; emerged four years later; spent a month with Regis Gignoux, and then began his career as a landscape-artist. Inness has been called a disciple of Theodore Rousseau, whose pictures his own in sentiment resemble. His landscapes are touched with imagination and charged with poetic feeling. His themes are imaginative: *Peace and Plenty*, *The Sign of Promise*, *A Vision of Faith*, *The Valley of the Shadow of Death*, *The Apocalyptic Vision of the New Jerusalem and the River of Life*. His less ambitious works, *A Passing Storm*, *Summer Afternoon*, *Tea-light*, *Sunshine and Shadow*, *Moist Green Level with Trees*, show a tender sympathy with nature. Inness has twice visited Europe, but never studied there with a master. He now (1875) resides at Boston, Mass. O. B. FROTHINGHAM.

**Inn'keepers.** An innkeeper is one who carries on the business of receiving into his house and entertaining guests. An inn, which is the technical legal name, and includes the tavern and hotel, is the house in which he thus receives and furnishes entertainment. The word "guests" is used in this definition in its technical legal sense, which will be hereafter defined. It is not necessary that a person should confine his entertainment to actual travellers in order that his house should be an inn and himself an innkeeper. It is enough that he keeps a public-house, and holds himself out as ready to receive all who come, and to furnish them general entertainment, including lodging and food. Provision need not be made for horses and carriages and cattle, although

\* In the *Handwörterbuch der Chemie* (vii. 399) it is stated, on the contrary, that ink for copper-plate printing is prepared with the thickest linseed-oil varnish, which has been allowed to burn.



this is customary, and probably universal in country taverns. There is a legal distinction between an inn and a boarding-house and a restaurant. A boarding-house is not an inn, because the proprietor does not hold himself out generally to take all who apply, but only receives those with whom he chooses to make an agreement. A special contract is the basis of all the legal relations between the keeper of a boarding-house and his boarder, while a common-law public duty is the basis of all the legal relations between the innkeeper and his guest. Still, an innkeeper may, in the same house in which he entertains guests, also have boarders. As to the one class of persons, he will hold the relation of innkeeper, and as to the other that of boarding-house keeper. The proprietor of a restaurant, like the innkeeper, holds himself out to the public at large, but not as one who furnishes general accommodation and entertainment, for he furnishes only food. A person, however, does not lose his legal character as an innkeeper because he does not actually supply all his guests by a *table d'hôte*. If he furnishes lodgings to all who come, and means by which they may all obtain meals at his house if they choose, he keeps an inn. In fact, the common-law doctrines in reference to this entire subject grew up at a time when meals were furnished at inns only as they were ordered, and the *table d'hôte* system was unknown.

Before describing the legal rights and obligations of the innkeeper, it is important to determine who is a "guest" at an inn, for it is only towards his guests that the innkeeper's peculiar and severe liabilities exist. All persons who apply for entertainment or refreshment to him as an innkeeper—that is, in virtue of his inn—and obtain it, are guests, and his common-law duty to them arises. On the other hand, if an innkeeper has a restaurant also in connection with his inn, and a person only procures refreshment thereat; or if he maintains a stable for public accommodation, and a person simply leaves his horses or cattle to be taken care of, without himself becoming a guest; or, finally, if the innkeeper by a special contract receives a person into his house in the character of a boarder—in neither of these cases do the legal rights of a guest exist in favor of the one party, or the legal responsibilities of an innkeeper devolve upon the other. These propositions may be better illustrated and explained by a reference to the facts of a few judicial decisions than by any general discussion. I purposely select those which are extreme, in order to show the extent to which the common-law obligations have been carried by the courts. There can be no possible doubt or difficulty in respect to the relations of the parties where travellers and others are actually received into an inn, and are entertained in the ordinary manner and under ordinary circumstances; it is the extreme and somewhat exceptional instances which indicate the limits of the legal rule. In an early case decided by the English court of king's bench a person came into an inn situated in a market town and requested permission to leave a box of goods until the next market day. The request being refused, he sat down in the public room and ordered some liquor. This was supplied, and he remained a short time drinking it, having placed the box on the floor behind him. When he arose and was about to go, it was discovered that the goods had been stolen. For this loss the keeper of the inn was held responsible; the procuring and partaking of the liquor in his house made the owner of the box a guest for the time being, and subjected the other, while that relation lasted, to the common law liability in respect of the property which had been constructively placed in his custody. The facts of an analogous case decided a few years past by the supreme court of New York show that the same severe rule is still enforced. A person came into an inn about seven o'clock in the morning and procured some liquor at the bar for himself and for others in his company. Taking off his overcoat, and directing it to be hung up, he immediately left the house, and was absent the entire day. Upon his return late in the afternoon the coat was gone, and the innkeeper was adjudged bound to make good this loss. The facts of still another case are given to illustrate the distinction already mentioned between the furnishing entertainment by an innkeeper, *as such*, which makes the party entertained a guest, and the furnishing it in some other capacity, which does not give rise to the same legal condition. The owner of a city hotel had in connection with it a saloon or restaurant. On a certain occasion a public ball was given at his house. One of the company in attendance at the ball upon his arrival took off his coat and other outside wrappings and left them in charge of a servant of the proprietor. During the evening he visited the restaurant and obtained liquor and other refreshment. The articles which he had entrusted to the servant were missing, either lost or stolen; but as the facts narrated did not constitute their owner a guest of the inn, he was not able to fix any responsibility for them upon the innkeeper.

The peculiar duties and obligations which are imposed upon the innkeeper in virtue of his public occupation are two in number; the first being in respect of the guests personally, and the second in respect of their goods.

(1) *In Respect of the Guests Personally.* The keeper of an inn is bound to receive all travellers and wayfaring men and other applicants, and to entertain them for a reasonable compensation if he has room, and if they are well behaved and free from any special personal qualities which might disturb the good order and well-being of his house. The "reasonable compensation" here spoken of means the prices customary at that particular house. A "Fifth Avenue hotel" is not compelled to receive persons at the rates charged by a country tavern. The duty to receive depends also upon the conduct of the applicant and the condition of the inn. If the latter is full, no one has a legal right to be received, and the law does not prescribe the amount or limit of accommodation in this respect. Nor is the landlord obliged to admit a person who is intoxicated or disorderly, or who is afflicted with a contagious or infectious disease which would be dangerous to the health of the inmates, nor, perhaps, a person of notoriously bad character and reputation, whose presence would be highly offensive to other guests. A refusal to comply with the obligation thus described—that is, to receive an applicant against whom no legal objection existed, and when there was room for his accommodation—gives a right of action in favor of the injured party against the innkeeper to recover the damages caused by the unlawful rejection. Such actions are of course very infrequent, but the right to maintain them is recognized by the highest authorities, ancient and modern. At the common law an indictment for a misdemeanor also lay against the innkeeper who should violate this his public duty.

(2) *In Respect of the Guests' Goods.* The common law doctrine is well established that the innkeeper is responsible for all the goods received into his custody—or, as it is often said, received within the curtilage of the inn—from a guest; in other words, he is liable for all losses of and injuries to such goods, even in the absence of his own or his servant's negligence or other wrong, except where the loss is directly occasioned by the "act of God," or by the "act of public enemies," or by the fraud or negligence of the guest himself or his servant or companion. He is, therefore, in fact, an insurer of his guest's goods, while in his custody, against all losses and injuries whatsoever, unless resulting from some one of the three causes just mentioned. This rigorous rule of the common law, originating at a very ancient period in English history, when all travelling was dangerous, and when it was supposed that innkeepers were often in league with robbers, has been maintained to the present day, and is still enforced in all the States of the Union, with one or two exceptions, unless modified by the legislature. In Vermont, however, a less stringent rule prevails as the result of judicial decision, and the innkeeper is not held responsible for losses occasioned by casualties over which he had no control, such as incendiary fires. The term "act of God" is not synonymous with "inevitable accident." It is an occurrence which arises entirely from natural causes outside of the ordinary course of events, and in which human agency could not by possibility have intervened. The most familiar examples are lightning, storms, unusual freshets, earthquakes, and the like. The term "public enemies" implies actual war, and it does not include mere robbers, rioters, or mobs. If an insurrection should attain such magnitude that it amounted to a war, the rebels would become public enemies within the meaning of the phrase as here used. Applying these explanations, the innkeeper is seen to be responsible for all losses of the goods while in his custody except those which result immediately from extraordinary natural events, such as lightning-strokes, earthquakes, etc., or from the violence of the hostile forces in time of war, or from the fraud or negligence of the guest himself. In order that the liability thus described should arise, the articles must be under the control, actual or constructive, of the innkeeper. In respect to the extent of the liability, and the kind of goods to which it applies, an attempt has been made in a few recent decisions to restrict it to the personal baggage of the guest, including such an amount of money only as may be reasonably necessary to his travelling expenses, and thus to place the responsibility of the innkeeper for his guest's goods and that of the common carrier of passengers for their luggage upon exactly the same footing. This limitation, however, is opposed to the rule as established by an overwhelming array of decided cases. No restriction has been placed either upon the extent of the liability or upon the kind of goods embraced within it. Innkeepers have been held responsible for baggage, for money in large sums whether in trunks or in separate packages, for merchan-



dise of all sorts, for animals, for vehicles; in short, for every species of personal property which can be brought within the curtilage of the inn and left in their legal custody. It will be seen from the foregoing that this stringent obligation imposed upon the innkeeper extends only to the goods of his guests. In respect to those placed in his care and custody by persons other than guests, his legal duty is far less onerous; he is responsible for them only as a depositary or as a bailee for hire—that is, for losses and injuries caused by the wrongful or negligent acts and omissions of himself or his agents and servants, and no further.

*Recent Statutory Modifications.*—The common-law liability of innkeepers has been partially relieved by legislation. A statute passed in New York in 1855 enacts that when an innkeeper shall provide a safe for the deposit of any moneys, jewels, or ornaments belonging to a guest, and shall notify him thereof by posting a notice stating the existence of such safe in the room occupied by such guest, and such guest shall neglect to deposit his moneys, jewels, or ornaments in the safe so furnished, the innkeeper shall not be responsible for the loss of such moneys, jewels, or ornaments. A similar statute has been passed in many, and probably in most, of the other States, as well as in England (26 and 27 Viet. ch. 41, § 4). Only one method, it will be seen, is here expressly mentioned of communicating information to a guest that a safe has been provided in compliance with the law—namely, by a written or printed notice posted in the room occupied by him. It is very properly held, however, that in the absence of this constructive mode of imparting the knowledge, a direct, personal notification will answer the same purpose. The relief thus given to the innkeeper extends only to "moneys, jewels, and ornaments." All other articles placed in his custody by a guest are left to the operation of the common-law rules. What "moneys, jewels, and ornaments" are within the meaning of the statute? No exception is made in its language, but some of the courts have attempted to engraft one upon its terms; and there are cases which hold that an amount of money sufficient for daily expenses, and the personal jewels and ornaments ordinarily worn are not included, and need not be deposited in the safe in order that the innkeeper should be responsible for their loss. These decisions have not been generally followed, and the better opinion is, that all moneys, jewels, and ornaments must be placed in the safe or no responsibility for their safety arises, except, of course, the liability which would result from the wrongful acts of the landlord himself. When the provisions of the statute have been complied with by the guest, and the designated articles have been delivered to the innkeeper or his servants in order that they may be deposited in the safe, his common-law obligation in respect to their safety at once attaches to its full extent, and continues as long as the special custody lasts. There is a tendency to relax by legislation the severe responsibilities of an innkeeper. Thus, in New York it is provided by statute that he is not liable for goods destroyed by fire in an outbuilding, where he is not at fault, and the fire is the work of an incendiary. Still broader legislation is to be noticed in England in the statute already cited. The innkeeper has a common-law lien on the goods of his guest, which authorizes him to retain them in his possession until his lawful charges are paid. (See LIEN.) It has been held in England that this extends so far as to give the innkeeper a lien in some instances upon the goods of third persons, as where the guest had a hired piano in his room, the innkeeper having no reason to suppose that it did not belong to the guest. The innkeeper has at common law no lien upon the goods of boarders. Such a lien is sometimes given by statute, as in New York. (See BAILEMENT.)

JOHN NORTON POWEROY.

**Innocent I.**, SAINT, b. at Albano, was elected bishop of Rome (pope) Apr. 27, 402; interceded without success with Arcadius, emperor of the East, in behalf of the patriarch Chrysostom, who was deposed from his see and banished; prevailed on Honorius, emperor of the West, to persecute the Donatists, who were excommunicated by the Council of Carthage (405); made exertions to save Rome from Alaric and his Visigoths, who nevertheless sacked that city Aug. 24, 410; condemned the doctrines of the Pelagians and the Novatians; first practised the system of sending legates to represent the papal see in remote districts; was vigorous in maintaining the right of his see to exercise appellat jurisdiction over other bishoprics, and enforced the celibacy of the clergy. D. Mar. 12, 417. His feast is celebrated. —INNOCENT II. (*Gregorio Papareschi*), b. in Rome about 1090, was a monk, and afterwards abbot of the convent of St. Nicholas; was legate to France 1124; was chosen pope Feb. 14, 1130, on the death of Honorius II., by seventeen cardinals, but Peter de Leon was put forward as pope by a minority of the electoral body under the title of Anacletus II. Innocent was driven from Rome; went to Cluny in France; was recognized by the monarchs

of France, Germany, and England; was supported by St. Bernard and by the Council of Rheims; was forcibly restored to power at Rome by Lothaire, whom he crowned emperor in the church of St. John Lateran 1133; was again driven from Rome the same year; held a council at Pisa and excommunicated his rival; was again restored by Lothaire 1137, and was finally recognized by the rebellious cardinals after the death of Anacletus in 1138. Innocent convoked in 1139 the second Council of Lateran, attended by 1000 bishops; condemned the opinions of Arnold of Brescia and of Abelard (1140); pronounced an interdict upon the kingdom of France, and had his temporal authority overthrown by an insurrection of the Romans, who restored the senate and the tribunes of ancient Rome. D. Sept. 24, 1143. —INNOCENT III. (*Lotario Conti*), b. in 1161 at Anagni; studied at Rome, Paris, and Bologna; became a cardinal-deacon in 1189; succeeded Celestine III. as pope in 1198; enlarged the papal temporalities; twice dictated the election of the German emperor; greatly diminished German authority in Italy; excommunicated Philip Augustus of France, and placed the kingdom under an interdict 1200, and afterwards visited the same fate upon Spain and Portugal, on account of the illegal marriages of the kings of France and Leon, and in both instances the pope was victorious; compelled King John of England, by the same means, to give up the right of investiture and make his possessions the tributary fief of Rome; caused himself to be acknowledged suzerain of Sicily, Bavaria, and Denmark; proclaimed in 1208 the crusade against the Albigenses; confirmed the Franciscan and Dominican orders; annulled Magna Charta 1215, and excommunicated the English barons; sent out the crusade which founded the Latin empire at Constantinople; convened the fourth Lateran Council 1215; and D. at Perugia July 17, 1216. Innocent was by far the most powerful of the popes in temporal matters, his power being as much the result of favoring conditions as of his own great ability and ambition. —INNOCENT III., ANTIPOPE, called *Landus*, was a Frangipani, who wore the tiara 1178–80, and d. in prison. —INNOCENT IV. (*Sinibaldo de Fieschi*), b. at Genoa; became a cardinal 1227; succeeded Celestine IV. in 1243. D. at Naples Dec. 7, 1254. His pontificate was characterized by continual warfare with the Ghibelline party, the pope's chief opponents being Frederick II. of Germany and Conrad, his son. —INNOCENT V. (*Peter of Tarantasia—Doctor Famosissimus*), b. at Moutier, Savoy, in 1225; became a Dominican; succeeded Aquinas at Paris; was made archbishop of Lyons 1272, and cardinal-bishop of Ostia; was chosen pope in 1276; d. June 12, 1276. Author of numerous scholastic works. —INNOCENT VI. (*Etienne Aubert*), b. at Mont, Limousin; was professor of civil law at Toulouse; became bishop of Noyon and Clermont; cardinal-bishop in 1342; was pope at Avignon 1362–67; was contemporary with Petrarch and Rienzi, and one of the ablest of the French popes. D. at Avignon Sept. 12, 1362. —INNOCENT VII. (*Giovanni Migliorati*), bishop of Bologna and archbishop of Ravenna, became cardinal in 1389, pope in 1404. D. Nov. 6, 1406; was a man of learning and of many virtues. —INNOCENT VIII. (*Giovanni Battista Cibo*), b. in Genoa in 1432 of Greek stock; was a man of irregular life, the father of many bastard children, and was married when ordained; became bishop of Savone and Melfi, and cardinal in 1453; obtained the papacy by simony in 1484. His pontificate was characterized by corruption and treachery. D. July 25, 1492, and was succeeded by the depraved Alexander VI. —INNOCENT IX. (*Giovanni Antonio Facchinetti*), b. at Bologna in 1519; became cardinal 1583, pope in 1591; was a man of learning and wisdom. D. Dec. 30, 1591. —INNOCENT X. (*Giovanni Battista Pamphili*), b. at Rome May 7, 1574; became a cardinal in 1629, pope in 1644; extended the temporal and spiritual sway of the papacy; opposed Jansenism; and d. Jan. 6, 1655. —INNOCENT XI. (*Benedetto Odescalchi*), b. at Como in 1611; became cardinal in 1647; was elected pope as successor of Clement X. Sept. 21, 1676; undertook to revive the ancient discipline of the Church, and had quarrels with Louis XIV. about the revenues of vacant benefices (1678), in which that monarch was supported by a general assembly of French bishops, who declared (Mar. 16, 1682) the authority of the pope inferior to that of a general council. Innocent thereupon held a consistory, in which he condemned and burned the propositions of the French bishops. In 1687 he published a brief abolishing the right of asylum as formerly exercised by foreign ambassadors; refused to receive the French envoy, who maintained that right and entered Rome with a military escort; sanctioned the condemnation by the Inquisition of Molino's doctrine of Quietism; joined the League of Augsburg, and d. Aug. 12, 1689. —INNOCENT XII. (*Antonio Pignatelli*), b. at Naples Mar. 13, 1615; became archbishop of Naples; cardinal in 1681, and pope in 1692; was a just man and able ruler of his temporalities.



D. Sept. 27, 1700.—INNOCENT XIII. (*Michel Angelo Conti*), b. at Rome May 15, 1655; became archbishop of Tarsus in 1695, cardinal in 1707, and bishop of Viterbo in 1712; succeeded Clement XI. in 1721; and d. Mar. 7, 1724. He was virtuous and devout, but not a very capable pontiff, and there is reason to believe that he was poisoned in consequence of his determination to suppress the Jesuits.

CHARLES W. GREENE.

**Innocentius**, a Roman jurist of the times of Constantine the Great and his sons Constantius and Constans, by whom his writings and opinions were invested with a kind of legislative force. None of his works has survived, and their tenor is known only by a few references of later writers.

**Innocent's Day** [in Old English, *Childermas*], the day on which the Catholic and Anglican churches celebrate the massacre of the children at Bethlehem, who are called the *Holy Innocents* and considered as the earliest Christian martyrs. Dec. 28. The Society of Lincoln's Inn, London, used to choose a *King of the Cockneys* on this day; children were permitted to wear the clothes of their elders and exercise a mock authority; in the convent the youngest nun became lady superior for the nonce, etc. The priest on this day wears a blue gown in church. In some Catholic countries the festival of the Holy Innocents is even now celebrated by playing practical jokes, precisely as in the U. S. the 1st of April is reckoned *All Fools' Day*. In Spanish-American countries, after a practical joke has been played, the expression equivalent to "April fool" is, *Qué la inocencia le valga — i. e. "May your innocence protect you!"*

**Inns of Court**, colleges in London designed for the education of students for practice at the bar, and having at the same time the right to admit persons to practice. These institutions do not govern attorneys, who are admitted to practice under the direction of the courts. The Inns of Court were situated between the city of London and Westminster. They are four in number, having preparatory schools called Inns of Chancery. At the present time the Inns of Chancery are only used as chambers. The Inns of Court are the Inner Temple, the Middle Temple, Lincoln's Inn, and Gray's Inn. To the first of these are attached the Inns of Chancery, called respectively Clement's, Clifford's, and Lyon's Inn; to the Middle Temple, New Inn; to Lincoln's Inn, Furnival's, Thavies', and Symonds' Inn; while to Gray's Inn are added Barnard's and Staples' Inn. The Inns of Court are voluntary societies and unincorporated. They are thus described by Pearce: "They are voluntary societies, for ages submitting to government analogous to other seminaries of learning; from time immemorial enjoying the protection of the Crown; at common law subject to the visitatorial powers of the judges of the superior courts, who possess a domestic jurisdiction over these bodies, to whom an appeal lies in every case against orders affecting members of these societies, forming a university with power to grant degrees in the municipal law of England, which constitute indispensable qualifications for practice in the superior courts of law; no corporations, and possessing no charters from the Crown; by the policy of the common law permitted self-government, subject to the qualifications mentioned in order to secure the independence of the bar." They were called inns, or in the Latin records "*hospitia*," as distinguished from public lodging-houses (*discessoria*). The meaning of the term is well shown by an order of the judges issued in the reign of Charles I., wherein it being set forth that as the institution of these societies was chiefly ordained for the profession of the law, and in a secondary degree for the sons and youth of riper years of the nobility and gentry of the realm, and in no sort for lodging or abode of country gentlemen, which if it should be suffered would turn them from *hospitia* to *discessoria*, it was provided that no person who did not belong to the society should be admitted or allowed to lodge in the houses. Being unincorporated, the members have been obliged to resort to special methods to keep the title to the property in the society. The first grant was made to a select number in trust for the society at large. This select number forms the bench. As the members die, others are chosen from the society, and new conveyances are made from time to time, the succession having been thus kept up for hundreds of years. (*Shelford on Mortmain*, p. 33.)

These colleges existed at a remote period in English history. Fortescue, writing in the reign of Henry VI., gives a pleasing account of them as they existed in his time. He says: "The students resorted thither in great numbers to be taught as in common schools. Here they learn to sing and to exercise themselves in all kinds of harmony. On the working days they study law, and on the holy days Scripture, and their demeanor is like the behavior of such as are coupled together in perfect amity. There is no place where are found so many students past childhood as here."

The early modes of instruction in these institutions were disputations (or *moots*) and readings or lectures. The members were divided into four grades—benchers, utter barristers, inner barristers, and students. The government of the society was committed to the benchers, or seniors, the discussions and readings appertaining to the barristers. In the course of time the office of reader came to be attended with great expense. Stowe informs us that the reader in his day for upwards of three weeks kept a splendid table, feasting the nobility, judges, bishops, principal officers of state, and sometimes the king himself, inasmuch that it has cost a reader above £1000—certainly a large sum of money at that day. Curious details are given by the authors cited at the end of this article as to the masquerades and revellings at the inns, growing more numerous and attractive as the business of instruction declined. The requisitions for admission to the society became nominal. "The applicants were examined in the classics to ascertain how they had spent their time before coming to the inn, and whether they had the manners of gentlemen." After the student period had passed the requisites for admission to practice consisted mainly in the fact that the student had eaten a certain number of dinners in each year for a fixed number of years in the common hall. Until within a few years all instruction was dispensed with. This entire departure from the original theory of the schools attracted until recently but little attention, and where it was noticed only elicited mild expressions of dissatisfaction. Herbert, writing in 1804, says: "It may be worth a question, however, whether the total rejection of every restraint in professed seminaries of instruction is an improvement or a disadvantage." Latterly, the best professional sentiment has strongly tended in favor of making these institutions true seminaries of learning, and ample courses of lectures have been introduced, and opportunities given to those students who may desire careful instruction to receive it. The rules adopted by the benchers provide for a preliminary examination, testing the student's general culture. It is quite certain that the result of the renewed interest in legal education, of which the present lord chancellor is a distinguished exponent, will be to produce a class of lawyers not only versed in the rules of the common law, but well informed as to the principles of the Roman law and the doctrines of general jurisprudence.

The benchers not only have the power of admitting persons to the bar, but also of disbarring those whom they deem unfit to practise. From their decision no appeal lies to any court as such, but only to the judges, exercising a limited power of review in the character of visitors. By this means the general sentiment of the profession, as represented by the benchers, may exercise a most salutary control over delinquent members, while, owing to the supervision of the judges, there is but little danger that so great a power will be wantonly or capriciously exercised. These principles are well illustrated in a recent case (1874), where a barrister brought a suit in equity against his inn, praying, among other things, that he might be adjudged to be entitled to retire from the inn without undertaking not to practise at the bar. The court decided that it had no jurisdiction over the subject; the whole matter was between a voluntary society and a member. The sole question was, whether he had complied with the rules of the society, and that point the court had no power to determine. His appeal was to the judges as visitors. The object of the barrister in bringing this suit was avowedly to obtain a decision that the monopoly enjoyed by the inns to admit barristers was not founded upon any rule of law, but depended solely on the sufferance of the judges. The judgment must be regarded as an emphatic reaffirmance of the authority of the Inns of Court.

The beauty and quiet repose of the grounds where the inns are situated are justly celebrated. Herbert, writing in 1804, gives a pleasing description of them as they appear to one looking from the Inner Temple: "A beautiful garden on the Thames side, chiefly covered with green-sward and having a spacious gravel walk or terrace on the water's edge, fronts the hall. This is laid out with great taste and kept in perfect order, and in summer-time forms a crowded promenade; from whence the view opened down the river is extremely rich. Blackfriars bridge, part of Westminster bridge, and the elegant back front of Somerset House, with the winding Thames, the opposite busy shore, and the beautiful swell of the distant Surrey hills, all together form an assemblage of objects unrivalled in variety and magnificence." (Reference may be made for further information to Herbert's *Antiquities of the Inns of Court and Chancery* (London, 1804); Pearce's *History of the Inns of Court and Chancery* (London, 1818); Ireland's *Law of Court*; Wharton's *Law Dictionary*, title "Inns of Court." For information as to the inns of Ireland see Duhigg's *King's Inns*.) T. W. DWIGHT.



**Inns'pruck**, or **Innsbruck**, town of Austria, the capital of the Tyrol, on the Inn. It is beautifully situated at an elevation of 1800 feet above the level of the sea, and encircled by mountains from 6000 to 8000 feet high. The five suburbs which form the new part of the town are finely laid out and well built. The cathedral contains the celebrated monument of Maximilian I., of marble and bronze, and also that of Andreas Hofer. Innsbruck has a well-frequented university and extensive manufactures of cloth, silk, and gloves. Pop. 16,810.

**Innu**it. See ESQUIMAUX.

**Ino**, in Grecian mythology, was secretly married to Athamas, king of Orchomenus, to whom she bore two sons, Learchus and Melicertes. Having accepted from Hermes the young Dionysus to nurse, Here visited her and her husband with madness, when Athamas slew Learchus. Ino fled with Melicertes in her arms and leaped into the sea, where she was changed into a sea-goddess, Leucothea. As the myth of Ino was much used by the Greek dramatists, it received many enlargements and augmentations, and exists in many different versions.

**Inocarpus edulis**, a stately evergreen tree of the Pacific Islands, and of the order Thymelaceae, producing a nut which after roasting is a palatable and important food. The tree puts out from its trunk curious plank-like buttresses, which are very convenient to the natives for use as natural boards, after peeling off the bark. Some of these planks are four feet wide at the base.

**Inoculation** [Lat. *inoculo*, to "bud"], in general, the intentional or accidental conveyance of disease to an individual by means of the actual application of morbid material to his person, especially upon a wound; in particular, it signifies such a transfer of variola, or smallpox; which proceeding is also known by the more specific term of *variolation*. Inoculated smallpox differs from natural smallpox chiefly in its course being milder and shorter, the mortality of the former being less than 1 per cent., whereas that of the latter ranges from 10 to 50 per cent. This comparatively mild character of the inoculated disease seems to have excited the attention of the Chinese and certain other Oriental peoples at a very early period, and hence they have practised intentional inoculation from time immemorial for the purpose of procuring immunity from the natural smallpox. The practice found its way into Europe by way of Constantinople, where it was openly introduced in the year 1701. The influence possessed by Drs. Timoni and Pylarini overcame the religious scruples of the Turks, and inoculation became a recognized practice. Although it was favorably spoken of in England as early as 1714, it was not until 1722 that the first inoculation was performed in that country—upon the daughter of Lady Mary Wortley Montagu, wife of the British ambassador at Constantinople. At first it met with some opposition in England, but after a few years it was extensively practised, and rapidly spread to France, Germany, and other continental countries. In America it was advocated by the Rev. Cotton Mather, and first practised in 1721 by Dr. Zabdiel Boylston of Boston. The proceeding consisted essentially in the insertion of lymph from a smallpox pustule into an incision or abrasion made for the purpose. In Asiatic countries, however, the practice was somewhat different; for instance, the Chinese inserted a variolous crust or a bit of linen from the clothing of a smallpox patient into the nostrils. This was called "buying the smallpox," and the proceeding was invested with a quasi-religious sort of mystery. Inoculation stood the test of experience as regarded the protection of the individual inoculated, but it proved the source of disaster to the community at large, since inoculated smallpox was found to be as infectious as the natural disease, and therefore served to spread the latter broadcast to a greater extent than would otherwise have occurred. Owing chiefly to this fact, but partly also to other considerations which need not be mentioned here, inoculation was rapidly supplanted by the announcement of Jenner's discovery of **VACCINATION** (which see), in the year 1798, and has now fallen into complete desuetude. Although perhaps somewhat more efficient than vaccination, it was fraught with such danger that it does not deserve to be revived.

FRANK P. FOSTER.

**Ino'sic Acid** [Gr. *is*, *ivós*, "muscle," "fibre"].  $C_5H_8N_2O_6$ , an acid found in the mother-liquor in preparing creatine from flesh-juice.

**Ino'site** [Gr. *is*, *ivós*, "muscle," "fibre"], or **Phaseomannite**,  $C_6H_{12}O_6$ , a variety of glucose found in the heart, lungs, kidneys, liver, spleen, and brain, and in the urine in a case of Bright's disease; also in kidney-beans, common peas, cabbage, potato-shoots, asparagus, etc. It is soluble in water, insoluble in alcohol and ether; is not discolored by boiling with potassic hydrate; does not ferment in contact with yeast; undergoes lacteous fermentation

under the influence of cheese, flesh, or decaying membrane and chalk. Evaporated nearly to dryness with nitric acid, treated with ammonia and calcic chloride, and again evaporated, it yields a characteristic rose-tint.

C. F. CHANDLER.

**Inowrac'law**, town of Prussia, in the province of Posen. It has manufactures of saltpetre and a much-frequented cattle-fair. Here are great beds of rock-salt. Pop. 7429.

**In Partibus Infidelium** ("in the regions of the unbelievers"). Since the Church of Rome in theory still holds ecclesiastical sway in those countries whence the Church has been expelled (such as parts of Asia and North Africa), the custom has long prevailed of giving to suffragans, coadjutors, vicars-general, missionary bishops, and other inferior dignitaries the nominal bishoprics of places far remote from their scene of duty. Thus, for example, the two missionary bishops at present (1875) serving in North-western British America are respectively bishops of Satala and Anemurium, cities of Asia Minor. Such prelates are called bishops *in partibus infidelium*, or simply bishops *in partibus*.

**In Perso'nam**. See IN REM.

**In'quest of Office**. In English practice this is an inquiry made by the king's (or queen's) officer, his sheriff, coroner, or escheator, *virtute officii* or by writ sent to them for that purpose, or by commissioners specially appointed, concerning any matter that entitles the king to the possession of lands or tenements, goods or chattels. The investigation is made with the aid of a jury, which is not required to consist of any specific number of persons, but may have either twelve or more or less. The most important cases in which inquiries of this kind are instituted relate to the escheat and forfeiture of lands to the Crown, either by reason of the alienage of their owner, who acquired them by conveyance or devise, or because there are no heirs of a deceased person to inherit the land of which he died seized. Upon a finding by the jury that the owner is an alien, or that he has died leaving no heirs, the property vests immediately in the Crown without any further proceeding being necessary. As the inquiry terminates with a *finding* of certain facts by the jury, the proceeding is sometimes termed "office found," which is an abbreviation for the fuller expression, "inquest of office found." Inquests of office were originally devised as an authentic means of giving the king his right by solemn matter of record, and in order that by the intervention of a jury the subject might be protected against arbitrary seizures of his property. In the U. S. this form of procedure is still retained in a number of the States, though it is not uniformly made applicable to the same classes of cases as in English practice. It is only resorted to when real property is to be forfeited to the State and does not apply to personality. It is a proceeding employed chiefly when lands escheat to the State for want of heirs. In some of the States, also, the common-law rules regarding the right of aliens to hold lands still prevail, and in these an inquest of office would generally be applicable to vest lands acquired by purchase in the State, unless a different mode of procedure has been adopted by statute. In a number of the States, however, statutes have been enacted enabling aliens to hold lands by an indefeasible title. An inquest of office in the States following the New York code of procedure is an action instituted by the attorney-general of the State. (See *New York Code*, § 447.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Inquisition** [Lat. *inquisitio*, a "seeking" or "searching for," "inquiring into," "examination;" used in the Vulgate, Acts xii. 19], in law, a seeking for proof in support of an accusation, a legal investigation, involving the examination of the inquisitors and the inquisitorial process. (See Carpov, *Prac. nov. imperial. Sax. Rer. Crim.*, ed. Quint. 1665, index.) In history, first a process of investigation, then a tribunal under various forms and modifications, then a fixed institution of a twofold type, bearing the names *Inquisitio hereticae pravitatis*, *Sanctum Officium*, *Il Santo Officio*, *La Congrégation du Saint Office*, *Glabensgericht*, *Ketzergericht*, established in some parts of the Roman Catholic Church and states to protect the faith by searching out and bringing to penance or punishing heretics, unbelievers, and certain classes of offenders against morals and the canon law. (See Du Cange, *Glossar. Med. et infim. Latinitat.*, iii. 844.) (For the early relations of the Church to errorists see HERESY.)

A careful defining and classification may help us to avoid some of the confusion which marks many of the accounts of the Inquisition.

**I. The Imperial Inquisition**.—This was not a tribunal, but a civil process. The emperor Theodosius the Great (379-395) used inquisitors or inquirers after the heretics for the detection especially of the Manichæans (382). They



were appointed by the prefect of the praetorium. Aggravated cases of leadership in certain specified forms of heresy were punished with death. (Theodorus, *Hist. Eccles.*, v. 16.) Justinian (525-565) employed similar officers to search for heretics in general (529). The Christian doctrine, as defined by the four holy synods general, and the canons framed by them, were acknowledged as part of the law of the empire, and heresy thus became a civil offence, the trial and penal visitation of which belonged solely to the civil magistrate. The whole matter was confined to the ordinary courts, and the bishops exercised for centuries no temporal jurisdiction. The bishop Ithacius reached Priscilian through the civil powers. But the Church had not then learned to make the subtle distinction which afterwards became so general. Though Priscilian was a very dangerous heresiarch, and though his trial and torture were conducted by the prefect, and his beheading was ordered by the emperor (385), the issue was regarded with widespread horror. Ithacius was degraded, excommunicated, and died in exile, and the best men in the Church refused communion with his supporters. (Baronius, *Annales*, ann. 381, 385, 386, 397. See HERESY.)

II. *The Diocesan Inquisition* gradually arose out of the imperial, relieved it of part of its duties, and gave it a subordinate character in the infliction of penalty. This inquisition was not a tribunal, but an ecclesiastical process or function. As the penalties visited upon offenders under the codes of Theodosius and Justinian were largely of an ecclesiastical nature, and the bishops were more and more recognized as governmental aids, the civil powers committed the jurisdiction in inquisitorial cases to the bishops in their several dioceses (about 800). The bishops used for this purpose their synodal courts. There the accused were examined. If found guilty, they were instructed and admonished. If they remained obdurate, they were left in the hands of the secular court to be punished under the common law. This sort of function assumed a far wider significance in the twelfth century. Pope Lucius III. (1181-85) at the synod of Verona (1184) prepared a decree against the heretics of that time. He puts them under perpetual anathema. Laymen are to be delivered into the hands of the secular judges to be punished unless they abjure at once. The relapsed are not to be allowed a second pardon. The bishops are to make at least an annual visitation to discover such heretics. All the secular authorities are to render every possible aid in the work under pain of excommunication and forfeiture of dignities. "In this decree," says Fleury, "we see the concurrence of the two powers—the ecclesiastical and civil—for the extirpation of heresies." He considers this decree as involving the germ of the Inquisition. (Fleury, *Hist. Eccles.*, iv. 766; Du Pin, *Twelfth Century*, ch. ix.)

III. *The Papal Legatine Inquisition*, for which the way was preparing, became independent of the diocesan, though coexistent in part with it. It was created by special commission, was not permanent, was not an institution. The disaffection toward the Church which marked the close of the twelfth century spread more and more rapidly. In Southern France her opponents had become almost the dominant party. To Innocent III. (1198-1216) it seemed that the bishops were carrying on proceedings against these heretics in quite too languishing a style. Whatever might be the philosophy of it, their lack of success was beyond dispute. He sent, therefore, as papal legates, the Cistercians Raineri and Guido into Southern France to give more energy to the repression of the Waldenses (1198), with authority to employ the interdict in coercing the civil powers. Peter of Castelnau was appointed associate inquisitor in Southern France (1200), and was active, in conjunction with other Cistercians, against the heretics, from Toulouse as a centre (1203). The powers of the papal legates were further enlarged, so as to reach the case of non-compliant bishops. To meet the popular aversion created by the dissolute lives of the clergy, Diego, bishop of Osma, and Dominic, by permission of the pope, went on foot and in poverty to preach among the heretics. Peter and Raoul were sent on a mission among the Albigenses (1206). Count Raymond humbled himself before the legate, Peter of Castelnau (1207), and promised to aid in extirpating the heretics he had been protecting. Dominic urged the crusade against the Albigenses (1208). The legatine inquisitors to a large degree acted independently of the bishop of the diocese; they held a court of their own, and by authority of the pope went on to try, to condemn, and to inflict penalties, and, with the concurrence of the magistracy, even death itself. Raoul feigned himself one of the heretics, and got possession of their secrets. Many priests, monks, laymen, and women were thus detected, and condemned in a council at Paris. Ten were burned and four imprisoned for life (1209). Proceedings so crafty, unscrupulous, and vigorous had all the success of which their nature allows. The search

was very thorough, and the remedy seemed temporarily almost complete. Peter de Castelnau, by a hand never traced, was murdered near Toulouse (1208). (Guillaume de Nangis, *Chronique*; Guizot, *Coll. d. Mémoires*, xlii. 97.) But his death helped to complete the work of his life. Innocent, exasperated to the last degree by the death of his faithful servant, hurled against the Albigenses a crusade, in part under Arnold (afterwards archbishop of Narbonne) as legate (1209), which after a bloody struggle ended in their extermination.

IV. *Rise of the Inquisition as a Permanent Institution—Acts of the Councils.*—The vigor with which the legatine inquisition had acted, the success of its mission, and the enormous pressure on the Church, which the old mode of procedure had allowed to increase, and of which the new measures had been but a local and temporary palliative, strengthened the tendency to give system and permanence to some institution which should furnish the specific relief required in the time of crisis. The official initiative in this work may be said to have been made by the Twelfth General Council, the Fourth Lateran (1215), Innocent III. presiding. It took the first steps in the direction of a permanent inquisition. It virtually gave something of the character of an inquisitorial tribunal to the synodal courts of the bishops. Provincial synods were to be held annually, and violations of the Lateran canons were to be rigorously punished. The punitive discipline was no longer to be a spontaneous and irresponsible matter, but the courts were to be under Church decree—by pre-eminence, courts for the searching out, trial, and punishment of heretics. The condemned were to be left in the hands of the secular power, and their goods were to be confiscated. The secular powers were to be admonished and induced, and, should it prove necessary, were to be compelled (*compellatur*) to the utmost of their power to exterminate all who were pointed out as heretics by the Church (*unicuique hereticus ab ecclesia denotatus, pro vicibus exterminare*). Any prince declining thus to purge his land of heresy was to be excommunicated. If he persisted, complaint was to be made to the pope, who was then to absolve his vassals from their allegiance and allow the country to be seized by Catholics who should exterminate the heretics. Those who joined in the crusade for the extermination of heretics (*hereticorum exterminium*) were to have the same indulgence as the crusaders who went to the Holy Land. Every bishop was to see to the carrying out of these provisions under pain of canonical vengeance (*ultionis*). He was to be deposed for neglect to cleanse his diocese of the leaven of heretical pravity, and his successor was to be one who had both the will and power to destroy it. The method of proceeding against offenders was by accusation, denunciation, and inquisition. (Carranza, *Summa Conciliorum*, Antwerp, 1556, 335, 336; ed. Schram, August. Vindelic., 1778, vol. iii. 36-39; Fleury, *Hist. Ecclesiastique*, Paris, 1840, v. 123.) The Council of Toulouse (1229) adopted a number of canons tending to give permanent character to the Inquisition as an institution. It was ordained that the bishop should make an annual visitation, and see to it that in all parishes one priest and three laymen of good repute should be appointed to devote their entire time to the making the inquisition for heretics. The local magistracy was to unite in this search. Any one permitting a heretic to remain in his country, or who in any way shielded him, was to be punished by forfeiture of land, personal property, and official position. All heretics were to be handed over to the archbishop, bishop, or local authorities. The houses in which they were found were to be levelled with the ground. Heretics, and those under charge or suspicion of heresy, were to be excluded from medical practice (*officio medici non utantur*). Any one could make inquisition and seize heretics in the country of another. Genuine penitents were to be removed from the tainted neighborhood, were to wear two crosses on their clothing, different in color from it, till the bishop allowed them to be laid aside. Their forfeiture of public rights could only be removed by a papal dispensation. Heretics driven to penitence by fear were to be imprisoned, so as to prevent their corrupting others. Men from the age of fourteen, and women from twelve, were to make oath, and renew it every two years, that they would inform on heretics. The laity were strictly prohibited from having the Holy Scriptures (Carranza, *Summa*, iii. 70-72; Harduin, *Acta Conciliorum*, Paris, 1744, xlii. 173; Maust, *Collectio Verborum*, 1778, xxvii. 192; Fleury, v. 214; Du Pin, *The twelfth Century*).

The local councils of this era followed up the work of the Fourth Lateran with special provisions in its spirit. Thus, the Council of Château Gaucien (Mavene, 1231). Jews cannot testify against Christians; the Council of Beziers (1233), the laying off of the crosses shall be considered sufficient proof of heresy (Fleury, v. 242); the Council of Arles (1234) convicted heretics to be imprisoned for life,



the heretic detected after death to be exhumed and given to the secular judgment (Fleury, v. 266). The Council of Narbonne (1233), under direction of the pope, laid down rules for the Dominican inquisitors. Prisons were to be constructed for the converts who had not property to support them in jail. Those who relapsed into heresy were, without further hearing, to be left to the secular judges for punishment. No one was to be excused from imprisonment because of old age, of wife, parents, or children; the names of witnesses were not to be made known by word or sign. Even the infamous and convicts were eligible as witnesses. (Carranza-Schram, iii. 83; Fleury, v. 271; Du Pin, *Cent. XIII.*, ch. vi.)

V. *Original Establishment of the Inquisition.*—Gregory IX. (1227–41) found that not even the multiplication of rigorous canons could overcome the scrupulosity, the mildness, or, perhaps, sometimes, the indulgence of the bishops. In Aug., 1231, he placed the Inquisition in the charge of the Dominicans, an order specially founded for the defence of the Church against heresy. Papal inquisitors of that order were appointed for Germany, Aragon, and Austria (1232), and for Lombardy and Southern France (1233). They were made formally free from all restrictive dependency on the bishops (1233), and could in certain cases summon the bishops themselves before them. The Inquisition then became an organized institution, a permanent tribunal, papal in its supreme authority, and administered mainly, though not exclusively, by the Dominican order. Under its jurisdiction persistent heresy was treated with unsparring severity. But "the Church does not thirst for blood." That maxim was too fixed to be disregarded. Blood had to be shed, the Church's need required it, but the Church could not shed it with her own hands. The casuists and divines hardly discuss the question whether the Church, as such, can shed blood; it is agreed that she cannot. That the Church might not even wear the appearance of staining herself with blood it was necessary that the princes should obligate themselves to co-work with her in carrying out the measures designed to repress heresy. Louis IX. of France (afterwards canonized) had shown his willingness, out of a pious mind, to use the powers of the state against the Albigenses (1228). Raymond VII. of Toulouse (1233) and Frederick II. of Germany (1234) followed up the work by the requisite laws, but neither of them with the unsuspected zeal of St. Louis. As these movements in the state followed in a secondary way upon the suggestions of the Church, the Inquisition of this type may properly be called an ecclesiastico-political tribunal. Both Church and state co-operated in it, but the Church was supreme, and used the state. The relation was reversed in the Inquisition as it existed at a later period, especially in Spain: there Church and state still co-operated, but the state was supreme and used the Church.

VI. *Method and Laws of the Ecclesiastico-political Tribunal, the "Ancient" Inquisition.*—We have seen the regulations established by the councils, under which the seizure and trial of persons suspected of heresy and other crimes took place. Their fellows in guilt, and even common convicts, were accepted as witnesses against them. The accused were to know nothing of them. Confession was wrung from them by torture. The torture of those suspected of heresy was sanctioned by Innocent IV. (1252). The torture was at the beginning applied by the civil authorities, but as the requisite secrecy was impossible with this arrangement, the Inquisition subsequently took the matter into its own hands, under direction of Urban IV. (1261–64). The penalties inflicted were penances of various kinds, forfeiture of civil and ecclesiastical rights, confiscation of property, imprisonment or the galleys, sometimes for life, and capital punishment, usually by burning alive. In mitigated cases persons were strangled first and burned afterwards. Rigorous as the Inquisition was even in this form, it was in many respects less arbitrary and severer than the politico-ecclesiastical Inquisition of after times. The bishops were not wholly ignored, the law of secrecy was not as strictly enforced, the means of defence were more ample. In Aragon and even in other countries conviction of heresy was not followed by sequestration of property. In a word, the Inquisition in its prevailingly ecclesiastical form was more dependent, more open to the influence of public sentiment, less compact and centralized, rather local than national, and altogether less terrible.

VII. *The Ecclesiastico-political Inquisition, History of.*—1. *In France.*—The special sphere of the Inquisition in the period of its earliest organization was in Southern France (1229–34). Its proceedings were marked with such severity that an insurrection of the people took place, and it was driven out of Toulouse and Narbonne. Four of the inquisitors were put to death in Toulouse, and the pope was compelled to withdraw the Inquisition from that place. It was again restored, and again fell into its earlier cruelty.

It was, however, put under some restrictions by Philip the Fair (1285–1314). In the fourteenth century it died out in France. When, two centuries later, an attempt was made, under cover of the intense passions excited by the Reformation, to bring it in again and use it against the Huguenots, the ministers of Henry II. (1547–59) assured him that persistence in the movement would bring on a civil war. His queen, Catharine de' Medici, and others, Roman Catholics and ardent opposers of Protestantism, resisted the restoration of the Inquisition. But, though the Inquisition was not allowed a formal establishment in France, its influence, though with a certain furtiveness, has been very great there at times. The *CHAMBRE ARDENTE* (which see) (1535) was associated with an inquisitorial tribunal, of which the pope was a corresponding member. Both were established by Francis I. (1515–47), who more than once, with his mistress, enjoyed the excitement of the public burning of heretics. Several heretics were burned when Henry II. entered Paris in 1549, and the cruelties of the conjoint tribunal aided in bringing on the religious war of 1560.

2. *Germany.* The Inquisition was introduced into a number of other countries. In some it was unable to obtain a permanent footing, and in all its spirit and history were in some measure modified by the character of the nationality. Conrad of Marburg, a Dominican, was appointed by Gregory IX. grand inquisitor of Germany (1231). He aroused the pope to a crusade against the *STERNINGERS* (which see), while the Inquisition proceeded with judicial measures against them as heretics. The cruel earnestness of Conrad, which imperilled the lives even of those who gave their souls to his keeping, directed itself alike against the high and the low with an impartiality which intensified the common aversion of people, princes, and bishops toward the Inquisition, and made it for ever impossible that it should find a permanent home in Germany. The pope was appealed to, and, expressing wonder at the long endurance of such atrocities, disavowed the excesses of his official. Before his reply was received Conrad was assassinated by some German nobles (July 30, 1233). Drosio, a Dominican, was associated in spirit and work with him. (See Höfler in *Wetzer and Weltes' Kirch-Lexic.*, and *Wagenmann* in *Herzog's Real Encyclop.*, "Konrad.") For more than a century the Inquisition seemed robbed of its vitality in Germany by its own excesses, but in the fourteenth century the *BEGHARDS* and *BEGUINES* (which see) were persecuted with great severity (1367) by Walter Karling and another inquisitor, both Dominicans, sent by Urban V. (1362–70). Their work was legalized and efficiently sustained by three edicts granted by Charles IV. (1369). Gregory XI. enlarged the number of inquisitors for Germany to five (1372), and Boniface IX. sent six for North Germany (about 1399). Toward the close of the fifteenth century it received a new impetus from the bull "Summis desiderantes affectibus," issued by Innocent VIII. Dec. 5, 1484, in which he alarmed all Germany, and stimulated to the last degree the superstitions of the people, by informing them that their country was overrun with witchcraft, and in the hands of magicians who were in covenant with the devil. For the extirpation of these criminals he appointed two inquisitors, Heinrich Krämer (*Inquisitor*, "merchant," is the Latinized form in which it often occurs) and Jakob Sprenger. Out of the confessions of those charged with witchcraft, aided by suggestive questions and the torture, was built up a complete system of demonology. The processes and results of these examinations were wrought up by Sprenger in the *Malleus Maleficarum*, the "Hammer of Witches," who were assumed to be for the most part feminine (Cologne, 1489). This book long remained an authority in the proceedings against that class of offenders. The repression became the excitant. The temptation of suffering and publicity always swells the number of crimes of the imagination. An epidemical mania swept over Germany. Thousands of women were burned or tortured to death, sometimes confessing, oftentimes boasting, that they were witches. Science, authority, and law made superstition almost invincible, and one of the latest roots of mediæval thinking which clung to the soil of Germany and of other parts of the Protestant in common with the Catholic world was the belief in witches. The Reformation completely broke the power of the Inquisition in Germany. The Jesuits endeavored to restore it in Austria and Bohemia. In Bavaria (1599) it was formally established, but it lacked vitality, and soon vanished from all parts of Germany.

3. *Italy—Rome.*—In Italy its life was protracted, though political complications prevented its assuming the severity of character displayed wherever the government completely controlled it or it controlled the government. It was introduced into Italy by Gregory IX. (1235). Its central tribunal at Rome was employed by Paul IV. (1555–59) against Protestantism. He declared in his last hours



that he found in it the only means of rescuing the Roman Catholic religion and the authority of the apostolic see from destruction. (Onuphrius, quoted in Henleiger, *Hist. Papal.*, 1698, 244.) In conjunction with the Inquisition stood the Congregation of the Holy Office, which a short time before had been established by Paul III. (1534-50), whose action in so doing had been influenced by Cardinal Caraffa, afterwards Paul IV. Sixtus V. (1585-90) enlarged the powers of the Congregation (1588). The Roman Inquisition was composed of twelve cardinals and of officials styled consultors or qualificators. The chief inquisitor was always a Dominican. The pope himself met with the court at least once a week, and confirmed its decisions. Inquisitorial courts, with a general similarity of organization, but with a varying number of members, chosen by the Congregation of the Holy Office, were introduced throughout Italy. The Inquisition in Italy was abolished by Napoleon (1808), was sanctioned again by Pius VII. (1814), but was used after that time mainly as a disciplinary tribunal for the clergy, and was extinguished by the consolidation of the kingdom of Italy, Oct. 9, 1870.

4. *Venice*.—The republic of Venice refused to receive from the pope an inquisition dependent on him, but instituted one under state control (1286). The papal nuncio presided indeed in it, but with him were associated the patriarch, the pater inquisitor, who was always a Franciscan, and three civil judges, without whose concurrence nothing could be decided (1289). The Venetian Inquisition might indeed be classified as politico-ecclesiastical, as the political was in some sense the primary element, and so take its place with Spain. But the Inquisition of Venice was really in the main an ecclesiastical tribunal, kept such by the state. While Spain stimulated the Inquisition, and gave it the largest powers, Venice restrained it, confined its jurisdiction to cases of heresy, did not allow it to deprive the heirs of the condemned of the property, and gave it no censorship of books. The Greeks and Armenians had freedom of worship, the Jews were tolerated, and the University of Padua was not limited to Roman Catholics in conferring its degrees in divinity. The ecclesiastical Inquisition of Venice is not to be confounded with the state Inquisition. (See Fra Paolo, *Marsollier*; Fleury, d. 96; Daru, *Hist. de Venise* (1819), i. 405-412; ii. 532; iv. 342, 460.)

5. *Naples, Sicily, Tuscany*.—The Inquisition was never established in Naples. It was prevented on the one side by the difficulties with the pope, and on the other by the unwillingness of the pope that an Inquisition should be established independent of his own control. The Inquisition which was established in Naples under the control of the general inquisitor of Spain was abrogated 1782. It was restored in Sardinia by Gregory XVI. (1833), and stood until 1848. In Tuscany, the grand duke had reluctantly given up Galileo to the Roman Inquisition (1633). The Tuscan Inquisition was suppressed by the grand duke Leopold II. (1824-59). In the political reaction following the year 1849 the Inquisition exhibited tokens of a revived life in Tuscany. An evidence of this which aroused Christendom was the sentencing of FRANCESCO and ROSA MADIAI (which see) to the galleys (1852) for having become Protestants. The incorporation of Tuscany into the united kingdom of Italy under Victor Emmanuel (1859) put an end to its Inquisition.

6. *Other Countries*. In Poland it was introduced by Pope John XXII. (1327), but was soon abolished. All the efforts of the pope to introduce it as an institution into England were futile. Inquisitors were sent thither, but exercised little influence, as England, with a very decided disposition to exterminate heresy, preferred to do it in her own independent fashion.

VIII. *The Politico-Ecclesiastical Inquisition—the "Modern" or "Spanish" Inquisition*. 1. *Spain*. The ecclesiastico-political Inquisition had been fixed in Spain in Aragon, and to its central inquisitor, Nicolaus Eymeric (d. 1399), we owe the *Directorium Inquisitorium*, which is a voucher for the substantial unity of the spirit and method of the Inquisition under its two forms. But the old Inquisition of Aragon is almost forgotten in the new Inquisition of Castile. The great theatre of the most terrible form of this Inquisition and of its highest activity has been Spain. The whole purpose and strength of the Church and State has never been so centralized as there, in the repression of what was regarded as a common evil threatening the life of both. A vigorous absolutism on the throne found a congenial mind in the Church, for State and Church were welded together in Spain in a theocratic conjunction almost without parallel in modern history. The primary reasons of all these facts are connected with the entire earlier history of that land and with civil and religious necessities, largely real, and always plausible, which rose out of that history. The long struggle with the Moors had

been one in which the antagonisms of races had been vivified by the antagonisms of religions. The Moors had been beaten in the field, but their conquerors felt that there could be no abiding security for Spain till the vanquished accepted the faith of the victors. The Jews had from an ancient period been a numerous, active, and influential element in Spain. As between Christianity and Mohammedanism, they had been more sympathetic with the latter than with the former. Jew and Mohammedan had been compelled toward the end of the fourteenth century (1391) to make a profession of Christianity. These reluctant converts, Moorish and Jewish, were more than suspected of clinging in secret to the faith they had publicly renounced. They were charged with atrocious acts and dangerous designs involving the government and the Church. A compulsory fidelity is the natural sequence of a compulsory profession. Of this compulsion the Inquisition became the organ. One of the earliest distinctive movements in this direction was made by Cardinal Pedro Gonzales de Mendoza, archbishop first of Seville, and afterwards of Toledo, who (1470) gathered together the legal maxims and regulations by which a sifting of these pretended converts might be made. This collection was circulated among the clergy to arouse and give precision to their efforts to repress the imminent mischief and peril. As this measure lacked the cogency in which relief alone could be found, the cardinal proceeded (1477) to punish in Seville a number of persons of Jewish origin who were charged with maintaining in secret the laws and usages of their fathers. He then submitted to the government the sketch of a permanent ecclesiastical court, in which the early vigor of the older Inquisition, which had been allowed to languish, should be restored, but which should possess larger powers and more effectual methods. In short, it was to be the Inquisition reformed. The plan met with the approval of Ferdinand and (after a temporary hesitation) of Isabella. At the cardinal's suggestion, which was all-potent (he was called "third king of Spain"), the plan was submitted to the Cortes at Toledo (1480), and, despite the opposition of a number of the states of the kingdom, was adopted. The king and queen loved the Church and loved their people. They meant to strengthen the throne by the altar, and the altar by the throne. They meant to serve the Church and to use the Church. They wished to secure the goodwill of the pope, and to gain by it. In their motives were mingled fear, piety, patriotism, absolutism, and ambition. Heresy was to be repressed; the dangerous races were to be kept under; the arrogance of the hereditary nobility and of the clergy was to be held in check; and the royal wealth and prerogative enlarged and made sure. In no permanent forms of persecution has there ever been a complete separation of political from religious motives. On petition of the sovereigns, Sixtus IV. had issued a bull (Nov. 1, 1478) authorizing them to appoint and depose inquisitors, and to possess themselves of the property of the condemned for the royal treasury. The Inquisition assumed the character of a predominantly, though not exclusively, state institution, in which the throne was largely allowed to define for itself how it would use the Church, yet under such bonds of fealty to the Church as made it questionable which would be master if their councils should ever be divided. The papal permission was not formally acted upon till Sept. 17, 1480, when the king and queen nominated as inquisitors two Dominicans, Morillo (previously inquisitor in Aragon) and St. Martin. With them was conjoined as assessor Medina, the queen's counsellor, and as procurator-fiscal, Lopez, her chaplain. This court began its official work (Jan. 2, 1481) by the publication of an edict which gave directions in regard to the arrest of heretics. These were for the most part the "new Christians," Jews who had professed conversion. The entire body of nobles was threatened with loss of title and estate if they neglected the orders of the Inquisition. Numbers of Jews were accused. Four days after the first edict, 6 of the condemned were burned, 17 more in March, and by Nov. 4, 278 persons had been sacrificed in the autos-da-fé of Seville. The dead were accused and convicted, and their remains dug up and burned. Many of the convicts were of high position. Wealth seemed rather to invite than turn aside the stroke. The plague caused the Inquisition to adjourn to Avila, but did not relax its energy. In that year (or, according to one interpretation of Mariana (xxiv. 17), within several years) the total number burned alive is computed at 2000. Many more were burned in effigy; 17,000 were reconciled—that is, had the capital sentence commuted to one of imprisonment for life, confiscation, and other penalties. The Jews fled in great numbers. Some bore their sorrow to the pontiff himself. Sixtus IV. (1481) wrote to Ferdinand rebuking the inquisitors for their severity, and threatened them with deprivation. But in 1483 he quoted the example of Isabella and encouraged Ferdinand and her to continue the



good work. In this same year (1483) he appointed Thomas de Torquemada, a Dominican prior, inquisitor-general of Castile and Aragon. This man was confessor of the queen, and had prepared her mind to shake off its womanly aversion to the extirpation of heresy by force. He was now invested with full powers to give the completest unity, method, and efficiency to the Holy Office. The estimate of the number burnt alive—principally nominally Christian Jews—in the eighteen years of his ministry ranges from about 2000 to 10,000; between 6000 and 7000 were burned in effigy. This was not the trifling, the almost ludicrous thing which the words suggest to the modern mind, but involved infamy to the dead, and to the living the loss of all that makes life dear. Nearly 100,000 were punished in other ways. Overawed by the grand inquisitor, the Spanish sovereign signed the edict for the expulsion of the Jews (Mar. 30, 1492). Fearing because he had made himself to be so feared, guarding against poison at home and against assassination when he went abroad, the "confessor of sovereigns" died in quiet at the age of seventy-eight (1498). (See Prescott's *Ferdinand and Isabella*, i. 255-268, and Wetzer u. Welte's *K. L.*, v. 651.) Diego de Dega, a Dominican friar, the friend of Columbus, archbishop of Seville, Ferdinand's confessor, and preceptor of his son John, succeeded Torquemada as grand inquisitor (1499). He issued statutes or instructions for the regulation of the tribunals (1500-04). An insurrection excited by the extreme measures of the inquisitors led to his removal (1506). Under his administration 1664 were burned alive, 882 in effigy, and 32,456 punished in other ways. (Herzog, *Real Enzykl.* xviii. 332.) The third inquisitor-general was Cardinal Francis Ximenes de Cisneros (1507-17). In those ten years Llorente (iv. 255, ed. 1818) computes that 2536 were burned alive, 1368 in effigy, 47,263 were punished in other ways; but in this estimate is included those who suffered in Aragon, whose Inquisition was not subject to Ximenes. (Herzog, *R. E.*, vi. 687; Hefele's *Ximenes*, tr. by Dalton, 399.) The Inquisition in Spain long maintained its original rigor. Philip II. (1555-98) used it with effect to the crushing out of Protestantism.

The style of procedure in the trials of the Spanish Inquisition was very thoroughly methodized. It was the business of subordinate officials, called "familiaris," to arrest the heretics and bring them to the place of judgment. The familiaris were supposed to take the place of a godfather (padrino) to the accused. As the position had various prerogatives of an ecclesiastical and temporal nature, it was greatly sought for. The various tribunals which were established in the provinces and colonies were formed on the general model furnished in Madrid. They consisted of three inquisitors, three secretaries, an alguazil (constable), three receivers and assessors, together with the familiaris and jailers. Every inquisitor was obliged to submit to the test of the *casa limpia* ("pure family"); that is, was obliged to show that he sprang from an old and unsuspected Christian ancestry, none of whom had ever been brought before the Inquisition. He was also sworn to secrecy. In its earlier history, as the "ancient" Inquisition, it had confined itself to charges of heresy or the suspicion of holding or conniving at it, of astrology, fortune-telling and witchcraft, of blasphemy, of offences against the Holy Office itself or its officials. In its later form the civil power, with the concurrence of the popes, extended its jurisdiction over professed converts from the Jews, Mohammedans, and over unbelievers, in as far as any of these classes gave offence to the Holy Office. The immediate process in Spain was as follows: The person suspected or indicted was summoned three times (*edictaliter*)—i. e. by a public judicial citation. If he failed to appear, he was, under reservation of a yet severer punishment, excommunicated in *contumaciam* and fined. An opportunity of escape was rarely allowed to those who were criminated. The familiaris, the holy *Hermosidad* (the government police fraternity), and the Fraternity of the Concinda followed pitilessly on the tracks of all who had been designated by the Inquisition. If the person criminated appeared, he was at once put under arrest. The suspicion of the crime was enough to cause his desertion by kindred and friends. They did not dare even to make their appearance with proof of his innocence, lest sympathy with his person should be construed as evidence of sympathy with his heresy. After the prisoner had been rigorously examined, a list was made of his effects, especially of his books and papers, and his property was confiscated so far as was necessary to cover the preliminary investigation. To render recognition easy in case he should escape, his head was shaven. He was committed to a dark prison. If he promptly confessed his guilt, real or alleged, he was as a penitent spared the penalty of death. But even in that case he and his entire kindred were dishonored and declared incompetent to bear any office of public trust. If he denied the charge, and the proofs were insufficient, he was dismissed, but as a

person suspected he remained under the surveillance of the familiars. The ordinary result of this was, that he was arrested a second time, and then began the lingering process of the Inquisition proper. This was conducted in general accordance with the prescriptions which are found in the *Directorium Inquisitionum* of NICOLAUS EYMERIC (which see). If the prisoner refused to confess at the first hearing, he was remanded to prison, and after the lapse of several months was required to make oath before the crucifix that he would acknowledge the whole truth. If he refused to do this, he was condemned without any further evidence. If he took the oath, leading questions were put to him well calculated to entangle him. The legal counsellor was not to act in the interest of his client, nor see him in private, but was to urge him to the confession of the truth. The accused was not to know who were witnesses against him. Their testimony was received on their unsubstantiated word, and was laid before the accused in such a fragmentary form as was necessary to keep him ignorant who his accusers were. Even in this shape it was frequently postponed for years. Any one was received as witness against him. Two hearsay witnesses counted as one eye-witness. The testimony of the informer himself was admitted. The domestics and the family of the accused were allowed to testify against him, but not in his favor. If, after all this, the attainted one stood firm in his refusal to confess, he was subjected to the three grades of torture—the cord, the water, and the fire—under the direction of the inquisitors and the bishop of the diocese. If the wretched being was brought to confession, he was put to the torture a second time to ascertain his motives. A third time he was tortured to lead him to betray those who were his accomplices and sympathizers. When everything had been extorted from him he was left to his anguish without medical care. After these confessions he was regarded as a penitent, but a solemn abjuration was required of him. If it was his acts which had brought upon him an imputation of heresy, his abjuration was said to be *de levi*—"from a light suspicion." If after the testimony of two witnesses he had acknowledged himself guilty of Judaism or heresy, it was *de vehementi*—of a grave or violent suspicion. If he made his peace with the Church, including a promise voluntarily to subject himself to all the punishments which might yet be in reserve, it was *in forma*. The person convicted was generally condemned to imprisonment or to the galleys for life, his goods were confiscated, and his family stamped as infamous. Any one who both confessed and abjured was punished by being compelled for a fixed period to wear over a black undergarment the *sambenito* (the French form of the word is *san benito*), a sleeveless coat, with a red St. Andrew's cross (substituted by Ximenes (1514) for the ordinary cross) on its back and breast. The penitent (*sambenitado*) who attempted to lay off this coat before the time appointed was punished as impenitent. When the time of his penance was over the coat was hung up in the church, with his name and a statement of his offences attached to it. Relapse into his crime was punished with death. If the three grades of torture failed to extort a confession, the accused was thrown into a more wretched prison. Of prisons there were three grades—public, intermediary, and secret. If even this produced no results, the opposite policy was tried. Relatives and friends were permitted to see him; the hope was excited in his mind that a penitent confession might yet secure pardon or pity for him. If any one died under suspicion, or if suspicion was first excited after his death, the trial went on as if he were living. If forty years had passed between his decease and his conviction, his heirs retained his property, but were infamous and incapable of bearing public office. If the remains of the suspected dead could be found, they were burned; if not, the burning in effigy was substituted.

When the various formalities had been gone through the *AUTO-DA-FÉ* (which see) was held. The most appalling feature of this, and the most attractive to the thousands whom it brought together, was the burning to death of the condemned. But the autos-da-fé were not exclusively scenes of death. In some there were no executions. Relief was brought to burdened hearts by the announcement of release or penance, or of punishments short of death, and the tenderer passions, as well as the fiercer, drew crowds together. The autos-da-fé were a climax to the solemn autos of the religious drama. They were dramas of awful realities, and seemed to the people an epitome and anticipation of the terrors and pardons of the Last Judgment. In the seventeenth, and yet more in the eighteenth, century these "acts of faith" became rarer. The material had been relatively burned out. But, more than this, better convictions as to the true mode of dealing with error had become more general. The penalties were executed privately. The tribunal lost more and more of its most dreadful characteristics, and finally came to fight with books rather than with men.



Charles III. (1759-88) imposed legal restrictions on it. No final sentence could be passed without the concurrence of the king, and no new regulations could be established without his sanction. The grand inquisitor was relegated (1762) to a monastery for condemning a book contrary to the wishes of the king. Count Aranda, minister of state, limited the powers of the Inquisition still further in 1770. Though Aranda was overthrown in 1773 by the influence of the clergy, public opinion sustained the spirit in which he had acted toward the Inquisition. The pope himself ordered various restrictions of its powers. By an edict of Joseph Bonaparte, issued from Madrid Dec. 4, 1808, it was abrogated as prejudicial to the civil government. From the period of its introduction in its later form into Spain (1481) to the time of its abrogation (1808) it is estimated by Llorente that the Inquisition had burned alive 31,912 of those whom it had tried, had burned in effigy 17,659, and had inflicted severe punishments of other kinds on 291,466 persons. These direct sufferings involved sorrow and calamity to millions. On the return of Ferdinand VII. to the throne (1814) he restored the Inquisition. In the revolution of 1820 one of the first objects of the popular fury was the Casa Santa, the palace of the Inquisition at Madrid. The tribunal itself was again abolished by the Cortes. The clerical or "apostolic" party considered the restoration of the Inquisition a matter of vital necessity, and labored energetically to bring it about. In 1825 a junta favorable to the Inquisition came in, and in 1826 the Inquisition was re-established in Valencia. After the death of Ferdinand VII. (1833), the law of July 15, 1834, again abolished it, and by a royal edict of 1835 its property was confiscated and devoted to the payment of the public debt. In the new constitution of 1855 the Roman Catholic religion is established by law, private freedom of faith is protected from persecution, but liberty of worship is not granted. In spite of this, in 1857 very active proceedings were entered into against all persons and books suspected of the taint of Protestantism. By the new constitution of 1869 the nation binds itself to sustain in good faith the Roman Catholic worship and the Roman Catholic clergy. Foreigners of other confessions resident in Spain are tolerated in both the private and public rights of religion, limited only by the general rules of morality and law. Spaniards who forsake the Roman Catholic faith are tolerated under the same general provision.

2. *The Netherlands.*—From Spain, where the Inquisition had been so efficient an instrument of the state, Charles V. (1516-56) and Philip II. (1556-93) endeavored to transfer it to the Netherlands, to be used against the Reformation. "The number of Netherlands burned, strangled, beheaded, or buried alive in obedience to the edict of Charles V. . . . has been placed as high as 100,000 by distinguished authorities, and has never been put at a lower mark than 50,000. Charles was no fanatic. It was political rather than religious heterodoxy which the despot wished to suppress." (Motley, *Rise of the Dutch Republic*, i. 111.) The result of the policy of which the Inquisition was a pre-eminent part was the revolt of the Netherlands. After an eighty years' war, in the course of which millions of lives were sacrificed, the country almost depopulated by the savagery of Alva, the remnant of the people condemned to death in a mass by the Inquisition, the institution of horror was rooted from the land, and the land itself lost for ever to Spain. The Jew lives, Protestantism lives, free government lives, but the system centring in the Spanish Inquisition, robbing of life all to which it clung, lies, a withered parasite, on the tree it exhausted. (See Prescott, *Philip II.* (1855), and his edition of Robertson's *Charles V.*; Brandt, *Hist. of Reformation in Holland* (1671); Motley, Llorente, Poignblanch.)

3. *America.*—Soon after the discovery of America the Spaniards introduced the Inquisition into it. Mexico, Carthage, and Lima were the principal seats of its jurisdiction. (See Prescott's *Mexico and Peru*.)

4. *Portugal.*—The Inquisition was introduced into Portugal under Spanish domination (1557) after a protracted resistance. Its supreme court was in Lisbon. The grand inquisitor was nominated by the king and confirmed by the pope. John IV. of Braganza, after the liberation of his country from the Spanish "sixty years' captivity" (1646), was anxious to abolish the Inquisition, and withdrew from it the right of confiscation. John himself was put, after his death (1656), under the ban, and not for some time was a solemn absolution pronounced over his body. The Portuguese Inquisition exhibited special severity in the East Indies: Goa was its centre. Pombal (1750-82), repressed or used the Inquisition as might best promote his political reforms. Nevertheless, by his influence the Inquisition was obliged to state the charge and give the names of the witnesses to the accused, who was entitled to the choice of a lawyer as his advocate, and had the right of conferring with him. No

sentence could be executed until it was confirmed by the royal council. John VI. (1792-1826) abolished the Inquisition both at home and in the colonies. Don Miguel (1828-34) showed a strong disposition to restore it, but was not able to do so. The world over, the Inquisition, in both its forms, has fallen. Whatever may be the difference in their details, the historical conditions of its life in both forms are substantially the same.

IX. *Defences of the Inquisition.*—Paramo, in his work on the *Sacred Inquisition* (1598), treats of its "dignity and utility," and in 1599 he published an answer to the objections made against it. But the best defences of the Inquisition belong for the most part to the period of its decline and extinction. The two best known are from the hands of Count de Maistre and of Hefele. So far as these defences rest upon the exposure of the confusion in classification and mistakes in facts fairly chargeable upon writers on the Inquisition, they will be found accepted and embodied in this article. Baudri has very compactly and forcibly presented the argument for his Church in these words: "There are three points which we are carefully to hold in view: I. As a distinctly spiritual institution for the preservation of purity of faith and sound discipline the Inquisition needs no vindication. In this aspect it is wholly correspondent with the plan and spirit of Christ. II. When it has been united with the civil power, or has been shaped into a state Inquisition, as in Spain, it was the State, not the Church, which sought the conjunction. III. As to the abuses and abominations of the Inquisition, the reply to be made is, first, that these have sometimes been overstated; further, that what are called the victims of the Inquisition were either common criminals, who would have been punished in accordance with the laws and spirit of the time had there been no Inquisition, or if they were heretics they were punished by civil law as offenders against the public weal." In *Allgem. Kirch. Lexik.*, v. Asebaeh (iii. 480, 1850), Hefele has argued on the same general basis, and with great circumstantiality of detail in *Cardinal Nimmest* Tüb., 1844; 2d ed. 1851, pp. 257-370; Eng. transl. by Dalton, 1860, 276-400) and in his article "Inquisition" in *Wetzer und Welte's Kirchen-Lexikon* (1850). The main points made by him, and the spirit in which they are received by intelligent Protestants, are well presented by Herzog: "Hefele has made the effort to put the Spanish Inquisition in its true light. He has done this partly by showing that its character was rather political than ecclesiastical, partly by exposing unjust crimination of it, and partly by correcting mistaken allegations as to its procedures. Such an effort deserves, in general, a thorough acknowledgment and praise. It is not fair to paint the Spanish Inquisition blacker than it really was. In its very nature, without a single touch of the pencil, its hues are sombre enough. It is especially necessary to bring into relief the influence exercised upon the Spanish Inquisition by the royal authority, and, we might add, by the national character. Hefele begins by carefully showing that the Inquisition was at once the creature and the organ of the royal absolutism. It is undeniable that, at the beginning especially, it was this in a higher degree than it was an ecclesiastical institution. (The conference between the king and the grand inquisitor in Schiller's *Don Carlos* rests, therefore, upon a mistaken impression as to their mutual relations.) On this ground Hefele relieves the Church of all the odious and fearful associations which cling to the name of the Inquisition. He then points out carefully how often and how strongly, though usually without result, the popes endeavored to put a check upon the cruel and iniquitous acts of the Inquisition. There has been, in fact, no other institution of the Catholic Church on which the papal censures have been so earnestly and repeatedly directed. No fact could more strikingly illustrate the spirit of the Spanish Inquisition, and show the pertinacious severity of its procedure: for it will hardly be maintained by Catholics themselves that the tendency of the popes has been toward undue leniency toward those who refused obedience to the Church. Hefele goes on to correct the excessive estimates of the number of the victims of the Inquisition. He corrects the chief mistake which Llorente made on this point when he stated that Torquemada alone, in the first year of his administration at Seville, burned to death 2000 persons, whereas according to Mariana these 2000 are to be divided among all the years of his rule and the whole body of inquisitorial tribunals under him. The words of Mariana quoted by Hefele do not, however, necessarily bear the sense he puts on them: *A Torquemada memorant duo milia et octingenta*, etc. (Mariana, xxiv. 17.) Hefele further directs attention to the fact that the procedure of the Inquisition, in fact its entire method, was no worse, and indeed was in many respects far milder, than that of the criminal law of the era, whose severity and inhumanity are beyond dispute. True as this is in general, yet we must be careful not too readily to infer



that the course of procedure was always in keeping with special mitigations. It is in this as in other parts of the same system, which in the written account wear a less repulsive air, but in which the contrast is great between theory and practice. The method, for example, by which the rule that forbade more than one application of the torture was evaded, shows of how little value were those mitigations on which Hefele relies. The wretch who had been almost tortured to death was allowed to rest for a couple of days until he was sufficiently recovered to endure new tortures. This was styled the interruption and resumption of the one torture. But why need we argue? Sad as is the theme, yet it is hard to avoid a smile when Hefele treats as if it were made in serious earnest the official request of the inquisitors, when they gave over the condemned to the civil power, that their lives should be spared, and puts it exclusively to the account of the secular power that this petition sank to an empty formality. It seems that even in Germany there is a man who could persuade us that in those days the maxim was held in good faith, *Ecclesia abhorret a sanguine!*—The Church shrinks from bloodshed! Hefele further adopts the opinion of Joseph le Maistre that the Inquisition was not detrimental to the intellectual life of Spain—an opinion with which Huber, a Protestant author, has recently concurred. The clumsy manner in which the opposite view has often been maintained gave some color to this opinion. The commission of the Cortes which (1812) introduced the motion to abolish the Inquisition, for example, says, 'From the moment the Inquisition appeared authors vanished.' There is no disputing that precisely at the time at which the Inquisition entered on its work, there began in Spain an active intellectual life, and that even poetry bloomed in new beauty. Hefele of course does not go to the extreme of regarding this as the work of the Inquisition, but he claims that it proves that the Inquisition did not have the repressive effect charged on it. But in the nature of the case it was involved that the fruits of the Inquisition could only ripen at a later period. Is it necessary to say what these fruits are? What has Spain been for the last two centuries? In answering this question we must indeed be careful not to charge all the misery of Spain on the Inquisition. Nevertheless, so much stands fast that the ecclesiastical and political absolutism by which Spain has been sunk so low has been bound up with the working of the Inquisition. But Hefele goes on, and it is impossible to avoid a feeling of profound astonishment when we read that the Inquisition so far wrought beneficently when, as with an inspired vocation, it saved Spain from innumerable errors and heresies, and from the horrors of the religious wars occasioned by the Reformation. Hefele does not indeed put forth these views directly. He urges them not in his own name, but under the authority of the most cultivated, the noblest intellects among the authors of Spain. It is clear, however, that he is not ready unreservedly to contradict them, and though he does not entirely adopt them, yet there is an unmistakable effort on his part to commend them as judgments which carry with them great weight. That a German Roman Catholic, who should be familiar, alike from history and personal observation, with the happy influence which Protestantism has exercised on Roman Catholicism itself, should envy Spain the repose of the grave, once deep, but now long broken, proves most clearly that the old spirit of Roman Catholicism is not extinct. This, indeed, is made manifest by many other signs of the times. Hefele also reviews the work of Llorente. That this book is fairly open to many sorts of censure is demonstrated, and yet it may be said that Hefele involuntarily becomes its apologist, for every fact which he adduces to set the Inquisition in a fairer light is drawn from Llorente himself. This shows very clearly that Llorente's work was not written purely for the making out of a case." (*Real-Encyclopädie f. protest. Theologie u. Kirche*, 1856, vi. 690-692.)

X. *Bibliography and Literature*.—The bibliography, direct and collateral, of the Inquisition is large. Lists of the most important works will be found in Lipenius, *Bibl. Theolog.*, 1685, ii. 100; ib., *Bibl. Philos.*, 1681, i. 133; ib., *Bibl. Jurid.*, 1679, 234; Walsh, *Bibl. Theol. Sci.*, 1758, 62, ii. 119; iii. 737; Nölsch, *Americ. u. K. Bücher*, 1800, s. 550; Fuhrmann, *Handbuchbuch Religi. u. Kirchengesch.*, 1828, ii. 48; Winer, *Handbuch Theol. Literat.*, 1838, i. 696; Grässe, *Lehrb. d. Lit. u. Gesch.*, 1840, ii. 1, 3; Danz, *Univers. Wörterbuch*, 1848, 43; Clarendon, *Biblic. Studies Assistant*, Edinb., 1844, 48; Poole, *Index to P. Test. L. t.*, 1853, 240, 457; Denis, Pinçon, Martonne, *Nouv. Man. de Bibliogr. Universelle*, 1857, ii. 39; Pierer, *Univ. Lexik.*, 1859, vii. 928; Pérennès, *Dictionnaire d. Bibliographie Catholique*, 1859, iii. 545, 571; Brunet, *Manuel du Libraire*, 1860, vi. 1164; Malecom, *Theological Lexicon*, 1868, 241; Kurtz, *Lehrbuch d. Kirchengesch.*, 1874, i.

374, 399. Among the most important works may be mentioned: (1) those which are documentary, embracing rules, methods of procedure, and instructions. *Questiones* (Fifteen Questions for the Inquisition) prepared by Cardinal Falcodi, afterwards Clement IV. (1265-68), edited with the annotations of Carrera, and his treatise of the mode of procedure in the Holy Office (1641), with the *Praxis inquisitionum* of Pegna, and additions by Carrera (1669). Clement V. (1305-14) presented to the council at Vienne (1311-12) special instructions for the inquisitors. These form a part of the *Decretales*, v. iii. l. 2, 3; *Corpus Juris*, Colon. Mun. 1730). Eymeric, for forty-four years inquisitor-general of Aragon (d. 1399), wrote the *Directorium Inquisitionis*. The first part gives the ancient Church laws and decretals; the second part, the papal laws concerning heretics and inquisitors; the third part details the methods to be observed by the inquisitors: first published 1503, with commentary of Pegna, 1578. Simanca, *Praxis hæresicon*, Venet., 1568-73; ib., *De Catholicis Institutionibus*, 1575; Reuss, *Sammlung* (Collection of Instructions from the Spanish, collected by order of Cardinal Manrique), with a sketch by Spittler, 1788. 2. Histories: *Nigamas*, 1582; Paramo, 1598; Marsollier, 1613; Limborch (best of the old works), 1692. *Mémoires*: 1716, Baker, Tiffensee, Baumgarten, 1741; Cramer, 1784; *Raisons*, *Erzähl.*, 1784; *Causas Vilesas* *francesas*, 1827; *Rule's History of the Inquisition from its Establishment in the Twelfth Century to its Extinction in the Nineteenth*, 1874. The French Inquisition, De la Mothe-Largon, 1829; the Venetian Inquisition, Paul (Sarpi), 1638; the Spanish Inquisition, Gonsalvi, 1567; Arnold, 1609; Ursinus, 1611; Böbel, 1692; *Inquisition in Spanien u. Achtenstücken*, Leipzig, 1810; Puigblanch, *Inquisition Unmasked*, tr. by Walton, 1816; Llorente, 1815, 1818, 1829; De Maistre, *Letters and Chapters*, *Espanade*, 1822; Hefele, *Nigamas*, 2d ed. 1851; transl. by Dalton, 1860. The Portuguese Inquisition, Heredia, 1858; at Goa, Delton, 1668. The histories of the heretics, councils, martyrs, the papacy, the religious orders, are of importance here. The best general church histories are also useful. Among those of the most importance on the history of the Inquisition are Bzovius, Spodanus, Raynaldus, and Fleury among the Roman Catholic writers, and Mosheim and Schrückh among Protestant church historians. Some of the monographs on special eras and particular nations are also important: Brandt's *Netherlands*, Milman's *Latin Christianity*, MacCrie's *Spain and Italy*, Ranke's *Popes*, the works of Prescott and Motley. Prescott's statements in regard to the Inquisition have been reviewed by Archbishop Spalding, *Miscellanea*, 1866. A thorough history of the Inquisition is greatly needed. Mr. H. C. Lea, of Philadelphia, is engaged upon such a work, which will doubtless prove worthy of the distinguished reputation he has won by his other monographs on ecclesiastical history. C. P. KRAUTH.

*In Rem* [Lat., "against the thing"], a technical legal term used to designate an action or proceeding directly instituted against the thing or property the title to which is in question, or upon which some lien or claim is made, or to denote the judgment or decree which is the result of such an action or proceeding. It is also applied to decisions directly determining the legal status of a party before the court with reference to marriage, divorce, bastardy, settlement, and other similar personal relations. Actions against the person, which are the ordinary forms of suit in courts of general jurisdiction, are termed, by way of contradistinction, proceedings *in personam*. Suits *in rem* frequently occur in courts of admiralty and in proceedings under revenue laws. Of this nature are proceedings for the enforcement of maritime liens against a vessel or cargo, for the recovery of salvage, for the condemnation and forfeiture of property on account of a violation of the revenue laws, or as prize in time of war, and, in general, all actions in admiralty where a claim is made directly against specific property. The title which such an admiralty cause receives indicates that the action is *in rem*, since the property is represented as if it were made defendant in the proceeding, as, e. g., "The U. S. vs. The Ship Osprey." The proceedings to enforce the judgment or decree of the court in such cases are confined to the property which is made the subject of the claim in the action. On the contrary, in suits *in personam* the judgment of the court is carried into effect by the levy of an execution, and all the property of the defendant, with the exception of a few classes of articles exempted by statute, may, if necessary, be sold to satisfy the judgment. A judgment or decree *in rem*, whether the suit be against specific property or with reference to personal status, is, in general, binding and conclusive, not only upon the parties in the cause, but upon all persons. It will, subject to some exceptions, be deemed valid and binding in foreign countries if the court by which it was rendered had jurisdiction of the proceeding. The judgment may, however, be invalidated unless it were obtained *bonâ fide* and



without fraudulent means, and unless the suit was conducted with an observance of the regular and requisite forms. Whatever disposition, therefore, a court having jurisdiction makes of property by a judgment *in rem*, or whatever determination it makes in regard to *status*, settles the question generally as to all the world. This obligatory force of judgments *in rem* is based chiefly upon considerations of public policy, since it is desirable that the title to property which has been the subject of litigation should not be left doubtful, and also that the personal relations of every member of the community should be definitively settled. (See JUDGMENT.) This doctrine also rests partly upon the ground that in most cases in which judgments of this kind can be rendered all persons who have any interest in the subject in controversy may appear and assert their rights. GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Insanity**: [Lat. *insanitas*, "unsoundness"] is a manifestation of disease of the brain, characterized by a general or partial derangement of one or more faculties of the mind, and in which, while consciousness is not abolished, mental freedom is perverted, weakened, or destroyed. An essential feature of the definition here given is, that insanity depends upon a diseased condition of the brain. It is therefore only a symptom, like paralysis, coma, or any other phenomenon of cerebral disorder; but as we cannot in the present state of our knowledge affirm with any degree of accuracy what part of the brain is affected in any given case of insanity, or even say how it is disordered, we are obliged to take the manifestation for the disease. It is not many years ago that cough was regarded as a disease, and by many paralysis still is. In reality, these are symptoms referable to disease of some part of the respiratory or nervous apparatus, and are not diseases in themselves. But it is questioned by some even at the present time whether insanity may not exist and the brain be in a perfectly healthy condition. The relation of mental aberration to cerebral derangement certainly cannot be invariable, unless the normal mind is directly dependent upon a normal state of the brain. If, however, it can be shown that the mind comes from the brain, or, what amounts to the same thing in physiology, is manifested through the brain, it follows logically, as well as pathologically, that insanity is the result of cerebral disorder. The proofs of this relation are the following:

(1) The action of an organ, even within the limits of health, frequently gives rise to sensations of various kinds, and slight functional derangements are very distinctly felt. Thus, the pain of indigestion is referred to the stomach or bowels, as the case may be; difficulties with the urinary excretion are accompanied by uneasiness in the kidneys; derangements in the secretion of the bile are often only indicated by pain in the liver; loud noises produce unpleasant feelings in the ears, and excessive or improper use of the eyes causes pain in these organs. So it is with the brain. Though ordinarily we are not conscious of any particular sensation when we use it in thinking (and the same is true, *mutatis mutandis*, of the other organs mentioned), yet inordinate mental exertion gives rise to headache, vertigo, and other derangements of sensibility referable to the brain. In some persons even slight mental action invariably produces pain in the head, and it is well known that the brain becomes diseased when it is unduly taxed, just as does the stomach, the eye, or a muscle.

(2) Injury or disease of the brain impairs in some way or other the powers of the mind. A blow on the head causes confusion of ideas, and if hard enough may destroy consciousness or the power of thought altogether. A piece of bone or a bullet pressing on the brain likewise destroys the ability to think; and though examples are not wanting of terrible wounds of the brain in which there is for a time no well-marked impairment of the mind, careful examination will reveal the existence of deterioration from the first, and eventually the patients die with head-symptoms. The various diseases of the brain likewise produce at some time or other of their course derangement in the evolution of mind, and insanity is generally shown after death to have been accompanied by structural changes in the brain.

(3) The action of the brain, like the functioning of

other organs, results in the disintegration of its substance, and this destruction of tissue is in direct proportion to the amount of mental work done. We find, therefore, that the alkaline phosphates, which are mainly derived from the destructive metamorphosis of the nervous tissue, and which are excreted by the kidneys, are increased in quantity after severe intellectual labor, and are diminished by mental quietude. In a memoir published several years ago I gave the results of experiments performed upon myself, which show very conclusively that increased use of the brain causes increased decay of its substance.

(4) The size of the brain is well known to have a direct relation to the intelligence of the individual; and when all other conditions are alike it may be said that the largest brain will produce the greatest amount of mental energy. Quality is, however, an important factor, and when with great size there is also a large amount of gray matter, the intellectual capacity is at its maximum. Thus, Dr. Thurman has shown that the average weight of the brain in Europeans is 49 ounces, while in ten men remarkable for their intellectual development it was 54.7 ounces. Of these, the brain of Cuvier, the celebrated naturalist, weighed 64.5 ounces, Spurzheim's 55.06, and Daniel Webster's 53.5. On the other hand, the brain is small in idiots. Of three idiots whose ages were sixteen, forty, and fifty years respectively, Tiedemann found the weight of their brains to be 19½, 25½, and 22½ ounces. Mr. Gore has reported the case of a woman forty-two years of age whose intellect was infantile, who could scarcely speak a few words, whose gait was unsteady, and whose chief occupation was carrying and nursing a doll. After death her brain was found to weigh but 10 ounces and 5 grains. Mr. Marshall has also reported a case of microcephaly in the person of a boy twelve years old whose brain weighed but 3½ ounces. The convolutions were strongly marked, though narrow and few in number.

(5) Experiments performed upon the nerves and nerve-centres show that from the brain proceeds the force by which muscles are moved, and that it is the organ by which sensations are perceived. Thus, division of a nerve supplying a certain muscle cuts off the connection between the brain and that muscle, and hence the will can no longer cause it to contract. Division of the optic nerve prevents the perception of visual images, and so likewise for the other nerves of special sense.

From all of which considerations the connection between the brain and the mind is as clearly made out as any other fact in physiology. The mind differs from forces in general in being compound—that is, in being made up of several other forces. These are perception, the intellect, the emotions, and the will. All the mental manifestations of which the brain is capable are embraced in one or more of these parts. Either one of them may be exercised independently of the other, though they are very intimately connected, and in all continuous mental processes are brought more or less into relative and consecutive action. As constituting the basis of the classification of the several forms of insanity to be considered in this article, it is expedient to describe briefly these four sub-forces of the mind.

1. *Perception*.—By perception is to be understood that part of the mind whose office it is to place the individual in relation with external objects. For the evolution of this force the mind is in intimate relation with certain special organs which serve the purpose of receiving impressions of objects. Thus, an image is formed upon the retina, and the optic nerve transmits the excitation to its ganglion or part of the brain. This at once functionates, the force called perception is evolved, and the image is perceived. If the retina be sufficiently diseased the image is not formed; if the optic nerve be in an abnormal condition, the excitation is not transmitted; if the ganglion be disordered, the perceptive force is not evolved. Like reasoning is applicable to the other senses, hearing, taste, smell, and touch. Perception may be exercised without any superior intellectual act—without any ideation whatever. Thus, if the cerebrum of a pigeon be removed, the animal is still capable of seeing and of hearing, but it obtains no idea from these senses. The mind, with the exception of perception, is lost.

2. *The Intellect*.—In the normal condition of the brain the excitation of a sense and the consequent perception do not stop at the special ganglion of that sense, but are transmitted to a more complex part of the brain, where the perception is resolved into an idea. Thus, the image impressed upon the retina, the perception of which has been formed by a sensory ganglion, ultimately causes the evolution of another force, by which all its attributes capable of being represented upon the retina are more or less perfectly appreciated according to the structural qualities of the ideational centre. To the formation of the idea several important faculties and modes of expression of the

\*The writer of this very able article has employed the language commonly used by the school of physiologists who hold the doctrine of the correlation of mental and physical forces. To those who, like the editors of this work, do not entertain that view, the interest of the article will not be impaired by this circumstance; while those to whom the doctrine is acceptable will esteem it on this account as more strictly in harmony with the actual state of advanced physiological science. It is to be observed that the writer, and many others who regard the mind as a function of the brain, disclaim the imputation of materialism cast upon them by some; and this disclaimer should be considered in judging of their modes of speaking.—EDS. JOHNSON'S CYCLOPEDIA.



intellect contribute. Thus, if we suppose the retina to have received the image of a ball, a higher ganglion converts this into a perception, and a still higher one into an idea; and this idea relates to the size, the form, the color, the material, etc. primarily, and to the origin, uses, ownership, etc. secondarily. In gaining this conception of the thing impressed upon the retina, the memory, judgment, and other faculties of the intellect are brought into action, and the process of reasoning is carried on.

3. *The Emotions*.—An idea in its turn excites another part of the brain to action, and an emotion is produced, or this last-named force may be evolved under certain circumstances without the intermediation of the idea, but solely from the transmission of a perception to the emotional ganglion. An emotion is that pleasurable or painful feeling which arises in us in consequence of sensorial impressions or intellectual action. According to Bain, the word *emotion* is used to comprehend all that is understood by feelings, states of feeling, pleasure, pain, passion, sentiments, affection, etc. Within the limits of health the emotions act powerfully on certain organs of the body, and thus express their own activity. Thus, grief is exhibited by the flow of tears from the over-excitation of the lachrymal gland; extreme joy may also cause weeping; the jaw falls and the angles of the mouth curl downward in mortification or sorrow, while in pleasure the face expands laterally. The eyes, the nose, and the mouth are the three facial centres from which emotional expression is mainly produced. Other organs of the body, as the salivary glands, the heart, the mammary glands, the liver, the kidneys, and in fact nearly every viscus of the body, may exhibit the effects of emotion by the transmission of excitations through the sympathetic nerve. Most of the resulting effects are due to the fact that the sympathetic nerve especially presides over the vaso-motor system, and thus regulates the calibre of the blood-vessels.

4. *The Will*.—By volition acts are performed. Some acts are automatic, but all done in consequence of intellect are the result of willing, and are for some specific purpose connected with an idea. Volition in the series of mental manifestations may precede emotion, but it always follows perception and ideation.

To sum up these outlines: a person walking in the street sees a man on the opposite side of the way—*perception*; he recognizes him as a friend whom he has not met for many years—*intellect*; he determines to go across and speak to him—*will*; he does so, and exhibits joy at the reunion—*emotion*. Or, to alter the sequence somewhat, a person at a theatre sees and hears an actor on the stage—*perception*; the attitudes, gestures, and words of the player call up certain ideas—*intellect*; he is moved to great joy or grief—*emotion*; and determining to recognize the ability of the actor—*will*—claps his hands or throws him a bouquet.

In individuals whose brains are well formed, free from structural changes, and are nourished with a due supply, neither excessive nor deficient, of healthy blood, the perception, the intellect, the emotions, and the will are manifested in a manner common to mankind in general. Slight changes in the formation or nutrition of the brain induce corresponding changes in the several parts of the mind or in it as a whole. As no two brains are precisely alike, so no two persons are exactly alike in their mental processes. So long, however, as the deviations are not directly at variance with the average human mind, the individual is sane; if they are at variance, he is insane. But within the limits of mental health marked irregularities are met with in different parts of the mind. Thus, some persons are noted for never perceiving things as the majority of people perceive them; others have the emotional system inordinately or deficiently developed; others are weak in judgment, defective in memory, feeble in powers of application or vacillating in their opinions; others, again, are lacking in volitional power—in the ability to perform certain acts, to refrain from others, or to follow a definite course of action which the intellect tells them is expedient or wise. Persons whose minds deviate in some one or more notable respects from the ordinary standard, but yet whose mental processes are not directly at variance with that standard, are said to be *eccentric*. It is not always easy to draw the line between strong eccentricity and mild insanity. About the former, however, there is this marked characteristic—that its manifestations are according to a fixed system, are not founded on delusions, and are generally excited by those emotions or desires which are reflected back to the individual, such as pride, vanity, the love of approbation or of notoriety, etc. Eccentric persons stand upon the verge of insanity, with a decided predisposition to mental disease, and ordinarily if they do not pass the limit it is for want of a sufficient exciting cause. Instances of eccentricity passing into positive insanity are common enough, and inquiry will frequently disclose the fact that the insane have

been eccentric for several years before becoming affected with cerebral disease to such an extent as to produce decided mental aberration.

Many classifications have been made of the various phenomena met with in insanity. Obviously, the only proper arrangement would be one based on the actual brain-lesions, but in the present state of our knowledge it is impossible to make such a one. We cannot say, for instance, that when an individual has a delusion, such or such a part of his brain is affected, nor that when he is melancholic another part is involved. We are obliged, therefore, either to arrange the symptoms into groups without any philosophical basis, or to classify them according to the relation which they bear to the several parts of the mind. Following this latter plan, we have—I. *Perceptual insanity*, characterized by the tendency to the formation of erroneous perceptions, either from false impressions of real objects (illusions), or from no external excitation whatever (hallucinations). II. *Intellectual insanity*, characterized by the existence of delusions. III. *Emotional insanity*, characterized by the uncontrolled or imperfectly controlled predominance of one or more of the emotions. IV. *Volitional insanity*, in which there is an inability to exert the full will-power, either affirmatively or negatively. V. *Mania*, characterized by the union of two or more of these forms in the same individual. VI. *General paralysis*, a peculiar form of insanity attended with progressively advancing loss of mental and motor power. VII. *Idiocy and dementia*, the first due to the fact that there are original structural defects in the brain; the second resulting from the supervention of organic changes in a brain originally of normal power.

Before proceeding to describe these several types, it is necessary to touch upon certain important symptoms of mental disorder, the character and import of which must be clearly understood. These are illusion, hallucination, delusion, incoherence, and delirium.

*Illusion*.—An illusion is a false perception of a real sensorial impression. Thus, a person seeing a ball roll over the floor, and imagining it to be a mouse, has an illusion of the sense of sight; another, hearing the pattering of the rain on the roof, and perceiving in this sound the voice of some one calling him, has an illusion of the sense of hearing; another, having some bitter substance placed upon his tongue, and forming the perception of a sweet flavor, has an illusion of the sense of taste; and so on as regards the other senses. In all such cases there is a material basis for the perception, but this latter is not in exact relation with the former. Illusions are not always indicative of cerebral disorder; indeed, they are very common with all of us under certain circumstances. It is, perhaps, never the case that the perception is precisely in accordance with the real properties of the substance making the sensorial impression. We never see, hear, taste, smell, or feel things exactly as they are. This imperfection may be due to surrounding circumstances not being favorable. Insufficient light may thus make our vision imperfect; loud noises may render us incapable of appreciating gentle sounds; a strongly sapid substance previously rubbed over the tongue and fauces prevents our distinguishing delicate flavors; a powerful odor may make such an impression on the Schneiderian membrane that other odors for a long time smell like it; and exposure to very cold weather interferes markedly with the discriminating power of the sense of touch. Imperfect perceptions are often formed in consequence of the perceptive ganglia being otherwise occupied. Thus, if we are looking intently at some object of interest, we are apt not to attend to the sounds which reach our ears, and consequently no clear perception of them is formed. Illusions of all the senses, but especially of sight and hearing, are met with in insanity, and particularly in those acute forms characterized by the presence of delirium.

*Hallucination*.—A hallucination is a false perception without any material basis, and is centric in its origin. It is more, therefore, than an erroneous interpretation of a real object, for it is entirely formed by the mind. An individual who on looking at a blank wall perceives it to be covered with pictures has a hallucination; another who when no sound reaches his ears hears voices whispering to him also suffers from a hallucination; and such false perceptions may be created as regards all kinds of sensorial excitations. The organs of the senses, in fact, are not necessary to the existence of hallucinations. Thus, if the eyes be closed, images may still be seen; if the hearing be lost, voices may still be heard; and the reason for this is found in the fact that the erroneous perception constituting the hallucination is formed in that part of the brain which ordinarily requires the excitation of a sensorial impression for its functioning. Hallucinations are always evidence of cerebral derangement, and are common phenomena of insanity. They may be excited by emotions of



various kinds, by which the character or quantity of the blood circulating in the brain is changed, by intellectual exertion, by certain drugs, and many other factors to be presently more fully considered.

*Delusion.*—Illusions and hallucinations may exist, and the individual be perfectly sensible that they are not realities. In such cases the intellect is not involved. But if he accepts his false perceptions as facts, his intellect participates, and he has delusions. A delusion is, therefore, a false belief. It may be based upon an illusion or a hallucination, may result from false reasoning in regard to real occurrences, or be evolved out of the intellect spontaneously by the result of imperfect information or of an inability to weigh evidence or to discriminate between the true and the false. Delusions are not a test for insanity, as most lawyers and many physicians believe. If they were, one-half the world would be trying to put the other half in lunatic asylums. They may be present without co-existent insanity, and many cases run their course without them. To be indicative of insanity a delusion must be in regard to a matter of fact, and contrary to the customary mode of thought of the individual. Thus, a believer in Spiritualism is not necessarily insane because he sees and converses with the spirit of Benjamin Franklin, for his delusion is one not capable of proof or disproof, and it is a part of his mentality to believe in the existence of spirits and in the possibility of evoking them so as to see them and talk with them. But, if a non-believer in Spiritualism should imagine that he was in the habit of seeing Franklin's spirit, and of conversing with it, it would be good evidence of his insanity. And, further, though the Spiritualist might think he had interviews with Franklin, and still be sane, yet if he believed, without foundation and contrary to evidence, that his brother had tried to poison him, he would have a delusion sufficient to indicate insanity.

At a former period of the world's history a belief in the possibility of seeing devils and demons of various kinds, and of suffering from their torments, was commonly entertained. Indeed, it is religiously held now by a great many otherwise sensible people. Such a belief is, according to our mode of thought, a delusion, and probably nine-tenths of those who read this article will agree with me in so regarding it. But it certainly would not be safe to consider every one holding such a creed as insane. A like reasoning applies to the holders of every other form of belief not in accordance with our own. A delusion, to be indicative of insanity, must be such a belief as would not be entertained in the ordinary normal condition of the individual, must relate to a matter of fact, must have been formed without such evidence as would have been necessary to convince in health, and must be held against such positive testimony as would have in health sufficed to eradicate it. Insanity may exist without delusions at any time being present. Thus, there may be emotional insanity, the main feature of which consists of mental depression with an unreasoning tendency to suicide; or there may be volitional insanity, characterized by an inability to refrain from setting fire to neighbors' houses or from committing homicide.

*Incoherence.*—A person is said to be incoherent when the words he utters are without proper relation to each other, or when his language is not in accordance with his ideas. Incoherence is a prominent feature of delirium, and is sometimes met with in the chronic insane. It is directly due either to the impossibility of keeping the attention sufficiently long on one idea for its full consideration, or to a like difficulty in co-ordinating those parts of the brain which are concerned in the formation and expression of thoughts.

*Delirium.*—Delirium is that condition in which there are illusions, hallucinations, delusions, and incoherence, together with a general excess of motility, an inability to sleep, and an acceleration of pulse. In acute delirium these phenomena are well marked; in the low and chronic forms they are less strongly indicated. Sometimes one or the other of these elements notably predominates. Delirium is present in the early stages of acute mania, and may exist as an accompaniment of certain diseases of the brain which do not ordinarily cause insanity, such as cerebral congestion or anemia. It is also common in fevers and in several other disorders of the system.

*I. Perceptual Insanity.*—In uncomplicated perceptual insanity those parts of the brain only are disordered which are concerned in the formation of perceptions. It constitutes the primary form of mental aberration, and of itself is not of such a character as to lessen the responsibility of the individual or to warrant any interference with his rights. It consists entirely in false perceptions, and if the intellect is for a moment deceived, the error is immediately corrected. As already stated, these are either illusions or hallucinations. In some cases the erroneous perceptions may coexist in the same individual. They

may be related to all the senses, but are especially common as regards sight and hearing. Illusions, as already mentioned, are not necessarily due to any centric difficulty, though such an origin is common. Thus, it is an illusion if a person on looking at an object sees two images. This result is due to some cause destroying the parallelism of the visual axes, and may be produced by a tumor of the orbit or by paralysis of one or the other of the ocular muscles. Even in such a case, if the paralysis were due to central lesion the higher ganglia of the brain might escape implication. Illusions are often excited by emotional disturbances, and are then probably directly due to some derangement of the cerebral circulation. The false perceptions called hallucinations are of more importance than illusions in the symptomatology of insanity in general. In the purely perceptual form of mental aberration they are also exceedingly interesting, and are very often troublesome symptoms. Thus, a gentleman who had overworked himself in financial business was subject to hallucinations of hearing, which, however, did not in the least impose on his intellect. As he walked through the streets to his place of business he heard a voice continually whispering to him, "Take care! take care!" So strong was the impression made that he often involuntarily turned round to see who was speaking to him. In another case a gentleman saw images of various kinds as soon as his head touched the pillow, though they were never present when he was standing or sitting. The case of Nicolai, the German bookseller of the last century, is well known as remarkable, and others are afforded in the cases of Jerome Cardan, Pascal, and many other noted personages. Like illusions, the immediate cause of hallucinations is generally derangement of the cerebral circulation, either as regards quantity or quality. As is well known, they are frequently produced by alcoholic liquors, opium, belladonna, Indian hemp, and other drugs. They may also result from mental exertion and emotional disturbances, from an overloaded stomach, or may occur in the course of various diseases, especially those of a febrile or exhausting character. Perceptual insanity may make its appearance suddenly, the first evidence of its presence being the illusion or hallucination. Usually, however, there are prodromata indicating cerebral derangement. These are pain in the head, irritability of temper, suffusion of the eyes, noises in the ears, a general restlessness, and some febrile excitement. The skin is generally dry, the mouth parched, the bowels constipated, and the urine high-colored and scanty. If not arrested, it may pass into one or the other of the following types of mental aberration.

*II. Intellectual Insanity.*—The essential feature of intellectual insanity is delusion. It may be developed suddenly, or, as is generally the case, is preceded by evidences of cerebral disorder, which, though at the time of their occurrence not attracting particular attention, are called to mind by the observers after the disease has become fully developed. In the first stages of intellectual insanity it is not often that the delusions are fixed, and they may succeed each other with such rapidity that the patient resembles one affected with mania. They may be based on illusions or hallucinations, or may arise from the reasoning of the patient from purely imaginary premises not connected with the senses. Sometimes they are spontaneous, and at others they appear to come from dreams. Thus, a gentleman who had for several days been singular in his behavior awoke in the night and imagined that he saw his wife standing by his bedside with a phial of prussic acid, which she was about to empty into his mouth. The hallucination took such strong hold of him that he went into the adjoining room, where his wife slept, to see if she were there or not, and, though he found her sleeping quietly, he awoke her and accused her of having attempted to poison him. No amount of argument or persuasion could eradicate the false belief from his mind. Another for several days had been spending money very freely in articles of little or no use to him, when one morning he announced to his family that for several days he had been thinking a great mistake had been committed in his conception, and that his soul had got into the wrong body. He was therefore convinced that he was not the man he should have been, and hence he had done a great many things which were altogether repugnant to his physical senses; so long as the antagonism continued between his mind and his body there was no hope of any happiness for him in this world. In this case there had never been any hallucination or illusion of any of the senses. The delusion was therefore entirely the result of the patient's own perverted thoughts. When rapidly following each other, delusions are clearly spontaneous, are not the result of any series of thoughts, but come on the spur of the moment and upon very slight suggestions. As they are readily formed, they are not fixed in character. A lady, for instance, after receiving some very sorrowful



news relative to her husband, imagined that she had lost her eyesight. For a few hours she remained with her eyes shut, alleging that there were two deep cavities behind the lids. Suddenly she opened them, said she saw perfectly well, but that the top of her head had been cut off; and this was almost immediately changed to the belief that she was perishing with cold; and so on, no one delusion lasting longer than a few minutes. In many cases like this the erroneous beliefs are excited by sensations in various parts of the body, but this was not so in the present instance.

The connection between dreams and insanity is very close. Most of us have at times had such vivid dreams that they have been removed from our mind with difficulty. There appears to be no doubt that many of the delusions of the insane have dreams for their cause. The delusions of the insane are in a great majority of cases connected more or less directly with themselves. Thus, a person believes that his leg is made of glass, that his head is reversed on his shoulders, that he is some great personage, that a large fortune has been left to him, or that some misfortune has deprived him of his property or his friends. He will often reason logically and forcibly from the premises he has assumed, and will give no evidence of insanity outside of his delusion. Such cases are embraced under the term "reasoning mania," and the skill and acumen exhibited by persons thus affected are often surprising. When it is important, in their estimation, for them to conceal their delusion, they will often do so for a long time, and stratagems of various kinds are necessary to their speedy detection. Sooner or later, however, the delusion comes out.

The designation monomania can properly be applied to many of the cases of intellectual insanity. In the uncomplicated form of the disease it is rare, after it is fully established, that more than a single object or a small class of objects is the subject of the delusion. The delusions of the insane may be comprehended under two categories—those which are of a pleasant or exalted character, and those which are unpleasant or morbid. These usually leave their impress on the countenance of the patient, and his actions and manner are in accordance with them. It would be strange if this were not the case. The only guide which man has for his actions is his reason. He weighs arguments and motives, and determines according to the bearing which they may have on his mental processes. A delusion is, in many cases, simply a false premise; the conclusions which the individual draws from it are entirely logical. Taking, for instance, the case of the gentleman who had imbibed the idea that his wife had attempted to poison him, and admitting that he was correct in this notion, his subsequent actions—his denunciations, his refusal to live with her, his efforts to have her imprisoned, etc.—are perfectly reasonable. The line of conduct was such as most men would have pursued under like circumstances. In such cases, therefore, there is no fault in the intellectual process after the first step is taken. It is this first step which constitutes the disease; it is the delusion which enslaves the mind.

Intellectual insanity is often uncomplicated by any other form of mental derangement. There are no illusions, no hallucinations, no overpowering influence of the emotions, and no loss of control over the will. Even when the delusion is of such a character as apparently to be connected with some one of the senses, and thus to be based upon a false perception, full inquiry will often show that there is no error of the sensorial processes, centric or eccentric. Thus, a lady had the delusion that she had lost her palate, as she called it. A mirror was held to her face, and while she opened her mouth the fact was pointed out to her that all the parts were present. "Yes," she replied, "I see all that; the form is there, I know very well, but the substance is gone;" and no arguments could convince her to the contrary. A gentleman conceived that his right hand was made of glass, and therefore, to prevent its being broken, he kept it carefully enclosed in a stout case made to fit it accurately. On calling his attention to the physical qualities of his hand, and pointing out how they differed from those of glass, he said, "I once thought just as you do. My brain was then incapable of appreciating minute differences as well as it can now; and though I confess that my senses still convey to me the idea that my hand is like other people's, yet I know the conception is erroneous, and I correct it at once by my reason. My hand looks like flesh and blood, but it is glass for all that. Nothing is more calculated to deceive than the senses." Persons affected with uncomplicated intellectual insanity may go through the world without giving any considerable evidence of mental derangement unless the subject of their delusion be touched upon. Still, there is no telling to what extremes a delusion may carry its subject. Such a person, for instance, imagines that he is the emperor of

Russia. At first he does not comprehend the full importance of his supposed position, and if of moderate reasoning power, possessing deficient information, and naturally of a quiet disposition, he may never go further than dressing himself in some tawdry finery and strutting pompously through the wards of the hospital. But under other circumstances he reflects upon the greatness of his station, and thus from time to time conceives new ideas of his powers and importance, and may thus become a very troublesome patient. He comes to believe, perhaps, that he has the power of life and death, and may attempt to exercise his imaginary prerogative. Delusions in regard to relatives and friends are very common, and hence the conduct of the person entertaining them is changed as it relates to the objects of his erroneous ideas. It is a usual thing, therefore, for such an insane person to disinherit those who would naturally be heirs to his property. This point is of importance in its medico-legal relations.

Delusions may be of such a character as to affect the emotions secondarily. A very common delusion is that of having committed the unpardonable sin, and accordingly the patient suffers great emotional disturbance. This influence upon the emotions is perfectly natural and logical, for if the person really has committed a sin for which there is no hope of pardon, and has thus incurred the punishment of eternal damnation, it would be strange if the emotions of sorrow and despair were not excited into activity. Such cases, however, are not to be embraced under the head of emotional insanity; and though at first sight they may appear to be of that type, inquiry will reveal the fact of the pre-existence of the delusion.

III. *Emotional Insanity.*—The emotions are at all times difficult to control, but they may acquire such undue prominence as to dominate over the intellect and the will, and assume the entire mastery of the actions in one or more respects. This effect may be produced suddenly, from the operation of some cause capable of disturbing the normal balance which exists among the several parts of the mind, or it may result from influences which act slowly, but with gradually increasing effect. In either case there is not necessarily either delusion or error of judgment, but it very generally happens that the intellect sooner or later becomes involved. Emotional insanity may be produced without there being any discoverable cause, and without the patient being able to allege a motive. Some emotions are more frequently disordered than others. Those of a sorrowful character are pre-eminent in this respect, and when they are affected the type of insanity called melancholia is the result. This may be either acute or chronic in its course. The first is rarely uncomplicated, and hence will be more properly considered under the head of *Mania*. Homicide, suicide, and other crimes may be the result of emotional insanity as well as of intellectual insanity. The most common of these is undoubtedly suicide, the individual committing self-destruction in order to escape from the depressing influences which act upon him. A person, for instance, to cite the example previously given, imbibes the delusion that he has committed the unpardonable sin or that God has deserted him, and in consequence passes into a condition of settled melancholy, during which he may attempt self-destruction to escape from his harrowing thoughts, or commit a homicide in order that the same end may be accomplished by his being hanged for murder. Other emotions may of course be excited into morbid activity by derangement of the intellect. Delusional jealousy, anger, hatred, or love may thus urge their unfortunate victim to the perpetration of crime, plunge him into a depth of unhappiness from which there is no escape, or lift him into an ecstasy of bliss far exceeding that derivable from the realization of all his wishes.

Under the head of moral insanity, Dr. Prichard several years ago described a form of mental derangement which embraces several species which are now more properly placed under other heads. Several of these are clearly emotional in character, and most of them relate to altered modes of feeling or of the affective faculties, and therefore, in the largest sense of the word, may also be called emotional. Careful and thorough inquiry will, however, often show that the primary difficulty is one of defect, not of aberration or exaggeration, and that, therefore, these instances of deficient moral sense, leading the subjects to the perpetration of crimes of various kinds, should be classed under the head of imbecility. Many cases of what are called temporary insanity, mania ephemera, transitory mania, and morbid impulse are really instances of emotional insanity. That such a condition exists there can be no doubt, and it is important, both as regards the subject and society, to be able to recognize or to disprove its presence. A few words, therefore, on this point will not be out of place. The state with which transitory emotional insanity is most apt to be confounded is that which has been desig-



nated "heat of passion." Passion is emotional activity. It refers to that mode of the mind in which certain impressions or emotions are felt, and which is accompanied by a tendency or impulse, often irresistible, to act in accordance with these impressions or emotions irrespective of the intellect. An act performed in the heat of passion is one prompted by an emotion which for the moment controls the will, the intellect not being called into action. It is an act, therefore, performed without reflection. The passions are, to a certain extent, under the control of the will, and this power of checking their manifestations is capable of being greatly increased by self-discipline. Some persons hold their passions in entire subjugation; others are led away by very slight emotional disturbances. The law recognizes the natural weakness of man in this respect, and wisely discriminates between acts done after due reflection and those committed in the midst of passionate excitement.

The acts performed during temporary emotional insanity, in their more obvious aspects and when viewed isolatedly, resemble those done in the heat of passion. But they are so only as regards the acts themselves. Thus, a person entering the room at the very moment when one man was in the act of shooting another would be unable to tell whether the homicide was done in the heat of passion or under the influence of an attack of temporary insanity; he would be equally unable to say whether it was committed in malice aforethought or in self-defence. The act, therefore, by itself, can teach us nothing. We must look to the attending circumstances and to the antecedents of the perpetrator for the facts which are to enlighten us as to the state of mind of the actor. Now, the conditions of temporary emotional insanity are so well marked that the act which indicates the height of the paroxysm may almost be disregarded, for it is always preceded by symptoms of mental aberration, while acts done in the heat of passion are not thus foreshadowed. And as regards the subsequent state of the individual the distinction is equally apparent. The one who has committed a criminal act in the heat of passion soon subsides to his ordinary condition of equanimity, and generally begins to think of his safety. The one who has perpetrated a similar act during an attack of temporary emotional insanity never thinks of escape, nor even avoids publicity. He may even boast of his conduct or deliver himself into the hands of the law. What is, however, of greater importance is the fact that though he may subside into a condition of comparative sanity, the evidences of disease are still present, and remain in him for days, weeks, or even months and years. These symptoms are generally those of cerebral congestion, to which attention has already been directed. In the heat of passion the act follows immediately on the excitation of which it is the logical sequence. In temporary insanity the act is the culmination of a series of disordered physical and mental manifestations, and may or may not be in relation with the emotional cause. The distinction is therefore clear and precise.

IV. *Volitional Insanity.*—In uncomplicated volitional insanity there are no delusions and no emotional disturbances, but solely an inability to exert the will in accordance with the intellect. Many cases of morbid impulse are instances of volitional insanity, in which an idea suddenly flashes across the mind and is immediately carried out by the individual, although his intellect and his emotions are strongly exerted against it. Thus, a person who previously has not exhibited any very obvious symptoms of mental derangement—though careful inquiry will invariably show that slight evidences of cerebral disease have been present for some days—instantaneously feels a morbid impulse to commit a murder or perpetrate some other criminal act, and is forced to yield, notwithstanding all the efforts he may make. Numerous cases of this kind are on record. Thus, Esquirol relates the case of a man thirty-two years old, of a nervous temperament and quiet disposition, who had been well educated and who was fond of the fine arts. He had suffered from a brain disorder, but had been several months cured. After being in Paris for about two months, during which time he led a perfectly regular life, he one day entered the Palais de Justice and attacked an advocate with great fury. The next morning when seen by Esquirol he was perfectly tranquil and composed, showed no anger whatever, and had slept well all night. The same day he designed a landscape. He recollected what he had done the previous day, and spoke of it with coolness. He declared that he had entertained no ill-will against the advocate, had never even seen him before, and had no business with him or any other lawyer. He could not understand, he said, what had actuated him to make the assault. Subsequently he exhibited no indications whatever of being insane. Many instances of so-called moral insanity may properly be placed under the head of volitional insanity, for they are characterized by an inability to so exert the

will as to refrain from the perpetration of acts known to be crimes. Of such are cases of kleptomania, dipsomania, pyromania, etc. The will in insanity is often secondarily affected through disturbance originating in the intellect or the emotions, and acts are hence performed which give evidence of the existence of mental aberration. In mania of all kinds, and especially in dementia and general paralysis, there is either a loss of volitional control or an inability to exert the normal will-power.

V. *Mania.*—In mania the mind is affected in several, generally all of its parts. There are illusions, hallucinations, delusions, emotional disturbance, and loss of volitional power or control. The patient is either morbidly excited or depressed, and is often violent in his language and actions. Acute mania is the more common species of mental aberration, and in its two types of exaltation and depression constitutes the form most commonly met with.

*Acute Mania with Exaltation* has its prodromatic stage, the symptoms of which are very similar to those which precede an attack of fully developed cerebral congestion. These, in the main, are pain and fulness in the head, confusion of ideas, increased irritability of the mind, and, above all, wakefulness. In addition, there are restlessness of body and a singularity of behavior which strikes those thrown into intimate relations with the subject, and causes them to suspect that something is wrong with him. The character and disposition undergo a change, and it is very common for unfounded prejudices to be formed against persons formerly highly esteemed. Before very long there are illusions and hallucinations. At first the patient struggles against them, but eventually he accepts them as true, and hence becomes subject to delusions. These are rarely fixed in the earlier stages, and may not be so through the whole course of the disorder. With these symptoms there are derangements in other organs besides the brain. Thus, the appetite is lessened, the bowels are torpid, the kidneys fail to eliminate the normal quantity of urine, the heart becomes irregular in its actions and beats with increased frequency—a certain sign of a weak and excited nervous system—and the skin is either bathed in perspiration or is dry and hard. With the full development of the disorder the patient becomes incoherent and rambling, showing a great disposition to talk, to laugh, and to sing, and to indulge in antics of various kinds. His delusions mainly have reference to himself; he imagines that he is some great personage, that he has suddenly become very rich, or that he has been specially singled out for some other piece of good fortune. Not unfrequently he is exceedingly troublesome, destroying the furniture of his room, tearing his clothes, attacking those around him, and making all kinds of attempts to escape from restraint; but at the same time there is rarely any serious effort to do great bodily harm either to himself or others. Sometimes, however—and this fact should always be borne in mind by the attendants—there is a disposition to perpetrate acts of extreme violence, and such a tendency, even when not previously manifested, may very suddenly be developed. As a rule, patients with acute mania lose all sense of decency, and become exceedingly filthy in their habits and obscene in their language and conduct. At times such lunatics exhibit a surprising degree of cunning, and are able to exercise great control over their conduct when they have an end to accomplish. They may thus deceive the young and inexperienced physician, and induce him to forego the idea of putting them under permanent restraint, or they may so impose on him as to induce him to relax his vigilance, and thus allow of their committing some outrageous act. It must be remembered that acute mania is not suddenly cured, but runs a definite and allotted course. It is rare that the memory of the patient suffers to any considerable extent in acute mania. The patients are perfectly conscious of their surroundings, and are seldom deceived by the subterfuge so frequently and so unjustifiably employed that they are to be taken to a hotel or a country-seat when about to depart for an asylum. If the stratagem does for a moment impose upon them, they recollect the fraud, and will not again repose confidence in those who have perpetrated it. Their appetites are generally unchanged. If in the habit of smoking or drinking, they still want their tobacco and their wine, and are usually able to eat a full allowance of food. After their entrance into the asylum the main object of their lives is to get out again as soon as possible. They often recognize their condition, and will call attention to any indications of improvement they may exhibit. They are not for a moment deceived by the delusions of their fellow-lunatics. It is rarely the case that the sleep is regular and sound. Often they will be awake at night talking over their plans, or else will annoy their attendants in every conceivable way. Although having usually uncomfortable feelings in the head, they rarely suffer from acute pain in that part of the body.



*Acute Mania with Depression.*—The acute melancholia of many authors is a very terrible form of mental aberration. Like that just described, it is generally preceded by prodromata, which indicate by their character the type of insanity which is about to be developed, but it often appears with great suddenness. In the case of a lady the first evidence of mental disorder was a violent scream, due to the fact that an idea had instantaneously flashed through her mind that she had committed the unpardonable sin, and had consequently lost all hope of saving her soul. For several days she continued, with scarcely an intermission, to scream, to cry, and to sob, at the same time showing the greatest terror from apprehension that the devils were approaching her. Gradually this extreme state became less violent, but she still continued to be actuated by intense fear, and paced the floor night and day, wringing her hands, weeping, and exclaiming, "Lost! lost! lost for ever!" In another case of a lady the idea suddenly occurred to her that she was about to be killed. She screamed and begged and prayed to those around her not to allow her to be injured. In the furniture and attendants she saw her murderers, and to escape from them made several attempts to throw herself out of the window. Then she believed that she was to be poisoned, and refused all food with the utmost pertinacity, closing her teeth so firmly together that it was only by the use of great strength that they could be opened. Of all the forms of insanity, this is the one in which illusions and hallucinations of the senses are most common. These are particularly so as regards sight and hearing, and do not, as a general thing, refer to the body of the patient, although generally in direct relation with his delusion. In all cases of acute mania with depression too great care cannot be taken to prevent self-injury or suicide. It must be constantly kept in mind that the idea is a very common one with this class of patients, and that frequently they manifest great astuteness in concealing it till they are ready to make the attempt.

VI. *General Paralysis.*—The affection known as general paralysis was first described by Delaye in 1822, by Bayle in the same year, and, with much more thoroughness and exactness, by Calmeil in 1826. It is a very common form of mental derangement, and, aside from the implication of the mind, presents the very striking feature of a gradually advancing paralysis, which derives its name from the fact that it involves, sooner or later, nearly every muscle of the body. This paralysis may show itself at the same time that the insanity is manifested, it may precede the mental derangement, or it may be subsequent thereto. The latter is much the more usual order. The mental symptoms differ in several important respects from those which occur in other forms of insanity. The first indication of disease is generally an excessive anxiety in regard to matters which are really of no great importance. Of the cases which have come under my care, one was first made apparent by a morbid apprehension on the part of the patient that he was not managing some trust-funds in the best possible way; another, by the idea that he was constantly wounding the feelings of his friends; and another was constantly changing his mind about the most trivial things, and apparently thinking that the world watched with great anxiety all his movements. At first, the general mental type is that of depression. The emotions are easily excited, and the delusions which soon make their appearance are of the melancholic form. The idea of propriety in the everyday acts of life seems to be lost, and the patient will commit all kinds of indecent acts without appearing to be aware that he is doing anything unusual. His memory fails rapidly, and his intellectual vigor declines from the very first. Hence, he is not able to argue in defence of his delusions, but attacks with physical force those who venture to differ with him. His acts are in other respects eccentric and absurd. He spends money in things which are of no manner of use to him, and at the same time refuses to pay his small debts; he harasses in every possible way those who are about him, gives them impossible orders, and then abuses them if they are not at once obeyed; he is whimsical at the table, and drinks voraciously, or declares that nothing is cooked to suit him, and leaves the table in a rage. Gradually the form of his mental aberration changes; he becomes more cheerful, forms all kinds of impossible schemes for suddenly acquiring great wealth, and these are quickly abandoned for others equally impracticable. Thus, delusion after delusion rapidly succeeds each other, and these, in the great majority of cases, relate to the grandeur, the wealth, the physical strength, or some other great quality of the patient, constituting the *délire des grandeurs* of the French. One will tell of his immense palaces built of gold and inlaid with precious stones, and in the next breath will descant on his great weight or his extreme lightness, or on the number of children he has, or on the millions of operas he has composed. Another urges

his great importance in the political world—tells us that he has elected all the members of Congress himself, that he has paid off the national debt, and that in consequence he is to be made emperor of the United States, with a salary of a thousand millions a year; that he is going to have a thousand physicians, who are to be clothed in blue velvet uniforms embroidered with gold and diamonds; that he has chartered the Great Eastern for a pleasure-trip, and engaged ten thousand musicians and a similar number of ballet-dancers to go with him. The next day he has forgotten all these fancies, and is off on another series of absurd ideas. In no respect is he restrained in the extent of his delusions. Impossibilities are not regarded. While scarcely able to drag one leg after the other, he will brag of his great fleetness of foot, and in the very death-gasp will mutter about his extreme strength or endurance. The symptoms connected with sensation are equally well marked. In the early stage headache is often very severe—so much so that, as Westphal has remarked in his excellent monograph on the subject of general paralysis, the patient often dashes his head against the wall. At other times the feeling in the head is that of fulness or tightness, and these sensations are often accompanied with vertigo. Neuralgia in various parts of the body is common, and some of my patients have complained of the different degrees of numbness, especially in the hands and feet. But still more strongly manifested are the disorders of motility, due to the progressive paralysis. One which is very often observed before any mental derangement is perceived is a slight defect of articulation, due to paralysis of the lips. At first this is scarcely perceptible; there is merely a little trembling—an action such as that seen in persons who are endeavoring to restrain their emotions—but it is sufficient to give indistinctness to the utterance of those words which contain labial letters. The tongue is the next to be affected. Examination shows that there are fibrillary contractions of the muscles, and the organ is moved with less facility. The articulation is slovenly, words are slurred over, and there are both stammering and stuttering. The patient notices these difficulties, and in endeavoring to obviate them makes matters worse by his inability to be exact, contrasting strongly with his efforts. The paralysis of the tongue gradually becomes more complete, and at last this organ can only be moved with great difficulty. The other facial muscles participate, and a blank, somewhat sorrowful, expression is constantly present. The voice loses its fulness and there is great difficulty of swallowing. The muscles of the eye are also generally involved, producing ptosis from paralysis of the levator palpebræ superius, diplopia from implication of the internal rectus, and contraction of the pupil; all of these effects, except the last, being due to lesion existing at the point of origin or in the course of the third nerve. The pupils are often unequal, and Austin declares, with all seriousness, that contraction of the right pupil is associated with melancholic delusions, and contraction of the left pupil with elation. Further investigation has not confirmed this theory. The gait of patients affected with paralysis is very peculiar, and is of two distinct kinds. In the one it is similar to that of a person suffering from sclerosis of the posterior columns of the spinal cord (locomotor ataxia). The feet are lifted high, and are thrown down with a great deal of force, the heel striking the ground first. As Westphal remarks, patients with this gait cannot stand with the eyes shut and the feet close together. In the other kind the feet are scarcely lifted from the ground, but are shuffled over it, and the action is somewhat like that of a person attempting to balance himself on a tight-rope. Patients with this gait can without difficulty stand with the eyes shut. As regards the upper extremities, the fingers lose their strength and delicate co-ordinating power. The handwriting is shaky, and there is awkwardness in buttoning the clothing. The grip of the hand is still strong, but there is an impossibility, as shown by the dynamograph, of maintaining a continuous muscular contraction for even a few seconds. The senses, with the exception of sight, do not often become materially affected. Atrophy of the optic nerve causes amaurosis or amblyopia. Ophthalmoscopic examination will very generally detect this condition of the papilla at a very early stage of the disease, together with retinal and choroidal anæmia. Convulsive seizures occur, and these are generally epileptiform in character, though occasionally they are of the nature of apoplexy. They vary greatly in character, sometimes resembling the *petit mal* of epilepsy, at others characterized by strong convulsive movements or coma. Besides these, there are attacks of complete paralysis of certain muscles, which, however, rarely leave any permanent effects, the usual degree of power being regained in a few days.

The course of general paralysis is often marked by periods of great improvement, and the patient's friends im-



agine that he is certainly recovering. The symptoms, mental and physical, all abate in violence, and may even disappear to such an extent as not to be evident to general observers. But the physician must not be deceived, for the amelioration is merely temporary, and sooner or later the disease regains its former ascendancy. At no time, even during the height of the remission, is the mind of the patient in such a condition as to admit of any considerable intellectual exertion. There may be an absence of delusions, but mental weakness still exists. Progressively, this decline in the force of the mind becomes more strongly marked, until at last a condition of extreme dementia is reached. Simultaneously, the physical power diminishes, until finally the patient, unable to walk, to stand, or even to sit, is confined to his bed for the rest of his existence. Bed-sores form and deglutition becomes more and more difficult. From this cause the food may become impacted in the fauces, and thus death be produced by interruption of the respiratory process, or the food may enter the larynx. The sensibility of the lining membrane of the cheeks and fauces is notably diminished, and hence the patient in eating goes on filling his mouth, not knowing that he is doing so. When he at last attempts to swallow, the mass of food is greater than can pass down the oesophagus, and unless some one is near to assist him he chokes to death. Death may otherwise take place from a gradual cessation of the respiratory process or from sheer exhaustion. The duration of general paralysis is variable. Sometimes death results in a few months, and in others it may be deferred for five or six years. The average period is about three years. General paralysis is not likely to be confounded with any other affection than chronic alcoholic intoxication, from which the history of the case and its general progress will suffice to distinguish it. With lead-paralysis it has scarcely any features in common. General paralysis is almost invariably fatal. A few cases of recovery have been reported, but there is room for doubting that most of them were actual cases of the disease, and the others were probably, as Griesinger suggests, instances in which the remission was long.

**VII. Idiocy and Dementia.**—In idiocy there is such an abnormal organization of the nervous system or arrest of development that deficiency of mind results as a natural consequence. Many idiots are possessed of less intellectual force than well-trained dogs or other animals. Occasionally, idiots show an excessive development of some one mental faculty, which has appeared to grow at the expense of all the rest. This is especially seen as regards the capacity for appreciating and remembering musical tones and for acquiring the ability to perform automatically, as it were, upon some musical instrument. There is scarcely an idiot whose mental status cannot be elevated by systematic and appropriate education, though where the cranial development is small no very material progress is to be expected.

**Dementia.**—Dementia may be primary, but such is very rarely the case, it being in the vast majority of instances the consequence of an acute attack of insanity or incident to old age. The characteristic feature of dementia is mental weakness, and this is shown as regards the emotions, the intellect, and the will. The former are not held under control; slight matters bring them into inordinate action, and tears are shed and laughter excited when there is no adequate cause for the one or the other. The intellect is affected in all its parts. The power of application or of fixing the attention is materially lessened; and this is doubtless one reason why imperfect ideas are formed of very simple matters, and why it is so difficult to conceive a series of connected thoughts. The memory, especially for recent events, is weakened to an extreme degree, and the delusions of the patient, if still present, are constantly undergoing change from the impossibility of recollecting them. Volition is almost entirely abolished. The patient is altogether controlled by others, the idea of offering opposition to their wishes never entering his mind. The facial expression of a patient affected with dementia is not always characteristic, and this mainly for the reason that the physical health is generally good. The deficiency of mental power is, however, readily perceived in the majority of cases when the attempt is made to excite the brain to action. The failure of the face to respond to the ideas sought to be conveyed becomes very evident.

**Causes.**—Among the causes inherent in the individual none is so powerful in its action as hereditary tendency. This may show itself not only by the fact that ancestors have been insane, but that insanity in the descendants may have resulted from hysteria, epilepsy, catalepsy, or some other general nervous affection in them. It often happens, too, that the disease, like many others known to be hereditary, skips a generation. Insanity is more common in males than in females, though the difference is not so great

as many suppose. The period of life between twenty-five and forty-five is that at which insanity is most liable to make its appearance. Cases are on record of infants having manifested unequivocal symptoms of mental aberration, but the affection is not often met with under the age of puberty. The civil condition of the individual as regards marriage or celibacy exercises an effect over the causation of insanity. Statistics show that celibates of both sexes are more liable than the married. So far as males are concerned, this result is probably due to the fact that in celibacy, as a rule, the mode of life is more irregular. Insanity is assuredly more common among civilized than uncivilized nations, but as regards the different classes of individuals who go to make up a civilized community, it is very certain that the refined, educated, and wealthy classes are not so liable to insanity as the lower orders. The exciting causes are both moral and physical. Of the former, emotional disturbance, grief, terror, disappointed affection, anxiety, great joy, etc. stand first in influence. It is doubtful if moderate intellectual exertion ever, of itself, causes insanity. It is only when the brain is worked night and day, to the deprivation of sleep and without sufficient change, that insanity results from mental labor. Continual thinking on one subject is the most effectual way of producing insanity by the action of the brain. Among the physical causes, drunkenness, the use of opium and other narcotics, excessive sexual indulgence, blows on the head, exposure to severe heat or cold, the puerperal state, and certain diseases may be referred to.

Other points in the natural history of insanity, such as the diagnosis, the prognosis, the morbid anatomy, and the treatment, would lead too much into the domain of medical science to warrant consideration here.

**Prevalence of Insanity.**—The question whether insanity is or is not on the increase has for many years been discussed, but with no very definite result. The weight of evidence, however, appears to be to the effect that, although the number of the insane reported in official documents is greater every year, this increase is apparent only, and is due to the facts that the registry is constantly becoming more complete, that cases of insanity are, through the advance of medical science, more readily recognized, and that through the same cause there are fewer deaths, and that hence the same cases are counted every year. Thus, in a paper read before the Medico-Psychological Association of Great Britain by Dr. Maudsley in Dec., 1871, it is shown that in 1844 there were in England and Wales, 20,611 registered insane persons, including idiots, or 1 in 802 of the population; on Jan. 1, 1859, the total number was 36,762, or 1 in 535; in 1865, the number was 45,950, or 1 in 434; and on Jan. 1, 1871, the total number was 56,755, or 1 in 400.

Now, it is very clearly shown, by inquiring as to the number of new cases occurring every year, that the great increase in the number borne on the registers is not the result of any marked increase in the number of persons becoming insane in any one year. Thus, Dr. Maudsley gives the following table, showing the proportion of admissions to the population in each of the twelve years from 1859 to 1870, inclusive:

In 1859, 1 in.....	2,114	In 1865, 1 in.....	2,043
In 1860, 1 in.....	2,092	In 1866, 1 in.....	2,111
In 1861, 1 in.....	2,156	In 1867, 1 in.....	2,045
In 1862, 1 in.....	2,240	In 1868, 1 in.....	1,930
In 1863, 1 in.....	2,307	In 1869, 1 in.....	1,953
In 1864, 1 in.....	2,192	In 1870, 1 in.....	1,901

This table shows a slight increase during the last three years, but it is fully accounted for by the greater diligence exercised in finding cases, and by the fact that many cases of mental disease are recognized and counted as such when formerly they were not.

Upon the whole, Dr. Maudsley draws the following conclusions: "(1) There is no satisfactory evidence of an increase in the proportion of cases of insanity to the population; and no evidence, therefore, of an increased liability to insanity. (2) It is not necessary to assume such an increase in order to account for the undoubted great increase in the number of registered insane persons. (3) The difference between 1 insane person in 812 of the population in 1844, and 1 in 400 in 1870, is mainly, if not entirely, owing to the fact that in the former year the returns included only half the existing insane persons in the country, while in the latter year nearly all of them have been registered. (4) Some part of the difference is owing to the fact that certain patients are registered as lunatics now who would never have been thought so in times past. (5) A lower rate of mortality and a lower percentage of recoveries may account for a part of the increase in the total amount of insanity. (6) The proportion of admissions to the population, which represents approximately the occurring cases of insanity, does not, when the neces-



sary allowances are made, yield evidence of any serious increase."

In the U. S. similar conditions have existed, and like results have been obtained. Thus, in 1860 the total number of the insane, including idiots, was—of males 22,841, and of females 19,983, being a total of 42,824; while in 1870 the numbers were—for males 30,505, and for females 29,772, total 59,677. Now, in 1860 the total population was 31,185,744, giving a ratio of insane to the population of 1 in about 725; in 1870 the population was 38,115,641, or 1 in about every 637. Here the apparent ratio is not to be ascribed to any actual increase, but to the fact that the researches were more thorough in 1870 than in 1860, and that hence a greater number of the insane were discovered than in the previous census. There is no reason for believing that insanity is more common in England than the U. S., though a superficial consideration of the foregoing statistics would lead to this conclusion; but it is very certain that the registry in the former country is much more thorough. But, as will readily be admitted by all neurologists, there are periods during which insanity is more common than at others, and hence it is not safe to take any statistics which do not extend over a long series of years. If, for instance, the number of insane in France for the year before the recent war with Germany be compared with the number existing in the year after the war, the latter will be found to be much the greater; and the like is true of our own recent civil war, and of all other periods of political excitement. Still, taking the civilized world as a whole, it will be found that the exciting and restraining influences about balance one another, and that insanity is not more frequent now than it was at any former period during which records have been kept.

*Cases of the Insane.*—In every State of the Union, with the exception of Delaware, Florida, and Nevada, there are suitable asylums for the reception and treatment of cases of insanity. All the States, with the exception of those named, have one or more public institutions, and in addition there are a number of private asylums in various parts of the country. The U. S. has thus not notably failed in its duty to the unfortunate class of individuals under consideration, and a great deal of the interest which has been manifested, and which has in numerous instances led to the construction of asylums, has been due to the disinterested exertions of Miss D. L. Dix, which have led to the action of State legislatures in the direction mentioned. It is not to be doubted, however, that here, as everywhere else, the provision is not so full as it ought to be, and this is especially to be noted as regards the pauper insane, who in many States are still kept in the county poorhouses or boarded out. The whole question of such provision is still somewhat unsettled in relation to the exact kind of protection and treatment certain of the insane should receive. The advocates of entire non-restraint—which in reality does not exist—have gone so far as to recommend the establishment of colonies of the insane in villages; and one such has been for some time in operation at Gheel in Belgium, with but moderate success.

Whether or not the insane should be treated in separate and distinct institutions, or in general hospitals more or less isolated from the other patients, is a subject well worthy the fullest consideration. At a time when insanity was considered to be a disease of the mind, and not of the brain, asylums were well enough, for the treatment thought to be necessary could be more advantageously carried out by metaphysicians than by physicians. But at the present day more practical and far more scientific notions are prevalent, and it is beginning to be a recognized principle that insanity is not to be treated from any very different therapeutical standpoint than that proper for gastritis or intermittent fever. Hence, the insane require medical treatment; and the more thoroughly educated the physician is in his science as a whole, the higher will be his qualifications for ministering to the unfortunate class of beings under consideration. So far as curative influences extend, it is not to be denied that the insane may be better treated in their own homes than in asylums. But owing to the character of the insanity, or to the impossibility of providing the necessary restraint and care, a certain number of lunatics absolutely require sequestration.

*Bibliography.*—The number of monographs and treatises devoted to the subject of insanity is very large. The most that can be done here is to cite the more important published during the last 100 years: Crichton, *An Inquiry into the Nature and Origin of Mental Derangement*, etc. (London, 1798); Arnold, *Observations on the Nature, Kinds, Causes, and Prevention of Insanity* (London, 1806); Haslam, *Observations on Madness and Melancholy* (London, 1809); Pinel, *Traité médico-philosophique sur l'aliénation mentale* (Paris, 1809); Rush, *Medical Inquiries and Observations upon Diseases of the Mind* (Philadelphia, 1812); Georget,

*Discussion médico-légale sur la folie ou aliénation mentale* (Paris, 1826); Calmeil, *De la paralysie considérée chez les aliénés* (Paris, 1826); Guislain, *Traité sur l'aliénation mentale* (Amsterdam, 1826); Conolly, *An Inquiry Concerning the Indications of Insanity* (London, 1830); Pritchard, *A Treatise on Insanity and other Affections of the Mind* (London, 1835); Broussais, *De l'irritation et de la folie* (Paris, 1839); Calmeil, *De la folie*, etc. (Paris, 1845); Esquirol, *Des maladies mentales*, etc. (Paris, 1838); Kieser, *Elemente der Psychiatrik* (Breslau and Bonn, 1855); Brigham, *Observations on the Influence of Religion upon the Health and Physical Welfare of Mankind* (Boston, 1855); Griesinger, *Pathologie und Therapie des psychischen Krankheiten* (Stuttgart, 1861); Schröder van der Kolk, *Die Pathologie und Therapie der Geisteskrankheiten auf anatomisch-physiologische Grundlage* (Braunschweig, 1863); Eucknill and Tuke, *A Manual of Psychological Medicine* (London, 1858); Winslow, *Obscure Diseases of the Brain and Disorders of the Mind* (London, 1860); Morel, *Traité des maladies mentales* (Paris, 1860); Ray, *Mental Hygiene* (Boston, 1863); also various important papers collected and published with the title *Contributions to Mental Pathology*; also *Medical Jurisprudence of Insanity* (5th ed., Boston, 1871); Leidesdorf, *Lehrbuch der psychischen Krankheiten* (Erlangen, 1875); Sankey, *Lectures on Mental Diseases* (London, 1866); Maudsley, *The Physiology and Pathology of the Mind* (London, 1867); Blandford, *Insanity, and its Treatment* (Edinburgh, 1871); Dickson, *Medicine in Relation to Mind* (London, 1874); Hammond, *Insanity in its Relations to Crime* (New York, 1873); *A Treatise on Diseases of the Nervous System* (6th ed., New York, 1875), *Morbid Impulse* (New York, 1874), and various monographs in the *Psychological Journal*.

WILLIAM A. HAMMOND.

**Insanity before the Law.** The term insanity, although unsuceptible of a strict definition, has yet received at law a convenient interpretation in the phrase *non compos mentis*. By this is meant a condition of mind, resulting from the influences of bodily disease, in which the individual has lost control of his faculties. He cannot think as he either wants to or needs to, and consequently as he would think if in the enjoyment of mental health. He is under coercion to a greater or less degree, and cannot, although at times conscious of his infirmity, overpower it by any effort of the will. He is the slave of his mental faculties, whose caprices henceforth rule him and give color to his actions. But however good may be the legal phrase *non compos mentis* when used in its general application to the insane, the attempt to subdivide this class into four categories, as made by Lord Coke, is one resting upon ignorance of the nature of the disease, and therefore confounding symptoms with sources. In his first category he places idiots or natural fools. But, properly speaking, many idiots are teachable, and can use their faculties to the extent of their possession of them, so that they are not necessarily *non compos*, any more than is an infant. Their possibilities are, like his, a question for future demonstration; and while they may always need guardians, this does not *per se* constitute them insane. So with his third category of *lunatics*. Science does not at this day admit that lunar influences can singly or conjointly tend to produce insanity. Speaking with technical accuracy, there are no lunatics, however otherwise insane any person so called may be. So also with Lord Coke's fourth category of *drunkards*. Such people, having voluntarily placed themselves in this condition, are not legally insane, since the law holds them accountable for all acts done while in that state. It is only in his second category that Coke properly describes the insane, according to modern views of the sources of their condition, by describing them as persons who were of good and sound memory, but by *sickness, grief, or other accident* wholly lose their memory and understanding.

The presence of the basic element of disease is, therefore, the indispensable prerequisite to any legal recognition of insanity; and no other form of insanity than that which springs from bodily disease is known to the law. Hence, it can take no cognizance of any forms of moral disorder, regarding them purely as varieties of depravity until they are shown to be the offspring of physical disease. Then, and then only, it considers these in their bearing upon questions of intention and responsibility. It is true that in medical investigations into the symptoms of insanity, moral acts are allowed much weight, as tending to show the progress rather than the existence of the disease; but in medicine no more than in law are such acts, *per se*, considered *prima facie* evidence of mental disorder. For in all cases the individual must be gauged by his own standard, and questions of mental strength and competency in this direction or that are questions of degrees relating to facts. There is scarcely a lunatic to be found who cannot perform some acts in a rational way, and were those acts alone to be ob-



served, nothing would be discovered in them evidencing insanity. It is owing to these varieties in the complexion of this disorder, due to the differing angles under which it is viewed, that the law has recognized the necessity of varying the legal significance of the acts of persons medically adjudged to be insane. They are not to be absolutely disfranchised on this account, but their acts will be weighed apart from their condition, and if found proper and right will be sustained. The scrutiny of such acts is directed to the discovery of how far the actor was at the time an intelligent and free moral agent; and while merely importuning a person would be considered no just ground for invalidating the acts of one who was sane, it would tend to raise a presumption of undue influence in the case of one who was insane. The phrase "mental unsoundness," which is the modern synonym of the ancient term *non compos mentis*, has, therefore, been very generally adopted, because it expresses, like its Latin analogue, the fact that the mind is unbalanced, and the party not possessed of the same power of regulating its functions as formerly. Yet to the extent and within the limits of that power many rational acts may be done.

Under the shadow of these principles it follows that both mental unsoundness and weakness of mind may vary in the degrees of their manifestation to such an extent as to render their border-lines wholly indiscernible. Exactly when the transit occurs from mere eccentricity to loss of mental equilibrium, exactly when weakness of mind passes into confirmed imbecility, are moments not to be ascertained with definiteness from any single act committed. Signs, symptoms, and acts must be grouped, evidence must be cumulative and plenary before any judgment can be safely pronounced, since in no department of human evidence is there such a field for debate and contention over premises, over the relative weight of facts, and over the conclusions which can logically be deduced from them. It is here that most commonly occurs the fallacy of commutating the subjective with the objective, of thinking as we feel, and of reasoning alone from our consciousness; for it is incidental to our nature to believe implicitly the testimony of our senses, and necessarily of discrediting that which contradicts their report. Thus, many persons squander their property through extravagance who are not insane, and many persons legally adjudged insane are disposed to be frugal; the former, so far as property is concerned, need guardians more than the latter, and yet the law cannot interfere with their sovereign rights over their own so long as they are not insane. According to the standard by which the miser regulates his conduct, the extravagant are insane; according to the opinion of the extravagant, the miser is insane. Each judges the other by the rule of his own life and the standard of his own feelings, and thus it is that each may judge erroneously.

The modern phrase "mental unsoundness" is intended to cover the same ground as the varieties of *non compos mentis* did at common law. It is to be distinguished, therefore, from the phrase "insanity," which implies the highest grade of unsoundness as tested in any particular direction. Thus, the term "partial insanity at law" is the equivalent of monomania in medicine, and imports limitation in the extent rather than in the degree of insanity. It is complete insanity as far as it goes, and as such tends to nullify all civil acts infected by it. In mental unsoundness we have rather an incapacity than a strict disorder of mind founded upon bodily disease. We can apply the term with propriety to any adult mind in which there is present a manifest incapacity to deal with the ordinary contingencies of life. Hence, we may speak of an idiot or imbecile as being mentally unsound, meaning thereby that such person is unequal to the ordinary strains of complex business relations, although able to feed, clothe, and protect himself. In him the incapacity consists in not being able to rise above a fixed plane of action, while in the partially insane the mind can attempt, and does generally, to execute, but does this in a faulty way, obedient to the coercion of some disordered faculty or overpowering delusion. The law, adapting its principles to these varying phenomena of mental action, therefore recognizes insanity, partial insanity, and mental unsoundness as varieties of mental incapacity, passing from simple weakness to complete delirium and incoherence of ideas.

*Insanity, or Mania.*—Insanity proper is distinguishable, both in law and medicine, from the merely temporary delirium of fever, and is only recognized as a condition of legal incompetency when become an established habit of life. The common law takes no special cognizance of acute stages as set opposite to chronic, the problem to be solved in every inquisition of lunacy being simply that of *compos* or *non compos*. Statutes may, for purposes of hospital classification or equitable regard for individual and pecuniary circumstances, establish special distinctions among the in-

sane, as in the State of New York, where they are classified as either *private* patients, *indigents*, or *paupers*. But the common law knows nothing of this kind, its inquiry being directed to the question of *sane* or *non-sane* as an established condition. Hence, even a habitual drunkard or an imbecile is not considered legally insane, but only weak-minded to the extent that evidence may show him to be unfitted to manage his own affairs. Little need be said, therefore, to show that insanity, under whatever name recognized in medicine, has but one designation in law, and that designation is founded upon the fact that mental incompetency exists in such permanent form that there is continuous enslavement or duress of the reasoning faculties. Consequently, every act performed by such a mind which involves responsibility at law is *voidable*, although not necessarily void. There may be acts which, without injury to other parties, enure to the benefit of the lunatic, and it would be manifestly a wrong to him to set them aside merely because of the condition of mind in which he performed them. Thus, a lunatic may purchase necessities or employ a physician or any other skilled labor, and his contract would be sustained if otherwise reasonable. The law always permits the exercise of every right which an individual can enjoy without injury to others or himself. Hence, persons legally insane and in charge of committees have been allowed to perform many acts of a character implying the possession of mental competency to a certain degree. Nor is there anything paradoxical in this, since it is simply following the law of our mental constitution, which presents us with great disparities of strength in the faculties of the same mind even in health. In law no person is presumably insane until after office found, and parties may deal with him as though sane, provided nothing in his manner or language be calculated to give warning of his real condition. In such cases, as elsewhere stated, his contracts are not even voidable if their subject-matter has passed into such a condition that it cannot be restored to its previous state. It would be a great hardship and a manifest wrong to a *bona fide* purchaser from a lunatic for a valuable consideration, who had subsequently disposed of the property, to compel him to restore it specifically; and it is difficult to conceive of any principle of equity upon which this could be demanded from the mere incident of the party's lunacy. If the transaction is untainted by fraud, why should it be set aside? If it be a reasonable act reasonably performed, that is all which the law can or does exact. But as the act is always open to suspicion derived from the mental condition of one of the parties, it behooves men to know whom they are dealing with, and to what extent their transactions may be subsequently voidable. Whence it follows that whenever a person is in charge of a committee, this constitutes to the world notice of his mental incompetency, and all persons deal with him at their peril. It is not competent for them to plead ignorance of these facts, because they are barred by a judicial record; and although it may be that nothing in the conduct of the lunatic or the character of the transaction is suggestive of insanity, still courts of equity will readily intervene to annul the contract if the least cloud of suspicion is seen to rest upon it.

*Partial Insanity.*—It is unquestionably demonstrated in medicine that such a condition as that known under the name of *monomania* or *partial insanity* cannot exist *strictissimi iuris*. "We are mad or not mad; we cannot be half deranged or three quarters, full face or profile." Such is the language of one of the leading European authorities in psychological medicine. These are facts which all experience of insanity certifies to. But, practically speaking, an insane person may do many reasonable things which, having no flavor of insanity in them, the law will not set aside. To that extent, therefore, it legalizes a sane act by whomsoever committed. And if a person being notoriously insane is capable of doing habitually a majority of his acts in a reasonable way, and only a few in a persistently insane way, there seems to be no just objection in law, particularly for convenience of description, to designating such person as *partially insane*. For, after all, insanity is largely a question of *degrees* of more or less mental power, and it cannot be gauged by the same standards which medicine applies to it. Municipal law must rest of necessity very largely upon artificial reasons, including convenience as among its chief ones. And since insanity proper has its varying temperatures and seasons, during which the individual becomes more or less competent to perform ordinary acts in a reasonable way, it follows as a corollary that one who has never exhibited this form of disease in any other than a mild type is entitled to as much more freedom of legal action, as he would be to as much more freedom of personal liberty if in an asylum. The simple question at law is this—viz. To what extent are his acts rational? If they be so in the majority of instances, then in the majority of in-



stances his acts do not differ from those of a sane man, and to that extent they deserve to be sustained. It is only for convenience sake that the term "partial insanity" is used, for the legal principles governing it are all found applying to insanity in its larger sense, and the latter includes the former both legally as well as medically. Municipal law looks only to the results of disease in its psychological inquiries, and does not concern itself with specific names or phases of insanity, both which are often but symptoms of a common disease arrived at different stages of progress. Hence, courts cannot make judicial distinctions in the civil or criminal responsibility of the insane based upon medical designations of the particular form of that disorder under which they may labor. It is sufficient for them that the result of such disorder has been to degrade or to overthrow the reason, because the condition of the *reason* and the *will* are the only standards by which the law judges human responsibility. It might happen, indeed, that in a question relating to the existence or non-existence of lucid intervals the predicability of such could not be determined without knowing the degree or form of mental disorder which the party exhibited, but it is clear that even in such cases courts would venture to give no opinions of their own, relying solely upon those of medical experts. Therefore, there are no legal grounds upon which to discuss such topics as *melancholia* or *dementia*, since they are not specific diseases, but only symptoms of insanity, either in its incipient, its middle, or its last stage. Formerly, these were treated as varieties of partial insanity; now a better comprehension of the pathology of that disease has classified them where they belong, among symptoms. It is for these reasons that American courts have not followed the dicta of English tribunals in passing upon questions involving partial insanity. All our decisions, whenever this point has been mooted, have reaffirmed the one cardinal principle that the law cannot concern itself with degrees of insanity, and that it is sufficient, in the interests of true equity, to lay down the rule that wherever the subject-matter of the transaction, be it contract or will, is not infected with insanity, the act even of one alleged to be partially insane is only voidable, and not *ab initio* void. In England this was also the rule, repeated and reaffirmed in all those decisions which have immortalized the name of Sir John Nicoll, nor was it ever questioned until the year 1848, when Lord Brougham, in a case before the privy council, ruled that it was erroneous to suppose that a mind shown to be partially insane could be really sound upon any subject, and therefore competent to make a will. This decision was the first introduction of a purely psychological dogma into the elements of a legal judgment, and while abstractly sustainable on the basis of *falsus in uno, falsus in omnibus*, has not, as before stated, secured any favor before our courts. Hence, with us partial insanity does not necessarily invalidate an executed contract, nor testamentary capacity, unless it enters into and infects the subject-matter of the contract or will. Where no evidence of such mental disorder appears upon the face or in the texture of the instrument, the partial insanity of the testator at the time of its execution, although a matter of general notoriety, as where he was in charge of a committee, will not, *ipso facto*, invalidate his will. Nor do defects of the senses incapacitate if the testator possesses sufficient mind to perform a valid testamentary act; but in such cases it must be proved that the mind accompanied the will, particularly where such instrument is neither holographic nor officious. These doctrines of American law, it will be seen, are far in advance of those of the civil law, which rendered the deaf and dumb intestable if the infirmity was congenital, or of British courts, which adopt the rule that every act of an unsound mind is necessarily an irrational one.

So, too, in relation to responsibility for crimes committed by persons alleged to be partially insane or temporarily insane, the law has discarded all those terms of medical designation which imputed insanity to the instincts alone. Regarding these, when perverted, as exponents either of voluntary depravity or as states of mental duress and loss of self-control arising from disease, it requires to know simply whether the party is capable of discerning the true nature and consequences of his acts, coupled with the power of acting or abstaining from acting in a particular way. And if not, why not? The true test of criminal responsibility before the law is the possession of reason and free-will. When both these are present the party is responsible; when either is absent, he is not. By reason is meant an intelligent comprehension of the circumstances in the midst of which one is placed; and by free-will is meant the power of doing or abstaining from doing a particular act. No mental duress can be pleaded as insanity which has not its foundation in disease. Hence, drunkenness or heat of blood, both which work loss of self-control and possibly reason, are not bars to criminal responsibility, for they do

not, in their uncomplicated form, rest upon disease as their foundation; and yet a case may be imagined where a sane epileptic might become insane through drink or heat of blood to such an extent as to be an irresponsible agent. Here the foundations of mental power are already undermined, and a cause of insufficient magnitude to overthrow a healthy brain becomes the determining factor in the production of insanity; for, after all, the only physiological test of mental power is the ability to bear strain.

*Mental Unsoundness.*—The condition known as mental unsoundness at law is one which is easily confounded with imbecility wherever the congenital character of this state is overlooked. There are those, too, who may think that the attempt to distinguish them by name is an attempt to establish a distinction without a difference in fact. But it will be seen upon reflection that a born imbecile does not necessarily present us with a case of unsound mind, for every child, if his mind does not develop proportionally with his body, but remains infantile after adult age, represents to a certain extent imbecility in some one of its phases. There may be weakness in intensity or extensity of action in minds otherwise sound, without, however, there being absolute imbecility, for there are as many varieties of original constitution among healthy minds as there are among healthy bodies, and every one must be judged by a standard which is derived from observations made upon the majority of men. What constitutes absolute mental health or absolute mental strength is a very difficult question to answer categorically. Mental unsoundness is frequently used also as synonymous with insanity, and in medicine there is no impropriety in commingling these terms, but at law there is a distinction between them, resting upon the fact that mental unsoundness may be, and frequently is, due to other causes than disease, whereas insanity, whether manifested as *mania*, *melancholia*, or *epileptic vertigo*, has always a foundation of physical disease to rest upon. Thus, mental unsoundness may arise from age, from habitual drunkenness or other vices producing precocious senility, or from a natural exhaustion of the mental powers as a consequence of inherited weakness, though unaccompanied by appreciable bodily disease. Its subjects not being necessarily dangerous to themselves or the community, it would be wrong to deprive them of their liberty or the control of their property from the simple fact of mental unsoundness, until it was first shown that some form of guardianship was necessary for their well-being. And while in an individual pursuing a mechanical vocation mental unsoundness, to even a very considerable degree, might not impair his usefulness, in a professional man like a judge, a lawyer, or a physician the least dimming of the mental mirror might jeopardize the entire value of his personal services, and require also, from the more enlarged character of his possessions, that their care should be assigned to a guardian or committee. The necessity for thus differentiating men according to the extent of power present in them for self-guidance or the care of property forms one of the most delicate and difficult problems with which courts of equity have to deal; for it is always reducible to a question of plus or minus power, measured both in action and at rest, in the midst of such variable factors as age, health, previous education, habitual employment, future exigencies, and the like, all of which have a disturbing influence in reading the scale of any human being's character and possibilities. Nevertheless, the distinctions between simple mental unsoundness and positive insanity may be drawn with sufficient clearness to enable us to classify an individual with relation to his civil responsibility, because the law will always secure him his personal rights to the fullest extent commensurate with his ability to enjoy them, treating him not as an imbecile absolutely, but as one over whose mind a film has come of unequal density and of varying consequences. His power over property, and much more over his own person, will not be taken from him until it is abundantly shown that its further exercise is incompatible with personal safety or pecuniary welfare.

In determining criminal responsibility in connection with mental unsoundness a different standard has to be employed. The peace and safety of society requiring that every individual should restrain his passions in their tendency to overpower his self-control, the mere fact of mental weakness is not an answer to an indictment for crime unless that weakness or unsoundness be the direct offspring of disease, and the disease overpower the reason and the free-will at the moment of committing the offence. A weak mind is not absolved from the duty of watching over its own conduct and restraining its evil propensities; and while it might not merit the same degree of punishment for offending as a strong one, it would be wrong to assert that it was wholly dispensable either in law or *in foro conscientia*.

JOHN ORDRONAX.



**Insanity before the Law (SUPPLEMENTAL).** *Jurisdiction of Courts of Chancery as to the Custody and Control of Insane Persons.*—The court of chancery in England has, from a very early period, exercised a general power of supervision and control in relation to the interests of persons of unsound mind, their custody, and protection. This power, though its origin is somewhat obscure, is generally deemed by writers upon equity jurisprudence to have had its source in the general delegation to the court of the inherent prerogative of the Crown as *paterfamilias* to protect those who are incapable of protecting and caring for themselves. But as the result of legislation in the reign of Edward II. (1301), the authority of the chancellor in regard to insane persons has been in many respects conferred since that time by special commission from the Crown under the king's sign-manual. This warrant gives to the chancellor the right to provide for their maintenance and for the care of their persons and estates. The chief objects for which this special jurisdiction of the court is exercised are the ascertainment of the fact of insanity by a judicial investigation, the placing of a person judicially declared to be insane under the guardianship of one or more persons termed a "committee," and the subsequent control of the committee in the management of the insane person's property and the custody of his person. In making an inquiry in regard to a person's insanity, the practice is to issue a commission out of the court of chancery, upon a proper petition addressed to the chancellor, authorizing the commissioners therein designated to examine into the person's mental condition with the aid of a jury, and commanding them to report to the court the result of the inquiry. This commission is said to be "in the nature of a writ de lunatico inquirendo." The commissioners have power to summon witnesses and to examine the person himself who is supposed to be insane, if he thinks fit to be present. The commission may issue even against a non-resident if he have lands or other property within the jurisdiction of the court. The degree of mental unsoundness which will justify the appointment of a committee need not be so great as to amount to idiocy or lunacy. Mental imbecility, resulting from age, infirmity, disease, or the decay of the natural powers, may be sufficient. The finding of the jury, however, must show that the person is to such an extent of unsound mind as to be incapable of governing himself and managing his property and directing his affairs. And this conclusion must be directly stated in the report as the result of the investigation, and appear as a positive verdict by the jury. It will not be enough to state the facts proved which indicate the existence of insanity, leaving it for the court to draw the conclusion that it actually exists, since this is the appropriate province of the jury. If there be any irregularity in conducting the inquiry, or if the return be insufficient in law, or if the verdict rendered be attributable to mistake or partiality, the inquiry may be quashed and a new commission be issued. If the return truly finds the party insane, it may be traversed (or alleged to be false) by himself or, on proper terms, by any one who has a claim against him upon contract; and the court may in its discretion allow funds out of the estate for the trial of the issue thus formed. In the appointment of a committee, relatives of the person adjudged insane are usually chosen, though this is not necessary. It is the duty of the committee to manage the property entrusted to their charge carefully and prudently, to make such investments as may be necessary to keep the estate reasonably profitable, and to account for the manner of administration when required by the court. All gifts or contracts made by the insane person himself after the actual finding of the inquiry are utterly void. The power of the committee to deal with the property in the exercise of an independent discretion is very limited. In most instances special authority to charge or dispose of the property must be obtained from the court. In the management of the estate under the direction of the court the interest of the insane person is to be regarded rather than the interest of those who are entitled to the succession. An order may be made authorizing a change of personal property into real or of real into personal, if it be deemed for his advantage. So, in making provision for those who are dependent upon him, the same principle is followed, and expenditures may be made out of his property which he is not legally bound to incur if they are substantially for his advantage. Thus, if the father of a family be a lunatic and under the charge of a committee, the mere legal right of his wife and children will not be regarded by the court, but an allowance may be made suitable to their station in life. Provision may even be made in some cases for the support of persons who are not related to the insane person, and have no legal claim upon him for maintenance, as, *e. g.*, persons whom he has adopted as children, or his brothers and sisters. This is on the ground that it is

reasonably presumable that the owner of the property would have made a like disposition of the income under such circumstances, and that his interests are promoted by assisting those whom he has made dependent upon himself, or who are intimately related to him. In such cases the court exercises its own discretion in fixing the amount of the allowance which it authorizes to be made. The education of the children of the insane person and a reasonable provision for the ordinary expenditures of his family will be deemed of special importance by the court. After a proper allowance has been made for the maintenance of a lunatic and his family, any surplus remaining will be appropriated to the payment of his debts. Upon a petition by a creditor a reference will be ordered to determine the amount of the debt and its validity, and if a report be made in favor of the creditor, the court will order the debt to be discharged if there are sufficient assets. After the appointment of a committee, suits in behalf of the lunatic must be instituted in the name of the committee, who are responsible for the conduct of the suit. The lunatic, however, is usually joined as a party plaintiff. So suits against the lunatic are brought against the committee. On the death of the insane person the power of administration ceases, though the committee still continue under the control of the court until there has been a final accounting. Should an insane person after being placed under the guardianship of a committee be restored to soundness of mind, the court may either remove the committee altogether, or suspend its authority until it can be ascertained whether the restoration to sanity will be permanent or temporary. The members of a committee are not allowed, as a general rule, any compensation for their services, but are only entitled to receive remuneration for necessary disbursements. The question has recently arisen whether if a person has become permanently insane, but no inquiry has been held and no committee appointed, a suit can be brought in his behalf by his next friend; and it is held that this may be done.

In this country courts of equity in some of the States exercise the same jurisdiction in relation to persons of unsound mind as the English court of chancery. This is the case in New York. In other States such persons are placed under the charge of guardians appointed by courts of probate, as in Massachusetts. The mode of appointing a committee or guardian and the extent of their authority are usually regulated to a great degree by statute. The same general principles prevail in regard to the power of the court exercising such jurisdiction, and its control over the management and disposition of property, as have been established in the English procedure, though minor differences exist which need not be here detailed. In some of the States the same power is exercised in regard to the custody and control of habitual drunkards and spendthrifts as in relation to insane persons. (See *Shelford on Lunacy*; Willard on *Equity Jurisprudence*; Adams on *Equity*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Inscription** [Lat. *in*, "on," and *scribere*, to "write"], language inscribed, sculptured, written, or impressed upon clay tablets, metals, wood, stone, or other material except papyrus, paper, or other fragile substances used for books. Stone was principally used for the purpose, and rocks at the very earliest period, some nations, as the Egyptians, Assyrians, Greeks, and Romans, using inscriptions for official and other records. In the East the oldest Babylonian and Assyrian inscriptions, cut in the cuneiform or wedge-shaped characters, date as early as the oldest Babylonian (or Assyrian) reign, being that of Uruk, about 2000 B. C. These were continued as late as the Roman empire, and the most remarkable is that of Darius Hystaspis at Behistun, giving an account of his subjection of the different nations and rivals to his power. It is in three kinds of cuneiform and languages—the Persian, Median, and Babylonian. Another remarkable inscription is that of Hadji Abad, in a character called Pehlevi—which later came into use in Persia—and is supposed to refer to the Parthian monarch Sapor. The inscriptions of the Egyptians are as old as the Babylonian, and are in the hieroglyphic character, the oldest known being a slab of the reign of the monarch Sont of the second dynasty, according to some chronologists above 2000 B. C. In Egypt the use of inscriptions more extensively prevailed than elsewhere, the walls of tombs, temples, and other buildings, besides objects of use or attire, being covered with them. The most remarkable are those recording the working of the mines at Mt. Sinai from the third to the eighteenth dynasty, others detailing the expulsion of the Shepherd rulers or invaders, the wars of Thothmes III. and Rameses II., the invasion of Egypt by the Ethiopian king Pianchi, the tablet of San or decree of the synod of priests held at Canopus 238 B. C., and the Rosetta Stone, or syncretic decree of priests at Memphis 196 B. C., both of which are



in three languages, Egyptian hieroglyphic, Demotic, and Greek, and which are keys to the decipherment and interpretation of the hieroglyphs. Amongst the Semitic nations of Palestine inscriptions were more rarely used, and seldom of any length. Of these, the best known are the inscription on the coffin of Asmunazar, king of Sidon, and the Dhiban Tablet or Moabite Stone of Mesha, king of Moab, about 900 B. C., the oldest known in the Phœnician character. Numerous inscriptions are found in the Wady Mokatteb at Sinai, supposed by some to have been the work of the Israelites after the Exodus, but now referred to a later date, about 300 B. C. or later, and attributed to the Nabatheans. Many Himyaritic inscriptions of a still later date have been found at the dyke of Mareb and Sanaa in Southern Arabia, some on bronze plates which have been affixed as votive offerings to the temples of the gods. Beyond the rule of the Egyptians few or no inscriptions have been found in Central and Southern Africa, but at the sites of Carthage and Utica, Punic inscriptions, chiefly votive, in a Phœnician character, have been found, and at Dugga and other places, in a peculiar script called Libyan, one bilingual in both characters. Another remarkable inscription is a bilingual one in the Cypriote and Phœnician character found at Dali, dated in the reign of Melekiathon, king of Citium and Idalium. The Jews appear not to have used inscriptions at an early period, and none are known earlier than the Christian era. It is in Greece that inscriptions of all classes and on all objects abounded, the oldest to which a date can be given being that of Abusimbel in the reign of Psammethichus I., about B. C. 665. They have continued in use till the present day, and some of the most remarkable have been found at Athens; but on the whole, the Greek inscriptions, although throwing considerable light on the municipal and social life of the Greeks, are not of great historical value. The Roman inscriptions, which commence with the republic about the time of the fall of Corinth, 145 B. C., continue till the extinction of the Latin language. There are also above 2000 Etruscan inscriptions, but the language has not been deciphered. In India no inscriptions have been discovered earlier than the age of Asoka, about 400 B. C., but in China that of Yu has been referred to 2205 B. C., although its authenticity is more than doubtful. Inscriptions of 1200 B. C., however, exist. Those of Indo-China and Japan are much more recent. In America the inscribed monuments of Mexico and Yucatan are of an undefined antiquity. For palæography, the verification of history, chronology, geographical sites, the appreciation of the social and municipal condition of nations, and the relative antiquity of monuments, inscriptions are of the highest importance. In numismatics, *inscription* means the letters in the area, not round the device. Inscriptions are more sparingly used in modern times, except for sepulchral purposes, printing having superseded their public employment. They are sometimes found in relief or in bronze letters attached by plugs to marble or other material, and were often painted for greater distinctness. S. BIRCH.

**Insect Fertilization.** One of the most significant modern discoveries in the domain of vegetable physiology is that the services of insects are indispensable for the fertilization of numerous kinds of flowers, which are so constructed that the pollen cannot pass without external aid from the stamens to the pistils of the same plant, much less to those of other plants. Hence, these flowers are provided with a nectar which attracts insects, and is so placed that to reach it they must first come in contact with the stamen, from which the pollen adheres to the insect's body, and is communicated in the same manner to the pistils of the same or of other flowers. The popularization of these facts is chiefly due to Mr. Charles Darwin, who, in his monograph on *Fertilization of Orchids* (1862), has exhaustively traced the operations of insects in relation to a single botanical family.

**Insectivora** [Lat. *insecta*, "insects," and *vorare*, to "eat"], an order of insectivorous placental mammals whose anterior as well as posterior limbs are primarily adapted for walking, although they may be secondarily modified for other purposes. The carpal bones of the proximal as well as distal rows, and the metacarpal as well as phalangeal bones, are normally differentiated and developed; the ulna and radius are more or less distinct; clavicles are always present and well developed; the hind limbs are normally related to the pelvis, and their elements to each other; no calcareous spur-like appendage above the ankle is developed; the lower jaw has well-defined condyles, which are more or less transverse, and are received into special glenoid pockets. The teeth are diphyodont, and are of three kinds (*i. e.* canines, molars, and incisors), but are more or less aberrant from the typical forms; the molars in the most familiar types have sharp-pointed cusps. The

placenta is deciduate and discoidal. The order is divisible into two sub-orders—(1) *Dermoptera*, including the Galeopithecidae; and (2) *Bestie*, including all the other members of the order. These sub-orders are chiefly based on modifications of the anterior members and of the dentition. (1) The *Dermoptera* are *Insectivores* with members modified for flight or progression in the air, the limbs being much elongated and very slender, and connected by an extension of the skin which involves the wrists and ankles and advances forward to the neck, and backward inclosing the tail; the condylar portion of the lower jaw extends outward; the incisor teeth of the lower jaw are palmate and deeply pectinated, while those of the upper jaw, as well as the anterior molars of both jaws, are compressed, and have multicuspoid crests. (2) The *Bestie* are *Insectivores* with members modified for walking or progression on the ground, the limbs being comparatively short and robust, and free; the condylar portion of the lower jaw does not extend outward; the incisor teeth of the lower jaw are conical and not pectinated; those of the upper jaw, as well as the anterior molars of both jaws, more or less conic, and with unilobate crowns. The *Bestie* are divided into eight families—*viz.* Tupayidae, Macroscelidae, Erinaceidae, Talpidae, Soricidae, Centetidae, Potamogalidae, and Chrysochloridae. These types are limited to the northern hemisphere, Asia, and Africa, only one (Centetidae) being represented in Cuba and Hayti, and none in South America or Australia. THEODORE GILL.

**Insectivorous Plants** capture insects and consume them. That some plants capture insects has long been known; that a few might possibly make use of their prey as food was suspected long ago; but it is only of late that the suspicion has deepened into certainty. The clearest case is that of *Dionaea muscipula*. (See *DIONÆA*.) An allied plant, *Drosera* (which see) or Sundew, effects its captures by the aid of bristles which are somewhat sensitive, and have at their glandular tips drops of a glutinous exudation. This insect-lime holds its victim while the surrounding tips converge towards the insect. *Pitcher-plants* (see *DARLINGTONIA*) of different families attract insects to the open mouth of their hollow leaves. The mouth is guarded by short stiff needles which point downward. Over these the descent of the insect is easy, a return difficult. In the liquid of the hollow leaf insects are drowned, and soon decompose. That the liquid thus enriched serves as food for the plant is not proved, but is probable. Minute animals in water are entrapped by the leaf-appendages of *bladderwort*. The stomach-shaped sacs have a mouth provided with delicate hairs which converge within to form a funnel. Through this guard minute organisms can pass in, but not readily out. The mechanism for entrapping is elaborate; it is unlikely that the captures effected by it are not of service to the plant. Mr. Charles Darwin published an elaborate work on *Insectivorous Plants* (1875). G. L. GOODALE.

**Insects.** See *ENTOMOLOGY*, and the names of the orders and of important species of insects.

**Insessores** [pl., the Lat. for "perchers"], a term used by ornithologists in various senses. Some systematists apply the term to a great sub-class, including the order *Passeres* (Oscines, or "singers," *Clamatores*, or "crying-birds," etc.), the order *Srisores*, or "shrinking birds," and the order *Raptores*, or "birds of prey." Others exclude the *Raptores* from the order. But most popular authors make the term synonymous with "passerine birds," and consequently make the term a comparatively narrow one.

**Insolvency** [Lat. *in*, and *solvere*, to "pay"], the state of a person who is unable to pay his debts as they fall due or in the usual course of trade or business. This is the general and most comprehensive sense in which the term is used, but in the English law until recently it was usually employed in a restricted technical meaning, and was carefully distinguished from bankruptcy. A bankrupt under the English system was a trader or merchant who had become unable to pay his debts. Those only were termed insolvents who were not traders or merchants, and could not meet their obligations. In the legislation regulating the distribution of a failing debtor's property among his creditors the same distinction was preserved, and laws were termed bankrupt or insolvent laws according as they applied to one or the other class of persons. The additional distinction was also established that bankrupt laws operated to relieve a trader absolutely from his present indebtedness, while insolvent laws only discharged a debtor from imprisonment, while they left his future acquisitions still liable to the claims of his creditors. But even in England these precise distinctions are disregarded in recent legislation, and it is declared in the latest bankrupt act, which took effect on Jan. 1, 1870, that all persons may be adjudged bankrupts whether they are traders or not. This statute contains the same general provisions concerning the



adjudication of bankruptcy in reference to all classes of failing debtors, and makes no distinction between them in regard to the right to obtain a discharge and the method of procuring it. In the U. S. the accurate discrimination between bankruptcy and insolvency which formerly prevailed in England has never been observed in legislation. Statutes of the States have been termed insolvent laws which were similar in their objects and the general nature of their provisions to the English bankrupt acts. There has, however, been a somewhat different application of the terms bankrupt and insolvent in actual usage, though this has depended upon other grounds of distinction. By the U. S. Constitution power is given to Congress to establish a uniform rule on the subject of bankruptcies throughout the U. S. In pursuance of the authority given by this provision, statutes have from time to time been enacted by Congress which have been designated distinctively bankrupt acts. Those enacted before the act which is at present in force were repealed within a few years after their passage, and laws passed in the States severally upon the subject took their place. These State statutes were generally termed insolvent laws by way of distinction from the legislation of Congress, even though there was no material difference in the general character of the provisions which they contained. The discrimination, therefore, did not depend upon the diverse nature of the laws adopted, nor upon the different classes of persons affected by their provisions, but upon the circumstance whether the legislature by which they were enacted was a State body or the U. S. Congress. This distinction, however, did not rest upon any substantial basis, and the terms "bankruptcy" and "insolvency" were often employed interchangeably. It was decided that a bankrupt law might contain those regulations which were generally found in insolvent laws, and an insolvent law might contain those which are common to a bankrupt law. The power given to Congress to establish a system of bankruptcy laws causes its legislation upon the subject to supersede that of the States. This was the effect of the present bankrupt act, which went into operation in 1867. It would, therefore, be of little importance to consider the insolvent systems of the several States as they prevailed before the adoption of this act. They were all enacted for the same general purpose, to secure the division of a failing debtor's assets proportionally among his creditors, though the regulations prescribed for the attainment of this object were somewhat diverse. The provisions of the present bankrupt law will be found under the title **BANKRUPT**. The superseding of the State insolvent laws by the U. S. system of bankruptcy has been a salutary change, since the regulations thus established by Congress have a uniform effect and operation throughout all the States, and controversies similar to those which previously arose in regard to the effect in one State of decisions under the insolvency laws of another can no longer occur. The operation of the law of each State upon the subject was confined to its own limits, and a debtor's discharge obtained in one State might be of no validity in another.

It is not an uncommon practice for insolvent debtors to avoid the necessity of a resort to the methods of obtaining a discharge from their indebtedness established by bankrupt laws, by a voluntary arrangement with their creditors, who agree to accept a part payment in full satisfaction of their claims, and grant the debtor a complete release. An agreement of this kind is technically termed "an agreement for a composition," or simply "a composition." This is usually made by deed termed a "composition deed," though when the indebtedness is based upon simple contract the agreement may be made by parol—i. e. either orally or by an instrument not under seal. The composition must in all cases be founded upon a sufficient consideration or it will have no validity. When the arrangement is made with a single creditor, the agreement which he makes to accept a certain percentage of the debt in full satisfaction, even though it be followed by an acceptance of the amount fixed upon, will not constitute a consideration and the arrangement will be void. Even if a receipt be given which is expressed as being in full discharge of the claim, the debtor will still be liable for the entire debt. That the agreement may be binding in such a case there must be a new and independent consideration, such as the payment of a sum of money by a third person, or an engagement by the debtor to pay the reduced sum in a manner or at a time more advantageous to the creditor than was originally agreed upon, or there must be a release under seal, which imports a consideration. But an arrangement for a composition made with more than a single creditor will be valid, though there be no independent consideration. The benefit which each creditor gains by the engagement of the others to forbear, and the consequent securing of a fund for the mutual benefit of all, is a sufficient consideration to sustain the agreement into which they mutually

enter. The composition deed or agreement is not required to be of any special form. It may contain such reservations or conditions as the parties may choose to insert and make binding upon themselves, provided these are not fraudulent nor invalid by general rules of law. Thus, it is sometimes provided that the agreement shall not be binding upon any of the creditors executing it until each and every creditor who has a claim against the debtor shall also enter into the same compromise. So there may be a reservation in the deed preserving the rights of a creditor against the debtor's sureties, though it provides for an absolute release of the debtor himself, and contains a covenant not to sue him. Such conditions will be held valid, and will be enforced according to their terms. If they are not fully complied with, the debtor will be liable to the extent of his original indebtedness. It is not necessary that all the creditors of an insolvent enter into the composition deed. If any less number agree to its terms, they will be bound by it, and will only be entitled to the percentage agreed upon, unless they have qualified their acceptance by the stipulation that the consent of all must be obtained before any shall be bound. One partner may agree to a composition of a partnership debt, and the agreement will be binding upon the firm. A creditor's assent to a composition may be signified as well by surrendering debts and taking composition notes as by executing a composition deed. But after such assent has once been given, in whatever proper mode it may be indicated, it cannot be subsequently withdrawn by the creditor without the debtor's consent if the agreement be originally valid and be properly fulfilled. But if any one of the creditors be afterwards refused the benefit which a faithful performance of the agreement would afford him, it will cease to be binding upon him. So, unless payment of the sum stipulated in the agreement for composition be made at the time appointed, the original debt is revived. Any creditor who joins in a composition is not allowed to include in it only a portion of his claim against the debtor, and sue for the amount of the residue. He must agree to a compromise of the entire claim, or else avoid entering into the composition arrangement. When a creditor signs his name to a composition deed without specifying the amount of the indebtedness, the agreement will be held applicable to the full amount of his existing claim. After a composition has been agreed upon with several creditors, every agreement or arrangement by which an advantage is secretly secured to any one of them, which is withheld from the others is a fraud upon the creditors from whom it is concealed, and consequently invalid. No securities given in pursuance of such an agreement will be enforceable. So, when there is an arrangement for a composition it is a fraud in any one creditor to sue the insolvent contrary to the terms of the compromise. Composition deeds and other agreements of a similar nature, if fairly made and executed, and not invalidated by any subsequent fraudulent transactions, will be duly carried into effect by the courts. The validity of such arrangements depends upon the same principles as the legal doctrine of accord and satisfaction. (See **ACCORD AND SATISFACTION**.) They accomplish practically the same results as bankrupt and insolvent laws, by securing a ratable division of an insolvent debtor's assets among his creditors as a condition of his full discharge.

Another mode by which insolvent debtors are accustomed to secure a division of their property among their creditors, without taking advantage of bankrupt laws, is by making an assignment in trust for the benefit of their creditors. The assignee of the property becomes a trustee, and the creditors are *cestuis que trust*. Such a transaction is governed by the general rules pertaining to all modes of assignment in trust, and the assignee stands in the same position with reference to his rights and defences against third persons as the assignor. He is under the same responsibility as all persons who are authorized to administer a trust fund, and is held to a faithful discharge of his duty. The mode of making the assignment and of distributing the assets received is frequently regulated by statute. It is also sometimes provided that a schedule of the debts payable and the available assets be delivered to some magistrate, with an affidavit as to its accuracy, and also that the assignee shall give a bond with sufficient sureties. If the assignment is fraudulent, it may be set aside. Before the enactment of the U. S. bankrupt law a debtor might make in some of the States what were known as preferential assignments, by which the claim of one creditor might be preferred to that of another; but this act prohibits the making of such assignments within a specified time (two months) before the filing of the petition in bankruptcy. Such an assignment, if made, is void, and the assignee in bankruptcy may recover the property from the party receiving it. The claims of all the creditors must be paid proportionately. **GEORGE CHASE. REVISED BY T. W. DWIGHT.**



**Inspira'tion** [from the Lat. *inspiratio*; Gr. ἐμπνεῖν or ἐμπνέειν, to "breathe into" or "upon," to infuse into, to inspire (the soul) from some supernatural source. In the classics it may be the mind under the influence of any divinity, but the New Testament, by the use of the adjective θεόπνευστος (2 Tim. iii. 16), defines this source to be the one personal God], that superintending influence of the Holy Spirit over the minds of Scripture writers which secures such a record as God designs. The subject is important, as attempting to answer the question, Have we in the Bible an infallible guide to religious belief and practice? The method best adapted to an impartial consideration of the moral evidence is—*first*, indications of the superhuman origin of the Bible; *second*, objections to the same; and *third*, specific inspiration.

**I. SUPERHUMAN ORIGIN OF THE SCRIPTURES.**—Of the lines of argument indicating this, the following may here be given.

1. *The Scriptures of the Old and New Testaments constitute a unique book*, being (a) the product of many writers scattered over a period of ten centuries, and so without the possibility of consulting as to the design or character of each other's writings; and yet, (b) though independent compositions of many men in different ages, still a self-consistent whole—a unity in doctrine and method, in both respects unlike all other books. At the same time, (c) it has a thoroughly historic basis and application, thus rendering a unity, on the one hand, more difficult, and affording on the other a valuable test of credibility. "This alone sharply discriminates it from all other so-called sacred books, from which the historic element is almost wholly wanting." (Rogers.) (d) Through great veneration for it, especially on the part of the Jews, it has been preserved in such marvellous purity that the most careful criticism and collation of manuscripts finds occasion for few important, and very rarely of fundamental, changes. Furthermore, (e) that is true of the Bible which has been realized in no other book—it can be translated into all languages and still retain its import, its force, and, to great extent, its beauty.

2. *The Thoroughly Monotheistic Character of the Scriptures is against the Supposition of their Human Origin.*—For (a) they were written at a time or times when all nations were polytheists, and yet from beginning to end they assert the existence of *one only true God*. Moreover, (b) how is it to be explained that monotheism should be taught by a people whose "fathers worshipped other gods," and who, once reclaimed, were disposed to relapse into idolatry?

3. *The Morality of the Bible shows a Superiority in these respects.*—(a) It makes God supreme as such, and will not allow human virtue to become separated from him or his honor. Connecting morality with theology, it subordinates virtue to religion. (b) In Scripture the heroic virtues most highly applauded by men are regarded as inferior to the *passive* ones of forgiveness, patience, and submission. (c) Its incentives to virtue are duty, God's will, his holiness, his favor, and blessedness the fruit of holiness—quite unlike those urged in the schools of philosophy. It is to be added (d) that its superior morality is nevertheless one which, in its process of attainment, is in conflict with the sentiments and current maxims of mankind.

4. *The Religious Teaching and Method of Scripture are Peculiar to Itself.*—If not in making God everywhere supreme, and having for its design to set men right with God, that Christianity, its religion, which is pre-eminently the sum of its teachings, has many things that are *sui generis*. (a) Its author appears in a character altogether his own—human, divine, man, God, both in one; without beginning of days, yet in time incarnate; sinless, yet dying for sinners. As the infidel Diderot confessed, it lies not within the possibility of human genius to invent such a character. (b) The Bible teaches salvation—impossible without him—secured by and in the incarnate Son of God. Hence, both as a possibility and in its method, salvation, as taught in Scripture, is divine and supernatural. (c) Notwithstanding this, rather in consequence of it, Christianity is represented to be *exclusive* of all other religions. But (d) it allows no coercion, but leaves its claims, though universal and morally inflexible, to the intelligent and voluntary acceptance of all, while yet, (e) though allowing no compromise of doctrine or method, and requiring faith as the test of either, it boldly announces a certain and abundant future success to the Christianity which it advocates.

5. *Could the Human Intellect Produce such a Book?*—It has, to a greater extent than any other book, held the attention and enlisted the interest of mankind for centuries; has shown itself adapted to the wants of all; "has gone hand in hand with the moral and intellectual cultivation of the species;" and "its very presence as a believed book has rendered the nations emphatically a chosen race."

(Coleridge.) And if not from God, the Bible presents the fourfold anomaly: (a) It would substitute for all human the one God-ordained system, although the tendency of the race has ever been from God to man-devised religions. (b) Nowhere else is human nature willing to represent itself, as the Bible does, destitute of restorative energy, and requiring a divine interposition to save it from itself. And if produced by men, then (c) by a people whose history it condemns, whose belief it opposes, and whose morality was not adapted to receive it; and (d) as no other book has been able to do even approximately, it has impressed the different classes of its readers in all ages with a sincere and reverential conviction of its *divine origin*.

**II. OBJECTIONS.**—These may be put into three classes:

1. *Those which seem to Invalidate the Claim of the Bible as being from God.*—Examples: Since all from the first needed it, why was revelation delayed so long, and then given to so few? If from God, why has the Bible, on the one hand, so many things insignificant, and, on the other, many that are obscure? And how can a book which is from God sanction cruelty and injustice? This whole class of objections may first be met by analogy, like that of Butler. Similar and equally weighty objections lie against "the constitution and course of nature;" hence, why should those who admit theism object to the word of God because of what is found equally in the *system of things* which he has ordained and controls? Analogy, indeed, can only silence objections by showing it *just* as reasonable to admit the Bible as the course of nature to be from God; while the word of God often aids in surmounting difficulties which Nature herself cannot do even in her own sphere. For example: in the course of nature war, famine, and earthquake destroy the good and bad alike, but when God orders Amalek destroyed the judgment is seen to be penal, because that people is declared ripe for destruction. If the innocent Son of God is permitted to suffer for the guilty, this is justified by the work of grace as a whole, which satisfies law and justice, and rises higher than the possibility of pure law. And if it is for man's good that many things lie before him in obscurity, requiring patient study, as nature does, revelation is given, it must be remembered, to those on probation, and that an intellectual is necessary before and in order to a moral probation, and that both are best secured by a communication of God's will neither too clear nor too obscure.

2. *Objections Presumptive against Plenary Inspiration.*—Apparent discrepancies, inaccuracies, seeming conflict with science. The objections cannot be here discussed *seriatim*, but the following remarks may indicate the proper treatment of them: (a) The language of sense and sight, not of science, is alone adapted to all peoples and times, and Scripture writers—who are to be interpreted accordingly—have wisely chosen the former. (b) If a mistake is really found in the Bible, if a date, a reading, a historic statement, is *proved* to be wrong, the correction is, in so far, to be made, and can be, without invalidating other parts. (c) Nothing is to be feared from the most thorough scientific inquiry if it be honest, but assumptions and hypotheses should not disturb the biblical student until fully verified and accepted in their appropriate field of science. (d) As in the past the most careful inquiry has lessened the number of supposed errors, so we have reason to believe it will be in the future, and that science and Scripture will in the end be admitted not to conflict. "With all the pains and ingenuity which have been bestowed upon the subject, no charge of error, even in matters of human knowledge, has ever yet been substantiated against any of the writers of Scripture. But even if it had been otherwise, is it not conceivable that there might be infallible divine teaching in all things spiritual and heavenly, whilst on mere matters of history or of daily life prophets and evangelists might have been suffered to write as men?" (Prof. Browne of Cambridge, Eng.) "We have no means of settling definitely whether a *posse peccare* in minor matters may or may not be compatible with a divine revelation communicated through human media; but certainly till inaccuracies, fairly and incontestably proved to be so, are brought home to the Scripture, we seem logically justified in believing that as it is with nine-tenths of the alleged contradictions in Scripture, so it is with the alleged inaccuracy." (Ellicott.)

3. *Objections from the Nature itself of Inspiration.*—It has been said that a full inspiration should give identity of expression when the same events are narrated by different writers; which is evidently not the case. And again, that inspiration must involve a suspension of the writer's own powers, but that intimation is given that they are still free. Further, that men, being themselves fallible, could not be the media of infallible truth. And, moreover, as by Kant, that the writers could not clearly distinguish a state of inspiration from their own thought. To which class of objections it is replied (a) that inspiration must be neces-



sarily a secret miracle, not cognizable by common consciousness, but yet clearly so by those made the subjects of it, and to be received on their testimony if credible men. (b) No theory of inspiration can be tenable which does not allow freedom and individuality in the writers. At the same time (c) it is claimed for the Scripture writers that, though in themselves fallible, they are kept from error in that for which they are employed by the divine Spirit. "Human instrumentality . . . has been moulded by the Holy Spirit into the organism of revelation—each ray of the divine light has been borne to mankind through the medium best suited for its transmission; and yet, while borrowing in its course that particular hue which the medium lends through which it passes, it retains, no less sensibly, the purity of the source from which it streams." (Lee.) It may be observed that objections to the inspiration of Scripture are raised in one way or another from its human element, and that it depends largely on the use made of this what theory shall be adopted—whether the Bible shall be received, and how far, as infallible.

III. SPECIFIC INSPIRATION.—The theories need to be distinguished and the proof given.

A. THEORIES.—These would group themselves into three classes, according as the Bible is held to be *not at all* from God, *partly* from him, or *wholly* from him.

1. *The Bible is, in no Peculiar Sense, from God.*—*Naturalism* or *Positivism*, ignoring a personal God, logically rejects revelation; *Pantheism*, regarding everything alike divine and inspired, can admit nothing to be *peculiarly* so; and *Rationalism* finds as much in Homer and Plato to call inspired as in Isaiah or Paul.

2. *The Bible is Partially Inspired, since it contains, but is not, a Revelation from God.*—Varieties are—(a) *parts only* are inspired; (b) the writers possess a consciousness, however high, differing, not in kind but in degree only, from that of others. (c) There must be a "unifying faculty" which is subjective. This class, in all its varieties, finds it not difficult to assume degrees of inspiration, but not easy to determine the authority for Scripture; while, moreover, the subjective state of the individual becomes the criterion in each particular case.

3. *The Bible, being from God, possesses a Full Inspiration.*—(a) The mechanical theory of dictation, the writers being mere amanuenses, would indeed give plenary inspiration, but not the manifold human element, nor the variety in style and freedom of the writers which everywhere prevail. It is hence to be rejected for (b) the dynamic theory, which holds to the divine superintendence throughout, but affirms the result to be gained through the free activity of the writers' own minds. "Inspiration is that divine influence under which all parts of the Bible have been committed to writing, whether they contain an account of ordinary historical facts or the narrative of supernatural revelation." (Lee.) If God communicates his will, it is *through*, as well as *to*, man, and in a genuinely human form. But a distinction is to be made between *revelation* and *inspiration*. The former refers rather to the divine thought communicated—not otherwise knowable; the latter, to the record of whatever truth God would have recorded. Hence, there may be revelation without inspiration, as to Balaam and Nebuchadnezzar; and inspiration without revelation, as through all parts not directly revealed. The Bible thus contains a revelation, and is an inspiration.

B. PROOF.—1. *Presumptive.*—(a) All the lines of argument showing the Bible to be superhuman; e.g. its brief, graphic, but unadorned narrative, as in the Gospels: its simple comprehensiveness, as the Ten Commandments, which convinced an able but infidel lawyer that they could not be human. (See under I. of this article.) (b) A revelation granted, and this because supernatural instruction is needed, inspiration may be presumed, since a mere human record of whatever truth would not be an infallible guide. (c) The doubtful attitude into which we are thrown by denying inspiration favors it, since without this we could have no objective standard of religious truth binding on all, and (d) inspiration may be presumed from the thoroughly harmonious commingling of the prophetic and miraculous with the historic and didactic portions, which is everywhere found. If Scripture is the divine in the human, the human seems at all points pervaded by the divine like an incarnation. (See T. Lewis, *Divine Human in Scripture*; also I. Taylor's *Hebrew Poetry*, and H. Rogers's *Superhuman Origin of the Bible*.)

2. *More Direct.*—(a) The Scripture writers distinguish between a divine communication and their own subjective state, *false* prophecy being subjective only, "prophecies of the deceit of their own heart," the *true* having a valid ground outside of their own mind, like the roll of a book in which was written "the word of the Lord" (cf. Jer. xxiii. 25, 26, and Ezek. ii. 9, 10). (b) The writers imply their

belief in the organic unity of Scripture by quoting and using what others had said, all such utterances being treated as binding; also, by assuming often a pregnancy of meaning in the original words. (c) Inspiration of the New Testament writers. [Note. Paul, one of the most important writers, was an apostle miraculously prepared for this office (Gal. i. 11, 12), which he claimed (1 Cor. ix. 1-5), and which was admitted by others (Gal. ii. 9). All other New Testament writers were apostles, save Mark and Luke. Whether they wrote, Mark under the supervision of Peter, and Luke under that of Paul, or were directly inspired, their writings certainly have been more readily received than some other portions. Hence, the argument for the inspiration of the New Testament is substantially that for the inspiration of the apostles as such, and is summarily this:] (1) The apostles were promised divine direction when arraigned as witnesses: "Take no thought how or what ye shall speak. It is not ye that speak, but the Spirit of your Father that speaketh in you" (Mark x. 19, 20). (2) And were to be kept from mistakes in their official testimony: "The Spirit of truth . . . will guide you into all truth, and he will show you things to come" (John xvi. 13). Also in respect to the past: "He shall bring all things to your remembrance" (John xiv. 26). And (3) The Spirit was to co-operate in their testimony (cf. John xv. 26, 27, with Acts i. 6-8). (4) They affirm their own inspiration: "We have received . . . the Spirit which is of God . . . that we might know the things of God, which things we speak, not in words which man's wisdom teacheth, but which the Holy Ghost teacheth" (1 Cor. ii. 12, 13; Eph. iii. 2-5); while (5) They assume without argument that others will admit their inspiration: "When ye received the word of God which ye heard of us, ye received it not as the word of men, but as it is in truth the word of God" (1 Thess. ii. 13; iv. 8). Accordingly, (6) they speak and write as for God and with his authority: "Maketh manifest the savor of his knowledge by us in every place." (See Rom. xv. 15-19; 2 Cor. ii. 14; iii. 5; iv. 5; v. 20.) (d) Inspiration of the Old Testament. (1) The New Testament gives proof of the inspiration of the Old, recognizing the three parts of the Jewish Scriptures—the Law or Pentateuch, by referring to or quoting various passages, and saying, "God commanded," or "Ye reject the commandment of God;" the *Psalms* (Hagiographa), as in Mark xii. 36, "David said by the Holy Ghost;" and the *Prophets*, Luke xiii. 31, etc. Moreover, our Lord speaks of the customary divisions, and then combines the three as "Scriptures." "All things must be fulfilled which were written in the law of Moses and in the prophets and in the psalms concerning me. Then opened he their understandings, that they might understand the Scriptures" (Luke xxiv. 44, 45). (2) The Old Testament contains in itself corroborative proof. For example, the prophet must speak, though he might die in consequence. (See Jer. xxvi. 11-14.) *Pretenders* were to be severely punished even by death (cf. Deut. xiii. 1-5 with Zech. xiii. 3 and Jer. xxviii. 11-17). It is further suggestive that direction was given to record historical events: "Moses wrote their goings out according to their journeyings, by the commandment of the Lord" (Num. xxxiii. 1, 2). Finally, the Old Testament writers, like those of the New, affirm that they speak in the name of the Lord: "The Spirit of the Lord spake by me, and his word was in my tongue. The God of Israel said: 'Best they should hear the law and the words which the Lord of hosts hath sent in his Spirit by the former prophets'" (2 Sam. xxiii. 2, 3; Zech. vii. 12).

Such is the outline of proof—necessarily of a moral character, but found to be cumulative—that in the Scriptures of the Old and New Testaments we have an objective standard provided by God himself as an infallible guide to religious belief and practice.

J. R. HERRICK.

**Inspired, The, or The Community of True Inspiration.** a small sect of Christians who trace their origin both to the old German Mystics and Pietists, and through the "French Prophets" to the Camisards of France. They accept the teaching of Böhmö and Schwenkenfeld. They reject the sacraments, practise to some extent communism in respect of property, and are evangelical in doctrine. They profess at times to receive divine inspiration, passing into a somnambulistic state. They have communities in Iowa and Canada. From 1844 to 1863 they had a flourishing community at Ebenezer, West Seneca tp., Erie co., N. Y., whence they removed to Amann, Ia.

**Installation** [Low Lat. *in*, and *stallus*, a "seat"], the ceremonial act by which an ordained minister is formally put in possession of his office and empowered to exercise its functions and receive its emoluments. In the English Church the ceremonial form differs according to the office conferred, and also the name, *intronization* being the technical term in reference to a bishop, and *induction* for



the lower clergy, while *installation* properly refers to the office of a canon or prebendary in a cathedral church. In the Congregational Church of America the term applies to all ministers, and is distinguished from *ordination* as being the conferring of the pastoral office over a particular church.

**In'sterburg**, town of Prussia, in the province of Prussia, at the confluence of the Angerap and the Inster. It carries on a considerable industry in weaving, tanning, brewing, and distilling, and a brisk trade in corn and linseed. It owes a great deal of its prosperity to a number of Scottish families which settled here in the seventeenth century. Pop. 7185.

**In'stinct** [Lat. *instinctus*, "incitement"]. Instinct, in popular language, is generally contrasted with reason. It is spoken of as an entity, a principle controlling the lower animals, and peculiar to them. Instinct more properly implies a peculiar mode of action which may prevail in the lower animals or man. It is a name for a class of impulses and capabilities that give rise to actions apparently connected with voluntary powers—actions for the benefit of the actor, but independent of intelligence. Instinctive acts thus simulate intelligent action, while there is no comprehension by the actor of ends, or of means in relation to ends. Such comprehension, wherever found, is the work of intelligence. But instead of attempting at the outset to frame a concise definition of instinct, we shall give a series of definitions and explanations which will aid us in understanding the nature of instinctive actions, and their relations to functional and reflex action on the one hand, and intelligent action on the other.

1. An *instinct* may be defined as an impulse to a particular kind of action which the being needs to perform as an individual or representative of a species, but which it could not possibly learn to perform before it needs to act. Instinct, as a general term, properly includes all the original impulses (excepting the appetites) and that apparent knowledge and skill which animals have without experience. There are some actions which have been regarded as instinctive that are probably only reflex; that is, actions produced without volition, as the immediate effect of some stimulus. The stinging by a bee is plainly a reflex action, because the abdomen of the bee when severed from the thorax will not only thrust out the sting, but will direct the sting towards the part that is touched. But when the bee flies at an enemy in defence of its nest, the act is instinctive, as that term is generally used. The definition of reflex action has been so extended by some as to embrace all the acts which we term instinctive. (*Descartes, Herbert Spencer.*) We cannot, however, regard the return of fishes to their breeding-places, the migration of birds, or the storing up of food by animals of different kinds as in any proper sense reflex actions. They are so complex, involve so much of time and space for their completion, and so simulate the wisest and most skillful actions of intelligent beings, that they at least deserve a specific name, which we have in the word *instinctive*. The activities properly denominated instinctive may be classified into four groups: (a) Impulses arising beyond the sphere of the appetites, or ministering to the appetites, as the impulse to migrate, to store food for winter; also the desires so called in man. (b) Ability (knowledge?) without instruction for meeting the demands of the appetites and desires, and for doing those things essential for the continuance of the individual and the species. (c) Ability (skill?) without instruction or practice to carry out the plans necessary for the good of the species, as the various methods of securing food, the building of nests, and care of young. (d) Ability (knowledge?) arising independently of any demand of the appetites, as recognition of certain enemies without instruction or experience.

Three things are involved in the highest manifestations of those activities which are together labelled *Instinct—impulse, knowledge, and skill*, or an *ability* that in action simulates both knowledge and skill. In the animal kingdom, as now existing, we find impulses to specific actions, and so much of apparent knowledge and skill belonging to each species as shall enable its members at birth to begin life successfully; just as a certain completeness of organs is given to them at birth that the vital processes may go on to perfection. As the physical system develops, new instincts are developed to secure the proper use of organs and the proper relations of the whole being to the world. However the result may have been secured, we now find, as a matter of fact, that structure, function, and instinct in all species supplement each other in a wonderful manner. The special manifestations of instinctive action illustrative of these general propositions are exhibited by animals, chiefly, in the following manner: (1) By those acts that supplement physiological functions, as in the choice of food, the methods of securing it, and the union of the sexes.

(2) By the natural recognition of certain enemies, and by those specific acts to avoid them, common to all members of the same species. (3) By the use of special structures, as the fang of the rattlesnake for defence and the use of the oil-gland by fowls in dressing their feathers. (4) By those acts necessary for the existence of communities of different kinds of individuals, as in the case of bees and ants, where individuals from the same mother have different instincts, but all working together for the welfare of the species. (See *BEE* and *ANT.*) (5) By the development of special impulses incidental to the parental relation for providing for and defending the young. (See *DAUER.*) (6) By the structure of complicated homes characteristic of different species. (7) By the peculiar impulses of the young, by which they are at once brought into proper relations to their parents and the world. The young of our hoof-bearing animals, for instance, must seek the udder for themselves, as the mother cannot aid them. (8) By the change of impulse and habit in different stages of existence of the same individual for its own advantage, as among insects. (9) By those impulses and actions of animals demanding certain changes in other beings to complete their work, as the formation of oak-galls to complete the work of the insect in providing for its young. (10) By the many cases in which the instinctive act exactly supplements structure and function, as in the honey-bee, which has the function in the rings of its body of secreting wax, and in its mandibles instruments for forming a cell. Instinct prompts the bee to use the instrument and the product of its function to construct its comb. (See *BEE.*) (11) By the interaction of the instinct of the mother and that of the young, as when the fowl gives the note of warning, and the young instantly scatter from her and hide, because she cannot protect them. (12) By those cases, as among fishes and many insects, in which the young never see the parent, never have an opportunity to learn from one of their kind, and yet instinctive impulse directs them in the same way and in the best way in all the exigencies of life.

A careful study of the subject shows the great difficulty of distinguishing instinctive action from reflex on the one hand and from intelligent on the other. This difficulty arises from the fact that the different kinds of acts are often alike in their results; and in the chief field of their manifestations—that is, among the lower animals—we have no means of determining their nature but observation as to the method and the condition of the action. Whether there is among them conscious relation of the actor to the act it is impossible for us to learn, except by inference. Reflex and instinctive acts are both in the same line, for the benefit of the individual in which they appear, or when against the welfare of the individual they are for the welfare of the species to which he belongs. As both classes of acts are in the same line, and are alike in their results, it becomes difficult, not to say impossible, to apply a satisfactory test for determining the class to which certain acts belong. The young bird just from the egg raises its head and opens its bill to receive food. Whether that act is simply reflex, or belongs to those acts properly denominated instinctive, we cannot certainly determine. But the act is in the same line as the instinctive work of the bird when, becoming older, it seeks food for itself. Instinctive acts commend themselves to reason as the best possible for the being that performs them; and in the lower animals they so simulate intelligent action, and seem to be so intimately joined to it in man, that it is here also very difficult to apply in a satisfactory manner any test for distinguishing one kind from the other. Hence arises the difficulty of proving that the lower animals ever perform any acts higher in kind than instinctive. They plainly learn by experience, and as a consequence of that experience perform acts that they would fail to perform without it. They come to have great power in interpreting the actions and words of men. Many facts seem to imply that there is in some of the higher animals an apprehension of means in relation to ends. As before intimated, such an apprehension is intelligence.

Instinctive impulses appear in man, and the instinctive principle of action plays an important part even in his higher nature. Hamilton says: "We can hardly find a more suitable expression to indicate those incomprehensible spontaneities themselves, of which the primary facts of consciousness are the manifestation, than *rational or intellectual instincts*." (*Metaph.*, Bowen's ed., p. 205.) Pres. Hopkins says: "What is conscience but a rational instinct, a guide without comprehension, but rational, because it reveals itself as the voice of God, which all instinct is without thus revealing itself?" (*Mor. Science*, 1st ed., p. 244.) The impulse of worship seems to be plainly instinctive. It is sure to appear in some form under proper conditions.

*Theories.*—The prevailing theories in regard to instinctive action may in the main be reduced to three: (1) That



these impulses and capabilities were the direct gift of the Creator to each species as its essential outfit. This theory would be satisfied with the doctrine of special creations, or the doctrine of evolution according to a plan, by which new organs and new instincts are co-ordinated in the evolution of new species from one form, as the organs and instincts of the individual are co-ordinated in its evolution from the egg. The essential thing in this theory is that each species shall have as an original gift all those instinctive powers and capabilities essential to its existence as a species and the development of its members as individuals. (See *EVOLUTION*.) (2) That what we call instinct is simply the accumulated results of individual experience, fixed by repetition and received by the living races by inheritance. Every instinct, according to Lewes, is an "organized experience," a "lapsed intelligence" (*Nature*, Apr. 1873; "its genesis [is] from actions that at first were tentative, in other words intelligent" (*Problems of Life and Mind*, vol. i. pp. 208, 209). (3) Mr. Darwin, while allowing that some intelligent actions may become converted into instincts, and be inherited, claims for the greater number of complex instincts an entirely different origin; that is, "through the natural selection of variations of simpler instinctive actions" (*Descent of Man*, vol. i. p. 37)—variations that arise from unknown causes. He thus attempts to explain the most complex cases of instinctive action. The full discussion of his theory as a whole, and the specific cases under it, would require more space than we can give. (See *Chadbourne's Instinct in Animals and Man*.)

The impulses of animal life are functional, as the appetites, or instinctive, as the desires. In the animal kingdom, as it now exists, the impulses find their expression through complex directing powers that supply for these lower animals the place of acquired knowledge and skill in man. In specific simple acts instinctive action depends upon the impression made upon the senses. Instinct may thus be deceived by appearances. In many cases we find instincts the exercise of which immediately after birth is essential to life, as the instinct of the young mammal to seek the udder. We cannot conceive of a time when such an instinct was not essential to all such animals. If we attempt, with Darwin, to explain the comb-making instinct of the honey-bee by the influence of natural selection in preserving those swarms that built best, because they used less honey in making wax (*Origin of Species*), we cannot help asking how we shall account for the similar six-sided cells in the nest of the wasp, where no honey is used for making wax and no food stored for winter. We can only state as a fact that we find each species as it now exists endowed with such instincts as enable it as a whole to hold its place in the world against all ordinary contingencies. We find these impulses and directive powers arising in individuals as naturally as the different organs develop by growth. The young animal comes into the world with a physical organization sufficient for carrying on the work of the physical system to perfection, and with instinctive impulses and capabilities sufficient for beginning and carrying on the same work. While physiological forces carry on the growth within the body, instinctive forces adjust the relations of the animal to the external world. Through these impulses and activities all animals are urged on to their end in that course best for the species as a whole.

In man the instinctive impulses are never wholly self-directive, but are conditional for the action of that rational nature through which man as a free agent seeks his own end. Consult Kirby's *Beekeeper's Treatise*; Wood (J. G.), *Homes without Walls*; Bain, *The Senses and the Intellect*; Lewes (G. H.), *Problems of Life and Mind*; Darwin, *Origin of Species*; *Descent of Man*, etc.; Wallace, *Natural Selection*; Spalding, *Macmillan's Mag.*, Feb., 1873; Flourens (P.), *De l'Instinct et de l'Intelligence des Animaux*; Chadbourne, *Instinct in Animals and Man*. P. A. CHADBOURNE.

**Institute of France, The.** occupies a unique position amongst the learned societies and academies of Europe. "Many countries," says Ernest Renan himself a member of the Institute, "have academies which may rival ours by the fame of their members and by the importance of their works. France only has an *Institut* where all the efforts of the human mind are bound together in one sheaf: where the poet, the philosopher, the historian, the philologist, the critic, the mathematician, the physician, the astronomer, the naturalist, the chemist, the lawyer, the sculptor, the painter, and the musician may call themselves comrades."

As early as 1570, France had begun to imitate the Italians in the matter of academies, but it was half a century later before its famous Academy arose. In a time of intellectual activity literary coteries and clubs naturally flourish. To one of these knots of literary men Richelieu made a proposition that they should be converted into a corporate body. With some hesitation the offer was ac-

cepted. The king's letters patent were issued early in 1635, and after two years and a half more the sanction of the Parliament of Paris was obtained, and the *Académie Française* came into existence, the first learned society endowed and erected into a corporation. Its chief aim was to fix the standard of the language, and a dictionary was the thing first thought of. This has not advanced very far, and is less likely to be completed now than when it was first undertaken. A less elaborate dictionary was issued under its supervision in 1694, and has since been frequently reprinted. In order to flatter the inordinate vanity of Louis XIV. a committee of the Académie were entrusted with the task of drawing inscriptions for medals, etc. in commemoration of his glories. In this manner commenced the *Académie des Inscriptions et Belles-Lettres*, which afterwards devoted itself with great spirit to the study of antiquities. In 1666, Colbert founded the *Académie des Sciences*; between 1648 and 1671 arose three more academies, sculpture and painting, music, and architecture, which at the last-named date became the *Académie des Beaux-Arts*. These learned societies were all dissolved by the National Convention in 1794. The Revolution did not seek to discourage literature and learning, but to break the continuity which bound them to the royal and aristocratic past of French history. For the continuance of their work the same convention in 1795 called into existence the Institut, which was in almost every way the heir of the older associations. The three men who had the greatest share in the framing of its constitution were Lakanal, Daunou, and Carnot. It was divided into three classes, which were respectively charged with the advancement of (1) physical sciences and mathematics, (2) moral and political sciences, (3) literature and fine arts. The Directory nominated 48 persons, a third of the members, and these elected the remainder. Some changes were introduced by the First Consul, who looked with suspicion upon a body which might be expected to unite intellect and independence. The modifications of 1803 were in some respects improvements. They involved, however, approval of the chief of the state for each election, and provided that moral and political sciences should only be studied in their relation to history. Whilst mathematics and physics flourished by the aid of Lagrange, Berthollet, etc., the literary sections displayed comparatively little spirit. In 1807 they undertook the continuation of the *Histoire Littéraire de la France*, commenced by the Benedictines. The Restoration was as eager to link the institutions of France with its monarchical past as the Revolution had been anxious to destroy their continuity. The Institute indeed escaped destruction, but a royal *ordonnance* in 1816, after naming the foundation of the old academies as one of the glories of the ancestors of Louis XVIII., declared that it was right and proper *convenable* to restore to each class of the Institute its original name, in order to bind together their ancient glory with that which they had since acquired. The opportunity was taken of depriving twenty-two persons of their right of membership. David the painter, Monge, Lakanal, and Sicéys were amongst the illustrious victims of royal spitefulness, and their places were supplied by nominees of the Crown. The unity which had been one of the aims of the Institute was broken. During the Restoration it languished. The revolution of July did something to improve upon the feebleness and intriguing spirit with which it had become infected. Guizot in 1832 restored the class which Napoleon had suppressed. Ten of its old members were found, and they constituted the nucleus of the present *Académie des Sciences, morales et politiques*. The fear of socialism, which reigns perennial in the well-to-do Frenchman's breast, led Cavaignac to ask the aid of this Academy in combating the communistic ideas of the wearers of blouses. They complied, and produced a volume of small treatises which, as Renan remarks, probably had not a single reader amongst those whom they wanted to convert.

In its present organization the Institute is made up of five distinct academies, each having its own officers, meetings, publications, etc.: (1) The *Académie Française*. Its origin has already been given. The number of members is restricted to forty. The elections have not always depended upon merit alone. The old Academy rejected Molière and the influence of Monsieur Dupanloup, bishop of Orleans, sufficed to procure the rejection of Littré on his first candidature. That the Academy which in 200 years has not got past the letter G of its dictionary should still find the man who single-handed accomplished the medieval labor, is indeed a striking proof that the highest culture is not sufficient to ensure either the presence of justice or the absence of bigotry. A body like the Academy is generally conservative, yet in 1827 it had the courage to address the king in opposition to the laws for the restriction of the press. The Academy has the function of a high jury. The French, with their passion for liberty, have also a pre-



dilection for authority, and the approbation of the Academy is one of the prizes to which young authors look forward. The Academy is rich. The annual allowance from the state is about 85,000 francs, a good part of which goes in members' allowances. The prizes for eloquence and poetry absorb 1000 francs. Whether any prize poem will ever go down to posterity may be doubted. The Montyon prize for virtue is well known; 20,000 francs are yearly divided amongst poor persons who have distinguished themselves by some specially virtuous act. Montyon also left a yearly prize to reward the publication of the book most conducive to public morality. De Toqueville's work on American democracy is perhaps the most notable book which has received this distinction. The *prix Gobert*, founded in 1823, is for the most eloquent work relating to the history of France. Thierry and H. Martin have been amongst its laureates. It amounts to 10,000 francs. There are many other prizes. In 1860 the emperor created a grand biennial prize of 20,000 francs to be awarded in turn to the special studies represented by each of the five academies. The first to whom it was awarded was M. Thiers, who immediately presented it to the Academy for the foundation of an annual prize of 3000 francs.

(2) *The Académie des Inscriptions et Belles-Lettres*.—It has 40 ordinary, 10 honorary, 8 foreign associates, and 50 corresponding members. It has the distribution of various prizes, the most important being that founded by Gobert for the most learned work relating to the history of France.

(3) *The Académie des Sciences*, having 65 ordinary, 10 honorary, 8 foreign, and 100 corresponding members. The most brilliant names in French science have adorned the roll of this academy. Arago, Ampère, Gay-Lussac in the new, as Lagrange, Laplace, Haüy in the old, have made it illustrious. The descriptions of French trades, the maps, etc. issued by the old academy were useful in their day, and have still their value. In the new academy associated work has been left aside, and it is the individual labors of its members which are chronicled in the *Comptes rendus*. This, by its frequent publication, is now the most important scientific periodical. The eight foreign members of the academy may be regarded as those whom a competent though not always unprejudiced jury regard as the most eminent men of science out of France. It is related that when Dalton, during his visit to Paris, attended a session in his capacity of foreign member, those present stood up in his honor, a compliment which was not paid to the emperor when he joined their body.

(4) *The Académie des Beaux-Arts* has 40 ordinary, 10 honorary, 10 foreign associate, and 40 corresponding members. It distributes a number of prizes and has published a dictionary of the fine arts.

(5) *The Académie des Sciences morales et politiques* has 40 ordinary, 6 honorary, 6 foreign associate, and 40 corresponding members.

Such is the manner in which the Institute is divided. All the year there are five academies, but on the 14th of August the Institute holds a general meeting of all the sections of which it is composed. There is a fine and rare library attached to the Institut. Each member receives a salary of 1500 francs, and the *secrétaires perpétuels* have 6000 francs per year. The Institute is a creation of which France may well be proud. Beyond the personal renown of its members and the value of their labors, the organization of the Institute shows that its founders had a clear sense of the *solidarity* of knowledge—a unity sometimes lost sight of in our own age, when nearly every savant is a specialist. The tradition of the old academies has stereotyped the internal form of the Institute, and probably prevented a growth and classification of its sections more in accordance with the present state of science.

WILLIAM E. A. AXON.

**Institutes** (of JUSTINIAN). See LAW, by PROF. T. W. DWIGHT, LL.D.

**Institution** [Lat. *statuere* in, "to establish on"], a word which is especially used in the plural, and applied to a series of doctrines and to some establishments. For instance, there are political, judicial, theological, medical, charitable, and other institutions. It applies more to the immaterial aim than to the material and practical representation of said institutions. A political institution means a whole set of such or such doctrines, rather than the kind of government entrusted with their application. A medical institution applies to the intellectual part of the concern, and not to the building in which the intellectual and medical programme is carried out. When anybody speaks of the "political institutions" of the U. S., he thinks more of the *spirit* of the political principles embodied in the American Constitution than of the letter of that Constitution, which provides for the organization of a Congress, of a supreme court, and other practical applications of the Declaration of Independence. FÉLIX AUCAIGNE.

**Insurance** [from *in* and *sure*], in its most general definition, is a contract whereby one agrees, for a sum of money, to indemnify another in case the latter shall suffer loss by certain specified risks. It is termed *marine* or *fire* according as it is applied to maritime or fire risks. It was unknown to the ancients, and had its origin in the exigencies of modern commerce. It was first applied to mercantile adventures. The fear of pecuniary ruin by the loss of ship or cargo checked the spirit of enterprise. Few were so wealthy as to be able to bear alone so great a loss, but by dividing the risk amongst many it was seen that the inconvenience to each of the proportion of loss which he assumed might become trivial. Thus originated the practice of insurance, which has for its purpose to break the force of the blow of calamity by increasing the power of resistance. Though known and practised amongst the commercial communities of Southern Europe at a much earlier period, it was a comparative novelty in England in the time of Elizabeth. During the last century, however, it has received an immense development, until now every prudent person who has property at risk takes care to seek shelter under a policy of insurance. The principles which underlie the contract are substantially the same to whatever subject-matter they may be applied, modified only as the peculiarities of the different risks assumed may require. Its fundamental principle is indemnity for loss; and so far as it is made the means of accomplishing more than this it passes over into the domain of speculation and leads to the mischiefs of gambling. It is a personal contract—insuring not the thing, but the person interested in its preservation, against loss to him by reason of injury to it. The person who undertakes to pay in case of loss is termed the insurer; the danger against which he undertakes, the risk; the person protected, the insured; the sum which he pays for the protection, the premium; and the contract itself when reduced to form, the policy. So general, if not universal, was the use of a policy in the early history of the contract that until quite recently it has been doubted whether writing was not essential to the validity of the contract; but it is now conceded that both a verbal agreement to issue a policy and a verbal agreement to insure are valid, even though the contract covers a period of time longer than one year, as the contract may be determined by the happening of the event insured against within a year, and so is not within the statute of frauds. Even corporations, which, under the ancient stringency of the common law, could only bind themselves by a contract under seal, it is now held, may contract verbally by their officers or other agents. All persons competent to make other contracts may be parties to this. Formerly, and to some extent at the present day, as in the case of the "Lloyd's"—a society of private capitalists who met at Lloyd's subscription-rooms in London, and subscribe to such proportions of the risks there offered as they may feel inclined to—the business was carried on by private underwriters; but the superior advantages of public companies now give them the chief control. Policies are for a sum agreed upon to be paid in case of loss, hence called *valued*; or for whatever the amount of the loss may prove to be, hence called *open*; for a fixed time or for the voyage, hence called *time* or *voyage* as the case may be. The contract is complete and binding when the parties have agreed upon all its terms, and, if entered into by correspondence, when the letter accepting the terms offered is deposited in the office for transmission in due course of mail. If the terms are agreed upon and the policy is made, it will be valid and binding without delivery if it be the understanding of the parties that it shall become operative from and after a certain act. The law will not permit an illegal business or an unlawful enterprise to be encouraged by insurance. Nor will it permit the insurance of an interest the protection of which would manifestly tend to evils which would more than counterbalance the advantages of insurance. Seamen's wages, for instance, cannot be insured, as this would tend to render them indifferent to the safety of the ship upon which their wages depend. Whatever, however, does not contravene good morals or sound public policy may receive protection. Subject to these limitations, any property or interest in its preservation may be the subject-matter of the contract. Policies without this interest to support them are *wager policies*, and are prohibited as a species of gambling and a temptation to fraud and crime. The insurance, however, in the same policy of a lawful and a prohibited interest will not vitiate the policy as to the lawful interest if it be separate and distinct. Insurable interests are as manifold as the relations of individuals to property. Whoever owns property, whether by an absolute or qualified, legal or equitable title, or any interest in property, or has upon him the duty or in him the right to protect and preserve it, may insure it to the extent of his interest or liability. The owner of a vessel or house, the



mortgagee or lessee, executors, administrators, and trustees, common carriers and bailees generally, consignors, supercargoes, whose compensation depends upon the success of the voyage, or under instructions to land goods and wait for a market, captors and salvors having a well-founded expectation of an allowance out of the property captured or saved, and sheriffs and other officers of the law having the care and custody of property, may severally insure their respective interests. The insurability of the interest depends not at all upon its value, provided it has some value; nor is it any objection that several interests in the same property are coincidentally insured. The mortgagor may insure to the full value of the property, and the mortgagee or successive mortgagees may at the same time insure to the amount of their several interests, and each may recover, in case of loss, to the extent of the several amounts insured, though the aggregate of these may much exceed the entire value of the property. A partner may insure the entire stock of the copartnership, being interested in the whole, out of which to realize his share, and for the same reason, no doubt, a stockholder in an incorporated company may insure the entire property of the company to the amount and for the protection of his interest. The vendee in possession of real estate under a contract partly performed, but not enforceable at law or in equity, since the vendor may not refuse to perform, an insolvent debtor, in the possible surplus which may come to him after payment of his debts, and the mechanic who has a lien upon the building for labor or materials furnished, have also insurable interests. The interest must subsist at the time of effecting the policy and at the time of the loss, though it need not continue the same in amount or without interruption. If an insured vessel be sold, and repurchased during the time covered by the policy, the policy will cease to protect during the period of alienation, but will reattach and protect after the repurchase. Stocks of goods may be sold and replaced by others under the same policy. The shifting interests of a mortgagee who makes advances and receives payments from time to time may likewise be protected.

The policy is generally issued upon an application containing certain statements descriptive of the property insured and the circumstances affecting the risk. These statements are termed representations, and if by reference or otherwise they are made part of the policy, they are termed warranties. A warranty is an agreement that a fact is as stated, or some future act or omission shall be as promised, upon penalty of forfeiture of all rights under the policy if the statement prove untrue or the promise be not kept: while a representation, being no part of the contract, but only an inducement thereto, need be true only so far as is material to the risk. Untruthfulness or mistake in a representation, unless material to the risk, will not avoid the policy, while either in a warranty, unless imputable to the fault of the insurer, will be fatal, whether material to the risk or not. A warranty that a ship is American, or that she will sail at a given time, will be violated if she be British or sail at a different time. A representation that a building is occupied in its several parts for certain specified purposes will not be vitiated though it appear that one of the apartments be differently occupied, or not occupied at all, if the difference be not material to the risk. Warranties are not favored, because they work forfeitures and sometimes operate very harshly; and for this reason, if from the form of expression or other circumstance there is chance for doubt, a statement will be regarded as a representation rather than a warranty. It is sometimes said that representations should be more full in marine than in fire policies, since in the former there is less opportunity for personal inspection. But this depends upon circumstances, and is no rule of law. That representation is material which induces the insurer to take a risk upon terms less favorable to himself than he would have made had he known the truth. The same test applies to a concealment, which is the withholding a fact which ought to be made known, if such fact be not known or ought not to be expected to be known, to the insurer, and is known, or ought to be known, to the insured. Mere silence about a matter which is unknown, or about which it is not to be expected that the insured would know, is no concealment. Warranties specially stated in the contract are express. There are also implied warranties, as of ownership, seaworthiness at the commencement of a voyage policy, and against deviation—which is a voluntary departure from the usual course of the voyage without necessity or justification, as, for instance, to avoid capture or to save life—and such a substantial alteration as to change the identity of the risk assumed. Seaworthiness is fitness for the particular service, and is one thing at one time and place and another at another, according to circumstances. The voyage commences when the vessel casts loose from her fastenings and

moves on her way, and ends, in the absence of express stipulation, when she has been moored in safety at her port of destination. Like a voluntary deviation, a substantial alteration in the property insured against fire, such as to make the risk in kind a different one from that assumed, will avoid the policy. Ordinary and reasonable changes and repairs, however, made in good faith for the due preservation of the property or prosecution of the business, will not vitiate the policy, although alterations increasing the risk are forbidden. If such repairs were deemed alterations, the insured could neither preserve his property from decay nor avail himself of improved methods of business—a result which neither party can be presumed to contemplate. Alterations in the surrounding circumstances, as in the erection of new buildings and changes not under the control of the insured, unless by special stipulation, are not imputable to him. If the insurer will protect himself to this extent, he must so stipulate in clear and express terms. In point of fact, however, the rates of premium are based upon an assumed liability for such risks; nor would any prudent person accept a policy which did not protect him from dangers beyond his control, the most perilous perhaps to which he is exposed. It is common to except from the risk such articles, uses, and trades as are regarded as specially hazardous, and the risk of which the insurer does not wish to assume. This is done by including them in a memorandum of articles excluded, in which case nothing can be claimed as indemnity in case of loss, or damage to, such excluded articles; or it may be done by a clause in the policy prohibiting the use of the premises for such and such processes, trades, or businesses, or for keeping or storing such and such goods, on penalty, unless specially authorized by the policy, of avoidance of the policy. In this case special authority is deemed to be given if the subject-matter of insurance, by fair interpretation and according to usage, includes the excepted article or use. The insurance of a stock in trade, for instance, "such as is usually kept in a country store," will permit the keeping of all such goods as are usually kept in such stores, although some of them may, by the terms of the policy, be prohibited as hazardous. The insurance of a "furniture business" will likewise permit the use of such oils and varnishes as are customarily used in the manufacture and preparation of furniture for sale, although the keeping and use of such oils and varnishes may be expressly prohibited. And if, during the period of insurance, some new process not used or known before comes into vogue, it may be adopted by the insured without prejudice to his rights, unless it be of such a character as manifestly to make the risk greater than either party could have contemplated. It cannot be supposed that in such cases it is the intention of the parties that the insured shall be tied down to the methods and processes of the date of the policy, and deprived of the right to avail himself of such improvements as may be necessary to the successful prosecution of the business. "Use and keeping" mean habitual use and keeping. A mere casual use of a prohibited article—as, for instance, benzine or naphtha to be mixed with paint while repairs are going on, or the building a fire for the purpose of heating tar to be used in the course of such repairs—does not contravene a policy prohibiting the keeping of fire or the introduction of hazardous articles upon the premises. Nor is the permission by the insured of an unlawful act upon the premises a use of the premises for that purpose. Playing a single game of cards does not make the premises a gambling-saloon. Unless otherwise agreed, houses may be left vacant, tenants may be changed, factories may be worked or shut down, and property may be watched and cared for, heated, and lighted at the discretion of the insured; and stipulations for the use of care and precaution against fire are generally not warranties, but representations to be carried out by substantially doing that which is provided. In such case equivalents will do. Keeping ashes in any receptacle made of equally incombustible material is a fulfilment of an agreement to keep them in an iron receptacle. Notice is frequently required of any changes in the circumstances or surroundings of the insured property affecting the risk, in order that the insurer may have the option to continue or cancel the policy. Under this requirement notice need be given only of such changes as are material, and if within a reasonable time after notice the option to cancel is not signified, all objection to the change will be presumed to be waived, and the policy will remain a valid contract. And, generally, it may be said that whenever a condition has been violated, giving to the insured the right to treat the policy as void, any subsequent recognition by them after knowledge of the breach of the policy as a subsisting and valid contract, as by the acceptance of premiums or the doing of any other act from which it may be fairly inferred that the insurers do not mean to take advantage of



the breach, will be a sufficient answer to any attempt by them to set up the breach against a claim for loss. Alienation or sale of course suspends the operation of the policy, as when the property passes out of the hands of the insured, having nothing at risk he can suffer no loss; and if the alienation continue till the time of loss, nothing can be recovered by the insured. Having lost nothing, he can claim no indemnity. But there is no alienation so long as the insured retains an interest in the subject-matter, although that interest may have undergone a change or even suffered a great diminution. A mortgage is not an alienation, nor is a written agreement, with or without seal, to convey, nor is a descent of property to heirs; and such qualified changes in the title or interest will not work a forfeiture unless specifically so agreed upon. Even an absolute sale by one partner of his interest to his copartner is not to be regarded as an alienation, but rather a shifting of interests among joint-owners, so long as no stranger is admitted. As any substantial change in the relation which the insured holds to the property insured is a matter of consequence affecting the judgment of the insurer as to the quality of the risk and the propriety of continuing it, the character of the person insured being oftentimes an important element in making up the estimation, so it is of consequence to him to know the true state of the title and interest of the insured in the property insured, whether absolute or qualified or incumbered, or how otherwise, to the end that in adjusting the amount to be insured so much in value shall be left unprotected as to make the insured himself also interested in guarding against loss.

The sound principle of insurance is that the insured must be in such position that in case of total loss he must himself necessarily suffer loss. If he be insured to the full value of possible loss, he may be tempted to carelessness, or even fraud and crime. He may not only neglect all precaution to prevent the happening of the peril insured against, but he may be tempted to scuttle his own ship or set fire to his own house. To inquiries made touching these and various other circumstances affecting the judgment of the insurer upon the value of the risk the answers must be with precision and certainty if they amount to warranties, or only with substantial truth if they are representations merely. If no specific title be required, then any form or extent of title or ownership will be sufficient. A declaration of ownership simply is but a declaration that the applicant is in some form or sense an owner. In mutual insurance the true state of the title is more especially material, since the lien which such companies usually have upon the real estate they insure constitutes to some extent the capital of the company. It is therefore of importance that the title should be such that a lien will attach. Hence, a misrepresentation as to the title may be material in a mutual company, while it might be quite immaterial in a stock company. It is also material, and for the same reasons, that the insurer should know not only what insurance may already exist upon the property upon which insurance is applied for, but also whether any and what further insurance may thereafter be obtained. Upon these points, therefore, inquiries and stipulations are usually made. Other insurance is additional, prior, or subsequent insurance effected by the same person, or for his benefit and with his consent, upon the same subject-matter, risk, and interest. Owners of different interests may insure them respectively without violating the condition against other insurance. The additional insurance must also be valid, or it is no insurance. A policy by its own terms void if there be prior insurance without notice, will not be a breach of the terms of a prior policy to be void if other insurance be obtained without notice. When notice of subsequent insurance is required, it must be given within reasonable time, and if the insurers, having the option to cancel the policy upon such notice, neglect so to do for an unreasonable time, or meanwhile recognize the validity of the policy as a subsisting contract, they will be held to have waived the right to insist upon a forfeiture.

Over-valuation of the property insured is another mode in which the insurer may be misled into making a contract which he would not otherwise have made. While intending only to make the prudent contract of insuring one-half the value of the property, he may be led by over-valuation into the risky contract of insuring the property up to, or even beyond, its full value. If this over-valuation be fraudulent, or so gross as to justify the inference of fraud, the policy will be void, whether there be or be not any stipulation therein upon this point of over-valuation.

The assignment of the policy without the consent of the insurers is often forbidden, and is objectionable upon the same grounds as alienation is objectionable. The insurers may be quite willing to insure one person, while they might be quite unwilling to insure another, or that to that other should be transferred the interest in the policy. Strictly

speaking, a policy is not assignable or negotiable, so as to give the assignee the right, in his own name, to claim the benefit of the contract. In order to this there must be an assent of the insurers to enter into direct relations with the assignee, as by consenting to the assignment and to pay the assignee in case of loss. In such cases the assignee will be substituted for the assignor, and may recover as he, and only as he, could recover; so that if the assignor after the assignment violate any of the conditions of the contract, this violation will work a forfeiture of the right of both the assignor and assignee to recover under the policy. To avoid this result, the policy and property may both be transferred to the same person with the assent of the insurer, the assignee securing by a new note or other memorandum the obligations of the assignor towards the insurer. The transaction thus becomes substantially a new contract, rather than an assignment of an old one, and is not subject to be defeated by the delinquencies of the assignor, the original insured.

The premium is the consideration which the insurer receives for the risk he assumes, and is greater or less according as experience and observation have shown that the chances of loss upon the particular risk are greater or less. The premium is usually paid when the policy is delivered, but this is not necessarily so. And even though by the terms of the policy it can only become operative on payment of the premium, a delivery of the policy without insisting upon this condition will make it operative. It is a condition for the benefit of the insurer, and like other similar conditions he may waive it if he will. In the absence of express stipulation as to the modes of payment, a note or check sent by mail, if so requested, or any other ordinary mode of payment acceded to by the insurer or his agent having authority in the premises, will be sufficient. Should it so happen that the property insured is never exposed to the perils insured against—in other words, if the risk never attaches—the insurer may demand a return of the premium if he has not been guilty of any fraud. The whole premium, however, is earned if the risk attaches even for a moment.

In marine policies, unless restricted, the risk extends to all losses proximately caused by the perils of the sea—that is, all losses which happen fortuitously from the extraordinary action of the winds and waves, stranding, collision, lightning, and other like natural and unavoidable accidents connected with navigation. Besides these perils, it is usual in marine policies to insure against loss by fire, barratry—i. e. the fraudulent misconduct of the master or crew—theft, piracy, capture, arrests, and detentions. As no one can stipulate for immunity from the consequences of his own fraudulent or criminal misconduct, where the master of a vessel is also owner, barratry is not covered by the policy any more than a house is protected to the owner against loss by fire set purposely by himself. But in both marine and fire insurance loss by mere negligence of the owner or of his servants will be covered by the policy. In fact, as it is impossible for any one who has even a moderately extended business to give his personal attention to all the details, one of the prime objects of insurance is to guard against the negligence of servants. And negligence of the insured himself, not so gross as to warrant the inference of fraud, will also be within the risk. All losses directly attributable to the risk insured against come within the sweep of the policy unless there be an exception stated in the policy itself. Damage by fire may happen without actual ignition, as by cracking of glass, or the blistering of pictures, or the scorching of paint, or heating and thus destroying the value of certain articles of commerce. Damage by fire produced by lightning is within the risk, but damage or demolition by lightning without burning is not. To protect in such a case the insurance must be against loss by lightning. So damage by fire resulting from explosion, as of gunpowder, for instance, is within the risk. Explosion is but the burning of the gunpowder by sudden combustion, and if damage results by concussion from such an explosion it is damage by fire. But loss occasioned by the explosion of a steam-boiler, the bursting itself not being occasioned by unusual fire, and no fire supervening, is not a loss by fire. Whether such loss would be a loss by explosion is a mooted question, some holding that explosion is the remote and fire the immediate cause, while others hold that explosion is the immediate cause through fire. Damages and expenses in reasonable efforts to save the insured property from destruction, as by water, removal, covering up, or any other suitable means, are included within the risk of a fire policy. So are damages by falling walls if the walls fall by reason of the fire. If, however, they fall by their own inherent weakness, crushing the insured property in the ruins, whence fire supervenes, this is not a loss by fire, as the property is destroyed by the fall and not by fire. So loss by the bursting of a boiler, where—



by a vessel goes down at once, is not loss "subsequent to and in consequence of such bursting," the bursting and the loss being practically simultaneous. When a vessel sinks till the water reaches her furnaces and drives out the fire upon her woodwork, so that the vessel is burned to the water's edge, the loss is attributable to the fire, but for the superintention of the fire, she would not have sunk; otherwise not. When there are two concurrent causes to which the loss may be attributed, the predominant and efficient cause where the damage is indiscriminate will be deemed to be the true cause.

If it be doubtful what property is covered by the policy, the doubt will be resolved in favor of the insured. A house or building includes all the appurtenances necessary to the ordinary use of the principal building, and a mill includes the machinery by which it is operated. Property in trust is not limited to property technically held in trust, but includes all such property as the insured may have the custody and care of for special purposes; and a policy may be so worded as to follow and protect property as it passes through divers hands, as by expressly insuring goods "sold, but not removed."

When there is an actual total loss, the insured recovers to the full amount of his insurance if the property be worth so much, and there be no express limitation to a proportion of the loss. In marine insurance there is a constructive total loss whereby, when the property, though not entirely destroyed, is damaged to such an apparent extent as practically to render the voyage worthless as a pecuniary adventure, as where the damage exceeds one-half of the value of the vessel or of the goods, or the vessel be captured or detained by embargo, the insured may abandon the damaged or detained property to the underwriter and claim for a total loss, leaving the latter from that time forth to get what he can by sale or use out of the abandoned property. This rule promotes commerce by reinstating the insured immediately in his capital, wherewith to engage in new adventures, rather than to subject him to delay and possible ruin by further efforts to restore his shattered fortunes. It is at the option of the insurer whether he will abandon, and this option must be made within reasonable time, and notice thereof given to the insurer in order that he may at once avail himself of his right to treat the property as his own and make the most out of it. The abandonment carries with it all rights and claims on account of ship or cargo, so that if the ship be recovered and the voyage completed and made productive, the insurer will have all the benefit both of the property recovered and of the profits in the way of freights earned, or otherwise. In the U. S., however, only so much of freight goes to the insurer as is earned after the abandonment. When the loss is partial the rule in marine insurance is that the cost of repairing the vessel, less one third for the greater value of the new substituted for the old, may be recovered. But in fire insurance there is no right of abandonment, and no rule of proportionate deduction on account of the greater value of the new, actual indemnity being the limit of the right to recover. In either case, when goods are damaged, the insured recovers the difference between the value of the damaged goods as they are and the market price of sound goods of like kind. The adjustment of marine losses, when all the interests saved are to contribute their proportion of indemnity for those lost, is oftentimes a matter of great nicety, and comes under the head of general average, a peculiar and intricate branch of maritime law. There is less difficulty in adjusting losses under fire policies, where general average contribution is unknown. Under both kinds of insurance, however, there may be divers policies upon the same subject-matter, in which case, if the loss be less than the aggregate insurance, either insurer may be held for the entire loss, unless there be an average clause, as it is called, limiting his liabilities to his proportion of the loss. In case he pays it, he will have his claim over for his indemnity against each of his co-insurers. Only the actual loss can, however, be recovered by the insured from all the insurers. The amount of loss recoverable within the limits of the amount insured does not always depend on the value of the interest in the insured. If the insured has any insurable interest, and that interest attaches to the whole property, he may recover for the whole value. Thus, a commission merchant, actually interested only to the amount of his advances and commissions, may recover to the full value of the goods lost, holding any balance for his consignor. A mortgagee may insure to the full value of the property, and recover the whole loss, although the insured mortgagee may also recover to the full amount of his interest, and thus the insured be compelled to pay much more than the whole value of the property destroyed. The respective contracts are independent, and cover distinct interests, each of which may extend to the whole value of the property. Special

and extraordinary circumstances—as that the building insured is on leased land, and must be soon removed at great cost or forfeited, or that a house is about to be sold on execution, or that duties have or have not been paid on imported articles—do not vary the rule of damages. The fair market-value of the property, without regard to such circumstances, is the criterion of the amount of the loss. Sometimes the policy stipulates that the insured, in case of loss, shall recover only a certain proportion—two-thirds, for instance—of the actual damage. In such case the insured will be entitled to the whole amount of his loss if that does not exceed two-thirds of the whole loss. A partner after the death of his co-partner can only recover for loss to the partnership property as it was at the time of the dissolution by death. Goods bought after the dissolution will not be covered unless by special agreement. When the right to repair or rebuild is reserved to the insurer, as it sometimes is, as a mode of payment to which they may resort if they deem the claim for loss exorbitant, it is optional with him whether he will or will not avail himself of his right; and if he do not, the rule of damages is the actual loss, and not the cost of restoration, which may be, as in the case of an old and dilapidated building, greatly above the actual loss. If a new building be erected by the insured, it is not the cost of the new, but the value of the old one destroyed, that is recoverable. And the option of rebuilding must be made known without unreasonable delay. An agreement to replace goods stands upon the same footing. The insured is to be indemnified, and no more. If the insurer be prevented from rebuilding or replacing without the fault of the insured, as by the intervention of the public authorities, that is his misfortune, but no defence against the claim of the insured. When the insured is not designated by name in the policy, but is referred to indefinitely as "the estate of A" or "whom it may concern," the loss will be payable to all such persons as can bring themselves within the scope of the designation; and if the policy be to A for the benefit of whom it may concern, A will take the loss and hold it for the parties in interest. Sometimes disputes arise as to the disposition of the loss after it is paid or as to the right of the several parties in interest. But as a rule neither can claim anything from the other unless by the terms of the policy it appears that it was the intention of the parties that one should be benefited by the payment to another. If the loss be paid to a mortgagee, the insurer can neither require him to assign the mortgage, nor can the mortgagee require the money to be applied towards the reduction of the mortgage or to repairing the damage. Each party stands on his own contract as against the other, unless it appears to be intended that some third party shall have an interest, as where a mortgagee insures at the expense of the mortgagor. But when the insurer pays a loss caused by the wrongful act of some third person, against whom the insured might have brought an action, the insurer is said to be subrogated to the right of the insured against the wrongdoer, and may, in the name of the latter, recover against him whatever sum the insured might have recovered. This right is based upon the ground that it is just that the wrongdoer shall be made to bear the loss which he has occasioned. The liability of the wrongdoer is first and chief; and if the insured insists, as he may, upon proceeding against the insurer, he is in fairness bound to allow the insurer to use his name in proceeding against the wrongdoer. But if the insurer pay the loss, and afterwards the insured proceeds against the wrongdoer, the latter can claim no advantage by the payment. If A sets fire to B's house, and B gets his insurance, A cannot avail himself of this fact as a defence to a suit by B against A for damages. After loss the insurers must be notified, and generally agree to pay in so many days after proof of the loss. If no form of notice be agreed upon, any notice, verbal or written, will answer. Notice "forthwith" is notice without unreasonable delay, and should be given to the person designated in the policy, or, this wanting, to some officer of the insurance company or to some agent acting in its behalf. The proofs of loss must also be such as are required by the terms of the policy, and substantially in the form required and within the time specified. If the certificate of the minister of the parish or of the nearest magistrate to any particular fact, or that the loss is as stated, be required, such certificate must be produced before payment can be demanded; and if the minister or the magistrate in some sense named will not so certify, the insured must find in his claim. It is his misfortune that he cannot comply with the terms of the contract into which he has voluntarily entered, and which seems to be perfectly proper and fair. Such agreements should be avoided, or provision made for some substituted mode of proof, as, for instance, the certificate of some other satisfactory person. In fact, as the ordinary conditions are made by insurers in their own special interest, they may waive them if they please either in form



or substance; and if they receive notice or proof, however informal or imperfect or out of accord with the requirements of the policy, without objection, and do not give the insured to understand that they are insufficient and unsatisfactory, and in what respect, so that he may have an opportunity to supply the deficiencies, or if the insurers, by silence or otherwise, induce in the mind of the insured the belief that they are sufficient, they will not be permitted to interpose such insufficiency against a claim for loss. If upon the receipt of verbal notice of a loss the insurers declare they will not pay, this will relieve the insured from the duty of further notice or proof. The law does not require a useless formality. If stipulation be made that suit shall not be brought against the insurer unless within a limited time, the insured will be bound by it. It is reasonable to require that disputed claims should be brought to an early trial, while the facts are comparatively fresh and the witnesses are at hand. But an agreement that a suit shall be brought in a certain place or court, or that the whole matter in dispute shall be submitted to arbitration, has no validity. The law determines how and where suits shall be tried, and parties cannot by their agreements settle or unsettle the jurisdiction of the courts. And when to an action to recover a loss the insurers set up in defence any breach of condition, misrepresentation, or other matter, it is always a good reply that such breach or other delinquency is chargeable to the act or omission of the insurers themselves or their agent.

In mutual insurance the holders of policies besides being insured are also insurers. They are members of the company, and by virtue of their membership are obliged to contribute to the losses of their associates, and have the right to claim from them by way of assessment or contribution, in proportion to the amounts for which they are severally insured, indemnity for their respective losses. Rightly managed, it is the safest and cheapest form of insurance, since, whatever be the rate of premium, the associates participate in the profits; and if the premium be fixed sufficiently high the aggregate amount of premiums, paid or promised by deposit notes, will constitute a capital adequate under any but most extraordinary circumstances to meet contingent losses. J. WILDER MAY.

**Insurance, Life.** See LIFE ASSURANCE.

**Integral Calculus.** See CALCULUS.

**Intellect.** See MIND, by HON. W. T. HARRIS, A. M., LL.D.

**Intemperance.** See INEBRIETY, by PROF. WILLARD PARKER, M. D., LL.D., and INTOXICATION, by E. J. BIRMINGHAM, M. D.

**Intercalation** [Lat. *intercalare*, to "insert"], the insertion of supplementary days or months into the calendar in order to effect an adjustment between the civil and the natural year. (See CALENDAR, by F. A. P. BARNARD.)

**In'tercoarse**, tp. of Sumter co., Ala. Pop. 440.

**Intercourse (Right of) between States.** This expression can include political and commercial intercourse, together with the right of individuals to pass into or through a given country. No text-writer on the law of nations, so far as we know, maintains that nations are bound to have communication with one another by ambassadors; least of all would the claim to send resident ambassadors be admitted as having the nature of strict right. As for the right of commercial intercourse, it is hard to maintain that a nation may rightfully force another into such a relation. It must begin in a voluntary way, on terms agreeable to both parties. If, now, one of the states wants nothing that the other can furnish, with what right can the other, to satisfy its wants, compel it to take certain products? But if there is a theoretical difficulty in such demands, intercourse is pretty sure to begin whenever an honest, peaceable way of bringing it about be tried, because all men love to exchange, and can be soon made to see the advantages of so doing. As for the right of travelling into or across a country, if this be necessary in order that a nation may have access to the rest of the world, it seems to be a right, subject to such precautions as may prevent dangers from foreigners. T. D. WOOLSEY.

**Interdict** [Lat. *interdictum*, a "prohibition"], in European history, censure pronounced by the pope, by a synod, or by a bishop, withdrawing from particular persons or places, or both, certain religious privileges. It still exists in theory as one of the ecclesiastical censures of the Roman Catholic Church, but is seldom exercised, except towards individuals, who may be, for example, interdicted from entering a church. It is also sometimes pronounced against places where horrible crimes have been committed. In the Dark Ages the interdict was the most terrible of punishments. Every man's hand was against the interdicted person, and even great princes have been humbled by the power

of this censure. At one time no bell might ring or organ be played in an interdicted district: the church doors were locked; services were performed without solemnities and in secret: all crosses and ornaments were hidden; Lenten food only could be eaten: no one could give or receive a kiss; the Eucharist was not given except to the dying; no man could shave his beard or brush his hair until the interdict was raised. But few interdicts, however, were so severe as this, though at the best an interdict was regarded as a severe measure. The Church herself from time to time mitigated the terrors of this dreadful visitation. Among the most celebrated interdicts were that laid upon all France by Gregory V. in 998; that laid on England by Alexander III. in 1171 as a punishment for the murder of A'Becket; that laid by the same pontiff upon Scotland in 1180; by Innocent III. on France, 1200; on England in 1209 under King John; on Venice by Paul V. in 1606.

**Interesse Termini.** See LANDLORD AND TENANT.

**Interest** [Lat. *interest* (an impersonal verbal form), "it is of advantage"], the compensation paid for the use of money borrowed. The most convenient form of capital to be loaned, for both lender and borrower, is money. Hence, loans are most commonly made in money, and interest is always reckoned at a certain per cent. of a defined sum of money, which is called the *principal*; the per cent. paid is called the *rate*, and is usually stated as the rate per annum, though often payable at shorter intervals than a year. The compensation for the use of capital in the form of land and fixed improvements upon land is called *rent*. This is determined by other considerations than the money-value of the property loaned or leased. (See RENT.) But in the case of other kinds of property an estimate is commonly made of the value in money, and interest is charged accordingly at the current rate. Thus, one may purchase a steam-engine for a mill, or cotton to be worked up in a mill, and give his note for its value, to be paid at the end of six months, with interest. Or he may borrow of a friend the money with which, as an instrument of exchange, to make either purchase, and give his note on interest. The transactions are essentially the same. The engine or the material is what he wants, and what he actually borrows and uses as a part of the capital of his business.

The rightfulness of interest rests upon two facts: (1) The fact that capital is the result of past labor, preserved by self-denial in saving. One's right of property in that which he has earned and saved is indefeasible, and it is but simple justice that if the owner allows another to use his property instead of using it himself, he should be compensated. This is all plain enough in the case of the engine or the cotton, and the principle certainly holds good when by a simple exchange the property saved takes the form of money. It is the property-right which is to be recognized, the same always, whatever may be the material form in which it is embodied. (2) The fact that in the production of values present labor is crippled, almost fruitless, without the products of past labor—i. e. capital—to work upon and to work with. The effectiveness of labor is increased many fold by the capital joined with it. Hence, he who provides the capital may rightly claim to share with the laborer in the profit of the joint result; and the laborer can well afford to pay for the advantage he gains. The loan is made for the sake of bringing present labor into union with past labor, all the same whether it is money or that which money can buy that passes from borrower to lender. The etymology of the term "interest," and its fitness in this application, imply such a mutual advantage to borrower and lender. Where money is borrowed to provide for the immediate support of an individual or a family, or for some present gratification, the property which it represents is consumed at once, without a profit; but the loan is made in some anticipation of means to be realized from labor or other sources at a future day, and the consideration is, even then, a supposed advantage to the borrower as well as to the lender. This *interest* or mutual advantage marks the prime difference between a loan and a gift.

The general rate of interest in a community is determined by three considerations: (1) The average productiveness of industry; (2) the proportion between the supply of capital and the demand for it; (3) the degree of security given to contracts by the protection of law and prevalent moral sentiment. In a new country these considerations combine. Labor is very productive in developing new and rich resources: capital is scarce, because the hardships of pioneer-life repel the rich; and contracts are insecure, because law and social order and mutual confidence are not well established. Hence, the rate of interest in a new country is high. It declines gradually as, in the course of time, population increases, society becomes organized, wealth is accumulated, and the fertility of the virgin



soil and other primitive resources of nature are exhausted. In particular cases, especially of speculation, the rate of interest is affected by risk on the one hand and the expectation of great profits on the other. The general rate of interest is lowest in an old country, where the accumulation of wealth is large, industry is active, exchanges are rapid, and men's integrity and honor are sustained by sound public sentiment and guarded by good laws well executed. Great fluctuations in the rate of interest arise chiefly from the infusion of the element of credit in the currency of a country, and the consequent expansion and contraction of the volume of currency, with the reckless speculations, panics, and commercial crises incident thereto. Whatever imparts instability to the instrument of exchange must cause fluctuation in all prices and uncertainty to all contracts; and to all such influences interest is most sensitive.

A. L. CHAMIS.

**Interest, History of.** From the time of Thespis downward, as has been remarked by Bentham, there is scarcely an instance where a lender and a borrower of money appear upon the stage without the sympathies of the audience being enlisted for the latter. The philosophers of Greece and Rome never emancipated themselves from the current of popular opinion upon this subject, and their extant writings afford abundant proofs of the odium which they contributed to fasten upon the money-lender. Both the philosophers and the common people usually branded the money-lenders as the main cause of the decline of the Roman empire. The laws of Rome expressly authorized the practice, but the legislators were constantly attempting to regulate the terms of interest. The severity of Roman law against insolvent debtors drove men to exhaust every resource to maintain their credit; and the exorbitant interest exacted from the unfortunate confirmed the popular idea that "interest is wealth made from the poverty of others." The evils above indicated had become an important feature of society at the time when the authority of the Christian Church was first brought into the scale. The Christians of the first two centuries were poor, industrious, and of simple tastes and habits; hence they had little occasion for availing themselves of the services of the money-lender. Accordingly, the writings of the Christian Fathers unanimously reflect an intense condemnation of "usury," and when Christian ascendancy stamped its image upon the earliest legislative codes of semi-barbarian and mediæval Europe, divine and human anathemas were alike incorporated therein. The "usury" of the Middle Ages was simply what the name implies, the price of the use of money at whatever rate; it was strictly synonymous with interest. It cannot be doubted that the rates of interest then current would now be deemed exorbitant. The monopoly of usury which the Jews long enjoyed was owing not more to their peculiar genius for monetary transactions than to the fact that they alone had no conscientious scruples against the practice. It was not until the eleventh century that the Lombards, and still later that the Christian merchants of Florence, became the rivals of the Jewish usurers. It was the revival of the commercial spirit among the republics of Northern Italy that initiated that conflict of opinion between the Church and the world which has finally culminated during the present century in a general recognition of the lawfulness and usefulness of money-lending. When the Eastern commercial enterprises of Venice, Pisa, Genoa, and Amalfi proved the possibility of obtaining from capital in legitimate trade a rich return, it was no longer thought a hardship to pay handsomely for the control of capital for investment. The old idea was that men would only borrow money from usurers under the impulse of hard necessity; thus, when the business was presented in another and an agreeable light, as a means of obtaining a share of the "wealth of Ormus or of Ind," the credit system of the modern world was founded. It is true that the earliest Reformers did not innovate upon the current theological view of usury, and some Protestant writers, like the celebrated secretary of state of Queen Elizabeth, Sir Thomas Wilson, vehemently denounced it as contrary to the law of nature; but the commercial enterprise of Protestant countries silently and speedily produced a healthful change of sentiment. Salmasius and Grotius lent the great weight of their names to the same scale, and by the middle of the seventeenth century the lawfulness of money-lending was generally admitted in Protestant countries. The battle was harder among the Catholics, from the immense mass of theological tradition which had to be overcome. The means finally employed for effecting a change of opinion consisted of subtleties of casuistry as to permissible cases of usury; then a distinction was drawn between a fair and an excessive rate of interest; the former was justified, and the odium embodied in the word *usury* was exclusively attached to the latter. By an easy gradation of thought the modern meaning of

the word was ascribed to the Fathers of the Church and to the canons of mediæval councils in their denunciations of usury. Finally, the civil and canon laws were held to imply merely the right to regulate the amount of interest, which has accordingly been the sole object of recent legislation thereupon. It was reserved for the economists of the school of Locke, Hume, and Adam Smith to expose, and ultimately to overthrow, a legislative folly which had been current for so many centuries. The final demonstration of the utility of interest was made by Jeremy Bentham in his famous *Letters on Usury* (1787). It only remains to add a few statistical data upon legislative enactments affecting the rate of interest. In the earliest Roman law-code, the *Tuicæ Tables* (B. C. 450), the rate of interest was established; the restrictions were removed by the Licinian laws 366-365; the former law was re-established 357; the rate was again lowered 347; all interest was prohibited by the Genusian law 341; the Sempronian law extended a uniform legislation to the allied Italian nations 193; the rate was fixed at 6 per cent. by Justinian A. D. 529. In England, the rate was fixed at 10 per cent. by act 37 Hen. VIII. c. 9, 1543-44; the taking of interest was prohibited by acts 5 and 6 Edw. VI. c. 20, 1552; the latter was repealed by 13 Eliz. c. 8, 1570; interest was restricted to 8 per cent. by act 21 Jac. I. c. 17, 1623; to 6 per cent. by act 12 Car. II. c. 13, 1660; to 5 per cent. by act 12 Ann. st. 2, c. 16, 1713; finally, most of the preceding legislation was repealed by act 17 and act 18 Vict. c. 90, of Aug. 10, 1854. (See the works of Locke, Hume, A. Smith, Turgot, Bentham, J. B. Say, M. Chevalier, J. S. Mill, and W. E. H. Lecky.)

FORSTER C. BEISS.

**Interest, Law Concerning.** In the comprehensive sense in which the word *interest* is popularly used, it denotes any compensation for the use of money which a debtor pays to the creditor, but in legal usage it has obtained also a technical meaning by which it is distinguished from usury, and denotes such a measure or rate of compensation as is allowed by law. Usury, on the other hand, is an excess of compensation above the rate established by law. This is a distinction whose original introduction into legislation is attributable to the belief which was generally prevalent in the early history of the Christian Church and in the Middle Ages that it was wrongful and contrary to the express teachings of Scripture to receive any payment for the use of money. The necessities of trade caused legal sanction to be given at an early period to the taking of a certain specified percentage upon the sum loaned, but the common conviction that there was an element of extortion and oppression in requiring compensation for money still remained apparent in the stringent laws which were enacted to prevent the taking of higher rates than that which was established as legal. (See *Usury*.) The results of this theory are abundantly manifest in the law even at the present day. Until within a few years nearly all of the States of this country had laws prohibiting the taking of more than an established rate of interest, and though the prohibition has been removed in a few of them by recent legislation, in the majority of them such laws are still in force. In England there was an established legal rate until 1854, but in that year all the laws against usury were repealed. In the U. S. the lawful rate generally prevailing is 6 per cent. upon the sum loaned, or principal. In New York it is 7 per cent. In some of the States there is a particular rate declared applicable to ordinary transactions in the absence of any special agreement, but the parties are allowed to stipulate for a higher rate if they desire. Laws to prohibit the taking of usury never prevent an agreement being made for a lower rate than that established by law, but only forbid the parties from stipulating for a higher rate. The obligation of a debtor to pay interest upon the sum which he owes may either arise out of contract, in which he expressly or impliedly agrees to its payment, or may be in the nature of a penalty imposed upon him for default in the payment of the principal at the time when it was due, or for the misuse of trust funds committed to his charge. In the one case, interest is owed to be payable by contract, while in the other it is given by way of damages, notwithstanding there is no agreement for its payment. A contract to pay interest may be either express or implied. It is *express* when there is a positive stipulation between the parties that the amount payable to the creditor shall bear interest, and the time from which it shall be reckoned, the manner in which it shall be payable, and the rate at which it shall be estimated may be distinctly specified in the agreement. If no rate is mentioned, the legal rate is understood. No higher rate, however, can be agreed upon than that established as legal unless such an agreement is expressly authorized by statute. If by the terms of the contract the debt is to bear interest, but the time from which it is to be reckoned is not stated, interest will generally be computed from the date of the contract



or the time when it is made. The stipulations of the parties may relate to the computation of interest not only until the time of the maturity of the debt, but after the debt has become due and in case of default in payment. If a rate be fixed upon not obnoxious to the laws against usury, and it is provided by the terms of the contract that interest shall continue to be reckoned at the same rate if the debt be not discharged when payable, the computation will be made at this uniform rate until the time of actual payment. If, however, there is no stipulation as to the rate of interest which the debt shall bear after maturity, it becomes an important question whether the rate agreed upon as computable before maturity shall continue after that time, or the rate fixed by statute. Upon this point the decisions are still in conflict, so that no settled rule can be stated. The prevailing doctrine appears to be that interest shall be reckoned at the statutory rate after the default, since the provision in the contract can have no force after that time in the absence of express specification, and interest must be given, if at all, by operation of law, and by way of damages for the debtor's failure to pay at the time appointed. A contract to pay interest is *implied* when an agreement is entered into of such a nature that an obligation to pay interest is naturally incidental to it, and is to be presumed as within the contemplation of the parties. Thus, it may be inferred from the course of dealing between the parties, as where interest has before been charged and allowed under like circumstances, or where it has been the uniform practice of the creditor to charge interest, and this was known to the debtor at the time of the transaction by which the debt was incurred. So, where there is a general usage in any particular trade or branch of business to charge and allow interest, parties having knowledge of the usage are deemed to contract with reference to it. For example, interest is not usually recoverable on an open running account for goods sold, but if there be a usage in any particular State or locality for merchants to charge interest upon such accounts at the expiration of a certain term of credit, and the purchaser can reasonably be presumed to be acquainted with such usage, he will be chargeable with interest, which will usually be computed at the legal rate.

Interest recoverable as damages is given by operation of law, and does not depend upon contract, express or implied. It is the general practice in the courts of this country to award interest, computed at the legal rate, for default in the payment of any liquidated debt or claim at the time it becomes due. The time from which it is reckoned is the date when payment should properly have been made. This practice depends partly upon the ground that the debtor in retaining the amount due gains the benefit of its use, and should justly reimburse the creditor at a rate of interest which measures the income which might ordinarily be derived from the money, and partly upon the ground that the debtor should be punished for his default by increasing the amount of the debt. The time when the debt becomes payable is frequently fixed upon by the parties when the transaction occurs out of which the debt arises, and the interest will be computed in such cases from the date appointed. Interest will be given as damages whether the debt bore interest before maturity or not. In many instances the time when the debt originally becomes payable does not depend upon agreement, and must be determined by special rules. The general principle is that interest will be computed from the time when the creditor might have brought action to enforce his claim. Thus, when money is lent to another or paid to his use, interest accrues from the time of the loan or payment. When goods are sold, and no time of payment is specified or credit given, interest is computable from the day of the sale. A note payable on demand draws interest from the time of the demand. It should be, however, noted that for some purposes a note on demand is due immediately: *e. g.* for the running of the statute of limitations. (See *LIMITATIONS, STATUTE OF*.) So, generally, wherever there is an unsettled claim with no determinate time for payment, the creditor may demand payment, and, if it be refused, interest will run from the time of the demand. When credit is given, interest will be calculated from the expiration of the time of credit. Upon a judgment it is reckoned from the time when the judgment was rendered. Judgments did not bear interest at common law, but this rule has been generally changed in this country. Upon unliquidated demands interest is not, in general, collectible, since there is no specific sum upon which it can be reckoned until the amount of the claim is liquidated or ascertained, and usually no definite time at which payment is to be made and from which the interest can be computed. Thus, a debt for board and lodging, where there was no price or time of payment expressly or impliedly fixed, will not draw interest until it is reduced to a judgment, or its amount otherwise liquidated.

While, as has already been seen, interest cannot be charged upon the items of a running account for goods sold or services rendered unless there be a particular usage to the contrary, still, after there has been a mutual agreement of the parties upon a balance struck, and the amount due thus ascertained, interest may generally be computed upon this balance. It is a common practice for creditors, when they desire to secure the settlement of an open account, to send to the debtor a statement of the items of the account, and of the amount computed to be payable, and the assent of the debtor to the correctness of the balance may be presumed from his failure to make objection to its accuracy after a reasonable opportunity for examination. This presumption, however, is not conclusive, but may be rebutted. Generally, after the lapse of a reasonable time, interest will commence to run upon the balance stated. In cases where the debt arises from an unliquidated claim, but the time of payment was determinate, and the amount then due could have been ascertained by computation, it is the law in New York, and generally in this country, that interest may be collected upon that amount from the appointed time, upon the principle that that is certain which can be rendered certain. The English courts, however, do not allow interest in such cases. It is on the ground that a creditor's claim is unliquidated that interest is not generally given in actions for damages for tortious injury. In cases of the conversion of personal property, however, interest is usually recoverable upon its value from the time of conversion, since that value is in general readily ascertainable, and the retention of the property is a continued wrongful act from the time it is taken or wrongfully detained. The same rule is also applied in some other cases of injury to property where the amount of the claim can be computed. It is not so general a practice in the courts of England as in this country to award interest as damages for the wrongful detention of a debt. It is only in relation to particular modes of incurring indebtedness that interest is held collectible on this ground.

Interest given by way of damages for the maladministration of trust funds is not grounded upon the detention of a debt after it is regularly payable, but depends, in the main, upon the same principles—*viz.* that the owner of the property or debt is entitled to the percentage which might be obtained upon it by a faithful administration of the trust, and that interest may be chargeable as a means of punishment. Thus, guardians, executors and administrators, and trustees of every kind will be charged interest upon all trust funds in their hands which it is their duty to invest, upon failure on their part to do so within a reasonable time or with proper precautions against loss. Generally, simple interest will be charged against them, or the rate which would have been obtained by a judicious investment, but in cases of gross delinquency compound interest may even be recovered.

Compound interest, by which is meant interest computed upon a sum consisting of the principal and previously accrued interest, is not in general recoverable at law. To require its payment is thought to savor of usury and to be unduly oppressive upon the debtor. Even though there be an express agreement that compound interest shall be paid, the contract will not be usually enforceable for more than simple interest. When, however, interest has already accrued and become payable, an agreement that it shall be added to the principal, and that interest shall be subsequently computed upon the new principal thus formed, will generally be deemed valid. In like manner, compound interest may be payable in certain kinds of mercantile transactions by virtue of usage. And even where it would not generally be recoverable upon an ordinary contract in which its payment was agreed upon, yet if it is actually paid it cannot be recovered back. When partial payments are made from time to time upon an interest-bearing debt, it is necessary to apply them towards the discharge of the debt in such a way that interest shall never be reckoned upon interest. The following is the rule which has been generally adopted: Compute the interest on the principal from the time when interest became payable to the first time when a payment alone, or in conjunction with preceding payments, shall equal or exceed the interest due on the principal. Deduct this sum, and compute interest on the balance as before. By this rule there is never any balance of interest remaining after deducting a payment upon which subsequent interest can be reckoned.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

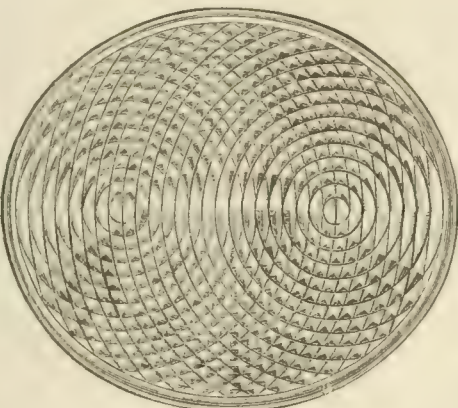
**Interference** [Lat. *inter*, "between," and *ferire*, "to strike"], a term used in hydrodynamics, acoustics, and optics to denote the mutual influence of different undulations which conspire or conflict in consequence of the superposition of one upon the other. A gross illustration often employed in explaining this idea is to refer to the appearances presented by the intersecting rings formed in water into which two pebbles have been thrown. The elevated rings



and their intervening depressions are undulations: the molecular movements are vertical, while the undulation progress is horizontal. When the rings intersect, the points where two ridges cross are doubly elevated: the points where two hollows cross are doubly depressed; while the points in which a ridge in one system crosses a hollow of the other are neither elevated nor depressed. The term applied to this influence of one undulation upon another is *interference*.

The interferences of liquid waves are finely illustrated in the undulations of mercury contained in a vessel of elliptical figure. If a disturbance be produced at one of the focal points of the ellipse, the circular waves proceeding from this will, by reflection from the sides of the vessel, form a second similar system having for its centre the other focus. If the corresponding points of interference be connected, they will form, as the figure shows, two sets of curves, elliptical and hyperbolic, having for their common foci the foci of the original ellipse.

FIG. 1.



The interference of waves of sound is often very perceptible. It is observed only in musical sounds, because it can only be observed in those whose undulations are continuous and uniform: and such sounds are musical. It is best observed when the waves are long—as in the case of the grave tones of the heavier organ-pipes. The sinking and swelling of the sound, called by musicians the *beat*, is owing to one of the interfering waves being slightly longer or shorter than the other. In many repetitions this slight difference of length accumulates until it reaches half an undulation; when, if the two waves originally conspired—that is (to borrow again an illustration from the water), if their two crests were originally superposed—they will, after this difference has crept in, be in conflict; or the crest of one will fall upon the hollow of the other. During this interval, a sinking of the sound will have been observed; but immediately after, as the difference of path goes on increasing from a half to a whole undulation, the sound will swell again as the two crests once more approach superposition. It need hardly be remarked that the interference of waves of sound of *perfectly equal length* would not be perceptible to a person standing motionless; for, in that case, the resultant sound would be *constant*. Should he endeavor, by moving about while two bodies of precisely similar pitch are sounding, to pass from the points of conspiring to those of conflicting undulation, he would not find it easy to detect these points for several reasons. In the first place, when the molecular movements are normal to the wave front, as in the case of sound, there is no complete interference, or approach to complete interference, except where the waves are tangential, or approximately so, to each other; except, therefore, in or near the line of the centres: and except, it may be added, when the distance between the centres is an exact number of half undulations. Again, at the *intersections* of sonorous waves, whether the molecular movements conspire or conflict, the resultant of these movements is never so great as the sum, nor so small as the difference, of the two components. The difference of intensity between the maxima and minima of sound in such cases will not be striking, unless they succeed each other with brief intervening intervals of time, as in the case of the *beats*.<sup>\*</sup>

It is, however, by this second method that we detect the interferences of light, and not at all by the first. That is to say, we discover these interferences by moving the eye through the space where they exist, in the course of which

movement the points of maximum and minimum brightness are easily observed; or we let fall the interfering rays upon a white surface, when the same points will become manifest by their difference of illuminating power. The first method is best, especially if the eye be assisted by a lens; but the second is that which was used by the earliest observers. We cannot detect the interferences of light by observing periodical maxima or minima, like the beats in music, because of the almost inconceivable shortness of the undulations. But if the waves of light were as long as the waves of sound, interferences might easily be made to manifest themselves in this manner.

The phenomena attending the interferences of luminous waves are such as to compel us to assume that the molecular movements are not, as in sound-waves, normal to the wave front, but are, as in liquid-waves, in the wave front itself, and normal to the direction of progress. In liquid waves gravity determines the azimuthal direction of these movements, confining them to the vertical plane passing through the wave centre, or origin of molecular disturbance. In the case of luminous waves, there is no such determining or constraining force; and hence it happens that ordinary light has no determinate plane or azimuth of vibration; but its successive undulations assume every variety of azimuth. There is no proof, however, that changes of azimuth are incessant: in other words, that many undulations, in fact many thousands or perhaps millions, do not follow each other, usually, in the same azimuth, between the changes. This, indeed, is probable, since the ethereal vibrations take their character from those of the luminous body; and these may reasonably be presumed to have a certain persistence in their modes of vibration, or at least not to undergo incessant and abrupt changes. Beyond a certain limit, however, this persistency could not continue; nor could there, among the changes which occur, be a predominating disposition to return to one azimuth oftener than to another, or to remain in it longer, without imparting to the light, more or less decidedly, the character of polarization. If five hundred millions of the mean undulations of white light were to follow each other in a single azimuth, they would occupy less than the one-millionth part of a second; and, accordingly, if five hundred millions of such undulations should take place in each of a million different azimuths successively, the whole would be performed in one second, and no instrumental test could detect polarization in the aggregate beam. The polarization of light consists, therefore, in the determination of all its vibrations to a single plane. (See POLARIZATION.)

When two polarized rays follow each other in the same path, or intersect under a very acute angle, it is obvious that, if their planes of polarization agree in azimuth, they are in condition to interfere. If in phase of undulation they are perfectly accordant, the two waves will be superposed, and the molecular velocity of the resultant wave will be equal to the sum of the velocities of the two components; but if there is a difference of phase between them amounting to exactly half an undulation, then the crest of one wave will fall on the hollow of the other, and the resultant molecular velocity will be equal to the difference of velocities of the components. If the difference of phase is any other fraction of an undulation, the resultant molecular velocity, and consequently the resultant intensity of the luminous effect, may be deduced by means of a mathematical formula into which this difference of phase enters as an element. If the azimuths of molecular motion are different, the effect of interference on molecular velocity and luminous intensity will vary with this difference; and the character of the movement itself will change with difference of phase, becoming elliptical or even circular, instead of remaining as originally rectilinear. If the difference in azimuth is  $90^\circ$ , the luminous intensity is not affected by difference of phase, and hence the interference is insensible to direct observation; but on testing the condition of the light by suitable optical methods, the molecular movement may always be resolved into its two component rectilinear movements.

Rays of common light, if the difference of their paths be not very great, will interfere, notwithstanding the fact that their undulations are confined to no determinate azimuth. This fact proves, what has been above assumed, that the changes of azimuth in common light cannot be incessant. But there is one condition absolutely indispensable to produce interference in any case; it is that the rays shall have a common origin. If the light subjected to experiment be unpolarized, the necessity of the condition is easily explained. The changes of the azimuth of vibration in two such rays could not, except upon a supposition which has an infinity of chances against it, take place at the same intervals and in the same order; and if they did, the chances would be equally great against the coincidence of those planes. But as it is true of polarized as well as

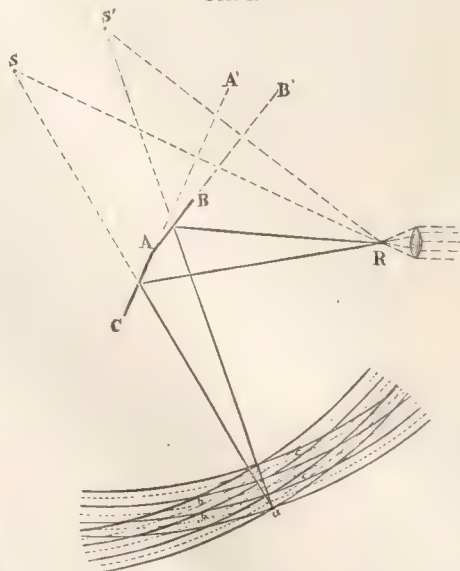
\* The rather difficult experiment of *beats* in the interferences of sound from two pipes in perfect unison was successfully accomplished by Mr. Despretz.



of ordinary light, we must look for a different explanation, and we find it in the fact that light is not homogeneous but compound; there being present, in every luminous emanation, undulations insensibly differing from each other in length through a range approaching the ratio of 1 to 2. When two minute and isolated portions of a wave thus constituted are brought together by reflection, by refraction, or by diffraction, at a very minute angle and with a very slightly different length of path, interferences of antagonism will take place between some of these elementary movements, and interferences of reinforcement between others. Colored stripes or fringes will therefore make their appearance; but these, owing to the differences of interval between those of different colors, will at each repetition be less and less distinctly separated from neighboring ones, and the whole will soon overrun each other, producing white by the blending of their colors, and uniformity of intensity by the overlapping of the brighter and fainter stripes. Even with wave elements from the same source, sensible interference cannot be produced when the paths of the uniting waves differ by more than a very few units in the number of their undulations. The possibility of their sensibly interfering at all therefore depends on their absolute identity of condition at a distance from the point of interference differing by only this small amount. Such identity will necessarily be found at contiguous points of a wave front from a single centre; but the chances are infinitely against its occurrence in points taken in two wave fronts from different centres. To this it may be added, that the actual sources in nature of luminous emanations are not perfectly fixed points. There are irregularities at the very origin of the undulations, or at the surface of the luminous body, which are propagated with the undulations, and which prevent the permanent coincidence or conflict of two sets of undulations, unless both are equally affected by the same irregularities. An instability, for example, affecting the position of the origin of two successive sets of undulations to the extent of a single one-hundred-thousandth part of an inch, would put them into entirely opposite phases. Considering the activity and energy of the forces at work at the surfaces of incandescent bodies, it is impossible to believe that the waves they generate can have their origins absolutely invariable in position.

Interference is the cause of the colors of thin plates or films (as those of soap-bubbles) of Newton's rings (which see), of ruled-plate spectra (see *SPECTRUM*), and of the iridescence which distinguishes many objects in the mineral and organic world. In the earlier history of optics, most or all of these phenomena were accounted for more or less satisfactorily, upon hypotheses having nothing in common with the theory of undulation. Of the truth of the undulatory theory itself, Fresnel proposed an experimental test, which he afterwards successfully employed as follows:—Two mirrors of polished metal are placed edge to edge and very nearly, but not quite in the same plane. A small solar beam brought into a dark room and concentrated by a lens of short focus forms a radiant before these mirrors.

FIG. 2.



The light from this radiant reflected by these mirrors, forms, after reflection, two intersecting waves, which, being received upon a screen, produce precisely the series of

parallel bright and dark stripes which theory leads us to anticipate.

In the figure, R is the radiant, A B and A C are the mirrors, S and S' are the apparent sources of the reflected undulations. The circular arcs described with these points as centres represent the intersecting waves, the full lines representing the crests and the dotted lines the hollows. Where two full lines or two dotted lines intersect, as at *a* and *b*, there is reinforcement, and a bright stripe is seen; where the intersection takes place between a full line and a dotted line, there is conflict, and the stripe is dark.

Further and quite conclusive confirmation of the truth of this theory of interference has been derived from the chromatic phenomena of polarized light. (See *POLARIZATION OF LIGHT*.) F. A. P. BARNARD.

**Interference** [Lat. *inter*, "between," and *ferire*, to "strike"], or **Intervention** [Lat. *interventio*, "coming between"]. In international law these words are used of the measures which one state takes to prevent injury to itself arising from the political measures of another state, or growing for some other reason out of the other sovereign's conduct. The principal cases of interference are—first, that for the purpose of preserving the balance of power—that is, of preventing a state from gaining, by political means or by force, an accession of power which would be dangerous to its neighbors. Many alliances and wars have taken place in Europe on this ground within the last four centuries. The plea here is self-preservation. A second class of instances of interference, all or nearly all of a modern age, have grown out of the efforts of nations to right themselves against tyrannical governments by revolution. The plea here also is self-preservation—that no government can stand against the revolutionary fever of neighboring countries. But the plea is made for the benefit of the powers that be, and not for that of the people. As a practical rule, it does not apply to great nations like France, which changes its political forms at will, without standing in fear of other states. It is also a dangerous rule to those who follow it, for it only intensifies revolutions within and without by exciting the feeling that there is a radical, endless antagonism between the interest and will of legitimate governments, so called, and the nations which they try to keep down. A third and more righteous kind of interference is that used when a government commits great inhumanity in punishing revolutionists, or great cruelty against rebels in war. On the whole, there is a somewhat vague border-line, beyond which, in extreme cases, nations having common interests and a common civilization will pass, in order to put an end to evil or to avert danger from themselves. T. D. WOOLSEY.

**Interim**, the name of certain formulas or confessions of faith adopted by the Reformation in Germany at the instance of Charles V., with the object of maintaining the *status quo* until a general council could decide all questions between Catholics and Protestants. There were three such: the Interim of Ratisbon (1541), of Augsburg (May 15, 1548), and of Leipsic (Dec. 22, 1548), each being the result of conferences between Catholic and Protestant theologians upon the points at issue. These interims were in reality despotic ordinances of Charles V., forbidding the Protestants to innovate upon the doctrines or rites they had once professed or agreed to. No permanent result could be expected from such attempts at compromise; accordingly, the Leipsic Interim was generally disobeyed and resisted by arms, was abrogated by Charles in 1552, and was finally superseded by the Augsburg Confession, confirmed to the Protestant states in 1555 by the diet of Augsburg.

**Interlaken**, a v. of Switzerland, in the canton of Berne, on the Aar. It has only 1000 or 2000 inhabitants, and consists mostly of hotels and boarding-houses. As it is beautifully situated, and its surroundings present some of the finest prospects of Switzerland (the Staubbach and the Jungfrau), it is visited during the summer by many thousand tourists.

**Interlude**. This term, which originally meant certain short pieces of music inserted between the acts of a drama or in any other intervals of a public performance, is now more commonly applied to the brief strains usually played by organists between the verses of metre psalms and hymns in divine worship. Interludes are now passing out of use as a needless interruption, or are introduced only once or twice in long hymns for the relief of the singers.

**Intermittent Fever, Ague-Fever**, and **Ague**, an essential, periodic fever resulting from infection of the blood by malaria or marsh-miasm. Malaria emanates from decomposing vegetable matter exposed to the action of the air and the sun's heat. It exists in swampy districts and in low, damp, undrained places, upon the banks of rivers, upon inlets of salt water, where variable water-level and tides expose a saturated soil to the atmosphere. Malaria



is most concentrated and intermittent fever most prevalent and severe in the tropics, where vegetation is luxuriant, and a soil enriched by decaying plants and falling foliage is subjected to the extreme influences of alternate seasons of rain and drought. In temperate regions it is present in new districts, disappearing as the land is populated, cultivated, and drained. It may appear in cities by the exposure of marshy subsoil when excavating to build, or by the escape of malarial air from defective street sewers constructed in a swampy substratum or emptying on a malarial water-course, whose tidal changes dam back marsh miasm to escape in the various quarters from which the sewers extend. Intermittent fever occurs in paroxysms separated by intermissions or non febrile periods. The paroxysms may recur daily, constituting the "quotidian" form, or on alternate days, the "tertian" form, since it recurs on the third day, including the previous attack. There is also a "quartan" form. Exceptionally, there may be a "double quotidian," with one strong and one mild attack each day; a "double tertian," with a daily onset, that of every second day being relatively weak; a "double quartan," having two attacks in every three days. Febrile paroxysms usually recur at a definite hour each day or alternate day. A recurrence of successive paroxysms at an earlier hour for each attack is termed "anticipating," and indicates an increasing malarial influence. When the paroxysms come at a later period, with successive attacks, it is termed "postponing" or "retarding," and indicates a subsidence of the malarial influence. Paroxysms may occur a few hours after exposure to malaria or after a period of incubation as long as two weeks. A paroxysm has three distinct periods or stages: (1) cold stage; (2) hot stage; (3) sweating stage. The average duration of the cold stage is one-half to three-quarters of an hour; it may be a few moments or two to three hours. It begins with shivering, chilliness in the loins, extending to back and limbs, muscular tremor, the lips quiver, teeth chatter, and the whole body is shaken. The respiration is sighing, the pulse feeble, the face pale or livid, the nails livid, the fingers waxen and cold. The general surface is pale, cold, often shrivelled. The thermometer in the mouth or armpit, however, reveals an increased temperature of the blood even in the cold stage, the blood having been expelled from the skin and extremities by the involuntary contraction of the elastic tissues of the skin. During the first stage there is therefore a determination of blood to internal organs, which may be dangerously congested, constituting the "pernicious" or "congestive" forms. Headache, vomiting, tenderness over the liver and spleen, are symptomatic of such congestion. The transition from the cold to the hot stage is gradual; chilliness ceases, flushings of heat are felt, "the coldness melts away." The skin becomes hot and red, pulse full and bounding, the face flushed, headache increases, the temperature of the surface may be 105° or 106° F. The duration of the hot stage is from three to eight hours. The third or sweating stage at first is gradual; moisture appears on the face, soon on the trunk and extremities. Heat, headache, thirst, and restlessness subside, the temperature falls rapidly, the person is drowsy, falls into long and refreshing sleep, with profuse or slight sweating. The duration of this stage is from three to four hours. During the intermissions or aperiodic periods there may be good health, or in graver cases impaired digestion, debility, pallor, or sallow cachectic complexion. Malaria impoverishes the red corpuscles and lessens the albumen of the blood. Intermittent fever tends to recur when incompletely cured, either in marked paroxysms or in less pronounced "latent," "masked," "concealed" forms, vague symptoms of chilliness and weariness known as "dumb ague" or in periodic neuralgia. The spleen is often permanently enlarged, and is termed "ague cake." The periodical recurrence of the paroxysms is due to successive efforts at elimination, the interval being the time required for the zymotic material of malaria to redevelop and impress the system.

The paroxysms require no treatment other than warm drinks and blanketing during the cold stage, cooling drinks and sponging during the febrile or hot stage. The treatment for the prevention of the paroxysms is to be in the periods of intermission. The chief of remedies is the Peruvian or cinchona bark, and the alkaloids derived from it. Quinine is mostly used in the form of the sulphate and bisulphate, less often the muriate. Cinchonine is an alkaloid resembling quinine, but less powerful. The mother-liquor from which these alkaloids are precipitated is evaporated, and an impure, crude sediment, in part quinine and cinchonine, and mainly quinitoia and cinchonitoia, or amorphous alkaloid, is obtained, and is much used, known as "chunoidine." Sahuine, the alkaloid of willow bark, berberine, piperine, apioi, eucalyptus, and other vegetable substitutes are weaker and less efficacious than quinine. Crude or unbleached quinine, an inexpensive article, has

recently been ascertained to have the full efficacy. Quinine is given either in one full dose of ten or more grains or in divided doses of five grains three times a day to break the paroxysms, and continued in smaller doses for many days to prevent their recurrence. Fowler's solution of arsenite of potash is second only to quinine in power. Nitric acid, sulphites of soda, ferrocyanide of iron, chloride of ammonium are also used. The patient may be more efficiently and permanently cured by combining cholagogue cathartics, and subsequently employing iron and tonics generally. The prevention of intermittent fever is to be sought by soil-drainage, by avoiding damp night air, and sleeping in closed rooms well above the ground. The sunflower freely planted adjacent to dwellings has been considered protective by absorbing malaria, and more recently the *Eucalyptus globulus*, or Australian fever tree, has been extensively planted in Algiers, at the Cape of Good Hope, and in Cuba, and is asserted to lessen, or even eradicate, malaria by its presence. E. DARWIN HUNSON, JR.

#### Internal Revenue. See REVENUE.

**International Law.** INTRODUCTION. International law is a collection of rules by which nations, and their members respectively, are supposed to be governed in their relations with each other. In its exact sense, law is a rule of property and of conduct prescribed by sovereign power. Strictly speaking, therefore, as nations have no common superior, they cannot be said to be subject to human law. But there is nevertheless a body of rules, more or less generally recognized, by which nations profess to regulate their own conduct towards each other, and the conduct of their citizens respectively. Being rules of property and of conduct, though not prescribed by a superior, they are somewhat loosely designated as laws; and taken together they form what is called international law, and as such are enforced by each nation separately upon persons and things within its jurisdiction. This body of rules is derived from custom or treaty. From the earliest times there must have been some sort of rule, tacit or expressed, for the intercourse, however small, which must have existed between nations, and must have begun with the beginning of nations. No community has ever yet existed, and none could exist, so independent and isolated as to have no communication whatever with its neighbors; and intercourse between communities, as between individuals, necessarily required some kind of regulation. We find, accordingly, in the oldest historical records, mention of messengers or embassies sent by nation or king to another nation or king, and of compacts between them. Treaties followed the unwritten regulations as a matter of course, for the necessity of changing or of adding to existing rules led to express stipulations. These were expressed as stipulations between individuals were expressed; orally before a written language was known, and orally or in writing afterwards. Of these treaties or compacts between nations there are many and multiform records. Various collections of them have been made, the most important and complete of which are those of Domont, Rousset, Martens, Morhard, Samwer, Calvo, and De Clercq. Notwithstanding the treaties of every kind and form that have been entered into, the greater part of international law is to this day customary only. These customs have been declared and enforced by judicial decisions, and set forth in the writings of publicists in all the languages of Europe.

The body of law which we have thus described is sometimes also called public law, or the law of nations. Its formation has been gradual, and its history is curious and instructive. They err greatly who say that it is the sole product of modern times. It is the product of all times ever since there were nations upon the earth, though its greatest development is unquestionably modern. The Amphictyonic Council enforced a kind of international law among the Greeks, by which, among other things, an exchange of prisoners of war and a truce after a battle for the burial of the dead were enjoined. The Romans, improving upon the Greeks, instituted a college of heralds for the declaration of war, and established one important and beneficent rule: that none but a soldier sworn into the service could fight the common enemy. Christianity wrought, with its other changes, a great change in public law. The spirit of Christian brotherhood found its way into cabinets and camps. The citizen of another state or the subject of another king was yet a brother in Christ, and the barriers which separated nations were, in part at least, thrown down. The influence of the Christian Church upon the public law of the world cannot be overestimated. As soon as the brotherhood of man came to be accepted as a religious tenet, it was inevitable that the old doctrine of the natural antipathy of nations should, sooner or later, disappear. In the earliest ages the stranger had been accounted an enemy, and even the victims of shipwreck



might lawfully have been plundered. Such barbarities fell before the gospel; and others less gross, which kept their hold in spite of the Bible and the Church, gradually lessened in intensity and in number. The laws of states, the ordinances of kings, and the writings of publicists have moderated the severity of earlier times, while every new treaty between nations has been an addition to public law. Starting from the theory of the natural rights of men and the equality of nations, publicists have striven to establish the code of ethics as the law of nations. Montesquieu declared it as a maxim that nations should do each other as much good in peace and as little harm in war as possible without injury to their own interests. The rules of the Hanseatic League, the laws of Wisby and of Oleron, the Consolato del Mare, and the Ordinances of Louis XIV. were all so many contributions to international law. A host of writers have discussed its principles and enforced its precepts. Aristotle, Cicero, Bacon, Grotius, Barbeyrac, Puffendorf, Wolffius, Burlamaqui, Rutherford, Bynkershoek, and Vattel before our times, and in our own days Kent, Wheaton, Phillimore, Twiss, Lawrence, Wharton, Woolsey, Halleck, Field, Heffter, Bluntschli, Hautefeuille, Cauchy, Parnet, Massé, Calvo, Mancini, Holtzendorf, Giraud, Goldschmidt, Asser, Lorimer, Westlake, Bernard, and Pierantoni are among those who have written on the subject. Of all these writers, Grotius stands as the acknowledged head.

As now existing, international law is a science of which the major part is generally understood and accepted. The residue consists of propositions more or less disputed or unsettled. Regarded as a whole, it consists of two main divisions; one treating of peace, and the other of war, or rather of the relations of nations and of their members to each other, except as they are modified by a state of war, and the modifications of these relations produced by war.

The portion of international law relating to peace is naturally subdivided into two divisions; one public and the other private. Public international law contains the rules respecting the relations of nations to each other, and to the members of other nations; private international law contains the rules respecting the relations of the members of a nation to the members of other nations. Only the briefest possible enumeration of the subjects treated in the various subdivisions of these two departments can here be given. In respect to the first department, they relate to the essential rights of nations, such as their sovereignty, equality, perpetuity, territory, property; to their extra-territorial action in regard to navigation, discovery, exploration, and colonization; to fisheries and piracy; to the intercourse of nations with each other by means of accredited agents; to international compacts, asylum and extradition, national character and jurisdiction, and domicile; and to the reciprocal duties of nations to foreigners, and of foreigners to the nation where they live, in respect of residence, occupation, religion, obedience to the laws, taxation, civil and military service. To the subject of private international law belong provisions respecting private rights and the administration of justice. Here may be grouped together regulations concerning personal capacity, social condition, the validity and interpretation of contracts, the effect of marriages and divorces, the devolution of property at death, the administration of justice, procedure and evidence, as these subjects apply to the persons and property of foreigners.

This brief enumeration shows how vast is the scope, and how varied are the details, of international law. The tendency of the science is strongly towards amelioration. Various causes are working to produce this result, such as increasing intercourse between different parts of the world and the waste and suffering of war. Men are perceiving more and more the need of reforming and of defining clearly the rights and duties of nations, that war may be discouraged, international controversies avoided, and international intercourse increased. The changing circumstances of men always require a corresponding change in the rules which guide and restrain them. The oppression of standing armies, the tyranny of conscriptions, the burden of taxation to meet the interest of debts contracted for war, are all so many motives to modify, if it be possible, and to define with exactness, the rules by which nations are to be guided in their intercourse with each other. Of all the measures taken in our time for the civilization of international intercourse and the settlement of international differences, none is comparable to that of international arbitration. The idea is not new—indeed it is as old as Henry IV. of France—but the practice is modern. America has the honor, on which she may justly pride herself, of having oftenest taught by precept and oftenest adopted in practice the closing of international controversies by the intervention of impartial arbiters. There are many instances of international arbitration, and among them the following: One in 1794, between the U. S. and

Great Britain to decide what river is the river St. Croix; one in 1802, between the U. S. and Spain respecting the excesses committed during the previous war; one in 1822 between the U. S. and Great Britain respecting slaves taken during the war of 1812; and another afterwards between the same powers respecting the limits of the State of Maine; then in 1843, between Great Britain and France respecting the capture of British ships on the western coast of Africa; in 1839 and in 1868, between the U. S. and Mexico respecting claims upon the latter; in 1853, between the U. S. and Great Britain respecting certain questions under former treaties; in 1856, the international commission at the mouths of the Danube; in 1857, the arbitration between Prussia and Switzerland in the affair of Neuchâtel; in 1858, between the U. S. and Chili respecting captures by the latter; in 1860, between the U. S. and New Granada, and between the U. S. and Costa Rica; in 1863, between the U. S. and Peru respecting the vessels Lizzie Thompson and Georgianna; in 1849, between the U. S. and Brazil; and in 1867, respecting the grand duchy of Luxembourg. The most memorable instance is the arbitration of Geneva between the U. S. and Great Britain for the settlement of the dispute growing out of the depredations of the Alabama and other Confederate cruisers built and sent from England during the civil war. This arbitration was preceded by a joint high commission of the two governments, by which a treaty called the Treaty of Washington was negotiated, and an arbitration at Geneva agreed upon, to proceed according to three rules of neutrality then first formally enunciated.

A provision for arbitration has been introduced into several treaties; in one between Spain and the Hawaiian Islands; in another between Spain and Sweden; in another between Spain and Uruguay; and in seven different treaties negotiated by Sir John Bowring.

The arbitration of Geneva was followed by a vote of the British House of Commons on July 8, 1873, by which, on the motion of Mr. Henry Richard, it was resolved: "That an humble address be presented to Her Majesty, praying that she will be graciously pleased to instruct her principal secretary of state for foreign affairs to enter into communication with foreign powers with a view to further improvement in international law and the establishment of a general and permanent system of international arbitration." The measures which have been lately taken for the codification of international law are of much significance. At the meeting of the British Association for the Promotion of Social Science, held at Manchester in Oct., 1866, a motion was made by Mr. David Dudley Field for the appointment of a committee to prepare the outlines of an international code. The proposal was agreed to, and a committee appointed, comprising jurists of different countries. Some circumstances, however, led Mr. Field to prepare and to publish in 1872 a draft of the whole work, which he entitled *Draft Outline of an International Code*. In 1868 Prof. Bluntschli of Heidelberg published a work *Modernes Völkerrecht der Civilisirten Nationen als Rechtsbuch dargestellt* which has been translated into French under the title of *Droit International Codifié*. On Sept. 8, 1873, eleven publicists assembled at Ghent and founded an institute of international law. The number of members is limited to fifty. The next meeting of the institute was held at Geneva in Aug., 1874, and the following three subjects were there more or less examined, and reports thereon were made: namely, international arbitration; the three rules of the Treaty of Washington; and private international law. On Oct. 10, 1873, upon the invitation of an American committee, a conference was held at Brussels, where was founded an association for the reform and codification of the law of nations. This conference was attended by representatives from America, England, France, Germany, Italy, Spain, Switzerland, Holland, and Belgium, comprising some of the most eminent authorities on international law. The two following resolutions were unanimously adopted: "I. The conference declares that an international code, defining with as much precision as possible the rights and duties of nations and of their members, is eminently desirable in the interest of peace, public order, and general prosperity. It is therefore of opinion that no effort should be neglected to obtain the preparation and adoption of such a code. The conference reserve the question as to how far the codification of international law should be simply scientific, and how far it should be incorporated into treaties or conventions formally accepted by sovereign states. II. The conference declares that it regards arbitration as the means essentially just, reasonable, and even obligatory upon nations, for the settlement of international differences which cannot be settled by negotiation. It abstains from affirming that in all cases without exception these means are applicable, but it believes that the exceptions are rare. It is convinced that no difference



should be considered as insoluble until after a clear explanation of the matter in difference, a sufficient delay, and the exhaustion of all pacific means of accommodation." This association had another meeting in 1871, at which papers were presented on various branches of international law. That the steps thus taken may lead to such a reform and codification of international law as will define, with all the precision possible, the rights and duties of nations, and thus lessen the occasions of dispute and the opportunities of conflict, the wise and good of all countries must devoutly hope.

DAVID DUDLEY FIELD.

### International Law, SUMMARY OF ITS PRINCIPLES.

—1. *Rights and Obligations of Nations, except so far as they are Modified by War.*—1. Here we speak, first, of the essential nature of a state, and of the parties to international law. (a) An individual man cannot be a party of this kind, but can only claim, if a stranger, humane treatment. The law of nature will be respected by the courts, but the law of nations is not as broad nor does it cover the same ground as the law of nature. When certain blacks, imported against Spanish law into Cuba, rose on the crew, killed the captain, and came into the waters of the U. S., our Supreme Court held that if not slaves they were not committing piracy in getting the vessel into their own power; and so they were not delivered up. By the same application of the laws of humanity, persons fleeing from cruelty at home, or shipwrecked mariners from a country not under our law of nations, would be treated with the same kindness as those with whose countries we had treaty relations.

None are parties to international law except independent organized communities—that is, nations properly so speaking, communities having the full power of making treaty contracts with other nations. This definition will exclude from active partnership in international law all protected or dependent states, all provinces and colonies, all confederacies, the members of which by their organic law form a close union, and the separate kingdoms which become one by a perpetual compact. Thus, the separate States of the U. S. have no more power than private persons have of making arrangements with foreign nations, unless perhaps that of selling State lands to them for purposes not inconsistent with the Federal Union. On the other hand, no form of government or of religion excludes an independent state from participation in international law; there are examples of all forms of government among the nations which acknowledge this law, and of various forms of a common Christian religion; even Turkey, a Mohammedan state, belongs to this international brotherhood, and there are signs that other states more remote from our civilization will move in the same direction. Although the present international law originated within the circle of Christian nations, there is no reason why it should not embrace heathen states if they could consent to come under its provisions.

(b). Independent states are said to be *sovereign and equal*. The latter term denotes *equality* in rights and obligations, which is the same as saying that they are all equally states, for a state has certain fixed relations towards the members of it, and towards other states, out of which rights and obligations grow. Size, therefore, and rank or dignity according to the etiquette of courts, have nothing to do with this state equality. *Sovereignty*, again, denotes properly the condition of having no superior in the political sphere, and is inseparable from independence. It is an unfortunate word, especially in the U. S., because we have been in the habit of talking of qualified and divided sovereignty. But as far as international law is concerned, only the Union or state called the United States is sovereign; the separate States in this sense have not a particle of sovereignty. But the States have local powers of great moment, and might commit a crime against the law of nations. Who is responsible? Clearly the U. S. Some one must be, and no one else, under our Constitution, can be called to account.

(c) Every state which is capable of its organization of fulfilling the ends for which states exist, and especially that of entering into treaty relations to others, is *legitimate*. International law knows only states *de facto*; it does not pretend to decide that although they exist they have no right to exist, nor does it pretend to deny such right to an organized community that has begun to exist by revolutionary means. In fact, a large part of the states of Europe and America have in violent ways passed through separations or unions or changes of form within the last century. It may happen, however, that an organized community, which has heretofore been a portion or a dependence of another, is acting as an independent body, and resisting efforts to force it back into its former condition. What is the legal attitude of old states toward such a newcomer? They have no relations to it whatever, and have acknowledged the state from which it has separated as one

of their body. They can, if they please, aid the parent state to subdue it; against this help from one state to another there is no law. Or they can remain neutral while a contest is going on. But they cannot aid the insurrectionists without thereby engaging in war with the parent state; and if the new community has so far become independent that the parent state gives up endeavors to bring it back into subjection—if, in short, the new state is without question a state *de facto*—they cannot, with any reason or propriety, refuse to concede to the community thus born a place among the parties to international law. A state being a *moralis persona*, capable of taking obligations upon itself, cannot destroy the obligations by any change of constitution. Thus, the U. S. acknowledged that it was bound to pay the debts of the old Confederation, and when Denmark and Norway separated in 1814 they took each an equitable share of the debt of the old kingdom.

(d) A state's independence is exercised especially in the free management of internal affairs. The right of interference in the internal policy of a state, or even in its external peaceful policy, is so inconsistent with the end for which separate states exist in the world that such independence is universally acknowledged. Yet there are several exceptions to the rule of non-interference either endorsed or admitted by international law. The first of these that we mention is interference for the preservation of the balance of power. That is, when, by diplomatic means, a state is becoming dangerous to the peace of its neighbors, it is held that they may take combined measures to check such growth. Thus, when by management in 1700 the throne of Spain passed over to a grandson of Louis XVI., a large part of the European powers combined to prevent it, and with this the war of Succession was begun. Intervention for this purpose will not be resorted to unless the aggrandizement takes place by political measures, unless those who are parties to it live near enough to fear each other's increase of power, and unless such increase takes place on the land. Commercial growth, colonial growth in remote parts, furnish little ground for apprehension. The plea for intervention in this case is self-preservation. The same plea, after the French Revolution and the fall of Napoleon, was made for interference in the internal affairs of other states. It was urged that the right of a people to alter its government against the will of the reigning dynasty is dangerous, and that revolution is opposed to the peace of all states in the neighborhood. On this plea some of the leading powers of Europe put down revolutions in Italy and Spain, although they did not venture to obstruct the way of revolution in France after the restoration of the Bourbons. The principle has never been admitted by England; it is contrary to the principle of national sovereignty, and it only delays and intensifies revolution. A principle just the opposite of such intervention, and intended to prevent its application to the Spanish South American republics, lay at the bottom of the "Monroe Doctrine"—that is, of the declaration, made by Pres. Monroe in 1823, that the U. S. would "consider any attempt on the part of the allied European powers to extend their system to any portion of our hemisphere as dangerous to our peace and safety." This declaration, highly just and timely, against political interference was made in concurrence with English policy, at a time when Mr. Canning opposed the measures of the leading continental states, and it had a decided effect. Nor has the policy on our part ever been altered. To this righteous ground for interference we add another, dictated by feelings of humanity, when any great cruelty or barbarity is committed. Such was the pretext for interfering on behalf of the Greeks in their struggle for liberty in 1827. The three great powers, Great Britain, France, and Russia, by their effectual aid destroyed the Turkish power in Southern Greece and built up a Greek monarchy. It is held, also, that atrocious barbarities in war, especially in civil war, will justify not only remonstrances, but measures for the protection of the weaker power, to the extent even of an earlier recognition of its independence on that account. But all these instances of interference, so far as they are to be justified at all, are to be regarded as extreme and exceptional cases. The exception must be looked at with severe impartiality, as a measure of necessity, and not be made the rule.

2. Another right of a state is that of *Property and Territory*. A state cannot exist without being sovereign within certain limits. A state may hold property like a private person, such as public buildings, ships and forts, unoccupied lands, etc.; it is the protector of all private property within its limits, and has the right of taxing its citizens or subjects; and it is also territorial sovereign within the same limits, by which is intended that it exercises jurisdiction there over property, territory, etc. to the exclusion of all foreign powers. A state's territory consists of all the surface of the earth, land or water, within such boundaries;



of the sea-line to the distance of a marine league from the shore: and of harbours, gulfs, and straits within certain not very remote headlands. Here observe (a) that the claim of control over the sea for a marine league is a rule dictated by self preservation and the necessities of commerce. If, for instance, war between two other powers could be waged within sight of land, serious evils to the nation inhabiting the land would grow out of it; and if there were no control over the operations of commerce within a moderate distance from the shore, there would be room for many evasions of the laws touching the revenue. The control over such an extent of sea is an *incident* to the occupation of the coast. (b) There is no absolute rule as to the remoteness of the headlands within which the waters are subject to territorial laws. It is perhaps enough to say that they ought to be near enough to enable vessels to ascertain when they are within territorial jurisdiction, and that a very considerable interval would obstruct the freedom of the seas and be unnecessary for national self-defence. (c) Outside of such limits the sea is free to all nations, so that the right of using it for commerce or for fishing purposes is common. But while fishing—e.g. on the banks of Newfoundland, as being a part of the ocean—is free, the power of spreading and drying nets and of curing fish on adjoining coasts can be lawfully exercised by foreigners only under sanction of treaties. (d) It was claimed by Hübner and other writers in the interest of neutrals in the last century that *ships* on the high seas were territory. This, however, was an unfounded position, taken for the purpose of preventing, as far as theory could, the exercise of war-rights, such as that of searching neutral vessels. A commercial vessel on the high sea, so long as it retains the national character and commits no piratical act, is under the exclusive jurisdiction of its own courts, but its deck is not properly territory. The vessel is simply private property under the protection of its own country. Hence, when it lies in a foreign port it may be attached for debt, and its crew may be amenable to the laws of the port and of the foreign country. (e) Rivers bounding two states, unless treaty pronounces otherwise, are common to both, and the boundary-line passes along the principal channel. (f) Rivers rising in one state, and having their entrances into the sea in another, have been treated by international law as subject to the exclusive jurisdiction of the state within whose boundaries they are contained. Thus, the dwellers on the upper waters have no right to descend to the sea through other territory except by concession; and yet there seems to be the highest equity, amounting almost to a right, in their free use of the entire river. The conflict between strict territorial right and this equitable claim has been settled by a succession of treaties, chiefly made within the last sixty years, which have now opened all or nearly all the navigable rivers of the Christian world to those who live in states situated on their upper waters, and some of them to outside nations. The Rhine and the Scheldt were opened at the Congress of Vienna in 1815; the Danube by the Peace of Paris in 1856; the La Plata and its great system of waters by treaties from 1853 onward; the Amazon in 1866; and the St. Lawrence, after varying arrangements, by the Treaty of Washington in 1871, which treaty also provided for the free navigation of the Yukon, Porcupine, and Stikine, rivers of Alaska, as an earlier one had provided for that of a principal branch of the Columbia rising in British territory.

3. *The Relations of Foreigners within a Country to its Laws and Government.*—Here we come to a department of international law where the rules of comity, or of humanity and comity—that is, not of strict right and obligation, but of equity and duty—determine the shape of the science. Of course, these rules express themselves with some differences in a multitude of treaties, but the general tendency of modern times is towards increased privilege, so that all the disadvantages of one foreign nation as compared with another are disappearing with every new treaty. It has been contended that no nation has a *right* to shut its ports to the rest of the world or to prevent their passage through its territory, if this should be necessary for their interests. It has even been said that there is no right of cutting off other nations from the use of necessities that cannot be obtained elsewhere. But intercourse can hardly be called a right between nations, any more than between individuals of the same nation. I am not bound to trade with any one, but may raise everything which I use. I have the right of contract, but nobody is bound to make a contract with me. The most civilized nations obstruct the way of free trade by highly protective tariffs. The true view seems to be that a nation may shut itself out from the society of the world, and that there is no right to force it from such a position. And in truth intercourse takes care of itself; it is so natural, a savage even is so ready to accept that which he cannot produce in exchange for that of which he has an

abundance, that only an opportunity of awakening a sense of want, and fair treatment afterward, are needed. The principal points to be noticed under this head are—(a) that aliens entering a country are subject to its laws, unless exempted by treaty or international usage. (b) Their condition is not necessarily that of citizens—in fact, ordinarily they cannot vote nor hold real property—but they have a secure enjoyment of their property, subject to ordinary taxation, the use of the courts, and the same rights of contract and communication with others. Sometimes they are called on to aid the country by personal service in time of war, but this, we believe, is not common unless they are domiciled, nor does it seem to be right. They can make wills in favor of heirs abroad, transmit property to their own land, and have consuls as well as ambassadors of their native country as their protectors. (c) There are several descriptions of persons who enjoy what is called extraterritoriality—that is, they are exempt, in whole or in part, from the action of local laws—such as sovereigns travelling through a foreign friendly country, ships of war in its ports, foreign armies if allowed to pass through its borders, and ambassadors accredited to its government. The crews of ships of war, when on shore, are under the control of the police; and it seems that police power may be exercised when soldiers in transit stray away from the army or from their corps. The extraterritoriality of ambassadors will be considered hereafter. (d) There are some nations where, by special treaties, the residents from Christian lands are exempt from the local laws, and placed under the protection of consuls or other representatives of their own nation. This practice first arose in the Middle Ages, when there seemed to be a wide gulf between the Turks and the Christians, and when personal, instead of territorial, law did not seem as strange as it does now. Such nations are Turkey, Muscat, Japan, and China. Thus, by the treaty of 1858 criminal acts of Chinese subjects towards citizens of the U. S. are punishable by the Chinese authorities according to the law of China, and “citizens of the U. S., either on shore or in any merchant vessel, who may insult, trouble, or wound the persons or injure the property of Chinese, or commit any other improper act in China, shall be punished only by the consul or other public functionary thereto authorized according to the laws of the U. S.” The same provision is found in our treaty of 1858 with Japan, by which also the courts of Japan and the consular courts are respectively opened for the recovery of just claims. (e) Foreigners may have privileges in Christian states, if mere residents or travellers. But there is also a condition known to the law called *domicile*, the criterion of which consists in residence with no intention of returning to one's native country or departing elsewhere except for temporary purposes. This status is of importance where the question is, Who is an enemy and who a neutral? It is also of importance in INTERNATIONAL PRIVATE LAW (which see). (f) There is still a closer relation which an alien may form with the country of his residence, called *naturalization*. By this process he becomes a citizen, having all or nearly all the rights of native-born citizens. In England it was formerly held that no English native-born subject could expatriate himself, nor could a foreigner be naturalized without a special act of Parliament. But by an act of 1844 a principal secretary of state, on petition from a foreigner desirous of being naturalized, can grant him all the capacities and rights of a natural-born British subject except that of being a member of the privy council or a member of either house of Parliament. The secretary may except other rights also. In the U. S. five years' residence is necessary before naturalization, and three years' residence after a legal declaration of intention to become a citizen and to renounce former nationality. (g) As the laws of countries differ in regard to the hold they have upon native-born persons, it may happen that one is legally a citizen or subject of two states, and collisions of jurisdiction can thence arise. Recent arrangements with the North German Confederation, with Bavaria, and with Great Britain have removed a great part of the possibility of such collisions. (h) Aliens taking refuge in any country on account of crime form a class by themselves. If the crime is political the freest nations now give to such persons their protection. If it is a gross crime against person or property, treaties of extradition provide for their being delivered up. This subject, which has a connection with international private law, will be considered under that title. (i) The rights of copy and patent which persons enjoy in their own country are to a considerable extent granted to them in other countries according to a rule of reciprocity.

4. A. *The Rights of Legation and Representation, or Ambassadors and Consuls.*—Every party to international law is a treaty-making power, and every such power must act by some representative. No inferior community, no body of lower grade than a state, no organization trying to be-



come a state but not yet recognized as such, is entitled to send representatives abroad who have international rights. A province or colony or city may have agents in foreign lands, but such persons have none of the rights of *ambassadors*. This term, *ambassador*, may be used generically to include various grades or kinds of diplomatic ministers, and it is often used also to denote one, and generally the highest, class of such ministers. Other words are *legates* and *ministers*, usually denoting representatives of the pope; *chanciers d'affaires*, a word for a lower grade of ambassadors; *envoys* and *plenipotentiaries*, which latter term generally means less than its derivation implies. There are again ambassadors sent for a particular object, and others whose functions relate to all the political transactions of a nation with another; there are temporary and resident ambassadors; there are also persons who discharge the office without taking the name, as kings or commanders of armies sometimes negotiate treaties. All ambassadors, of whatever rank they may be, have the privileges which belong to this class of persons by the law of nations.

Ambassadors have had from very early times a sacred character, which has been sometimes accounted for by their being originally persons of a religious order; but it is better to say that the office was protected by religious sanctions on account of its great importance. The ancient herald became a sacred person because he could not otherwise safely mediate between armed men. The ambassador needs for his protection the same sanctions, and, as he represents the highest interests of a state, it is a great crime to treat him with indignity or injury. There is a difference between the ambassadors of ancient and those of modern times, consisting especially in this—that the former were sent for a temporary purpose, and returned after completing their work, but the latter, since the time of Louis XI. of France and Ferdinand the Catholic of Spain, have generally resided in the foreign country for a considerable time. The resident minister is now expected to make himself acquainted with the politics of the country where he lives, to calculate the chances of war and peace, to use a constant influence in behalf of his own country; and thus, since this custom began, nations have felt themselves more secure than before. As intercourse is suspended by war, ambassadors, on the outbreak of a war or in expectation of it, are either dismissed or summoned home. When peace returns, the renewal of intercourse is marked by the parties receiving each other's diplomatic representatives.

An ambassador represents the sovereign or the sovereignty of his country. In a republic the power of appointing such officers is determined by the constitution or the laws, but instructions are given by the executive authority. In most monarchies the king or emperor appoints those who represent him in foreign courts, but this he does as the head of the government. Hence, when a sovereign is deposed, and is no longer the actual head of the administration, other countries are not bound to recognize his ambassadors, nor on the other hand are they bound to receive those of a new sovereign *de facto*. The rule here, apart from dynastic and political preferences, is the same which holds good when new states are recognized. When the *de facto* government is acquiesced in by a country, and is in orderly operation, other countries will enter into new diplomatic relations with it. If agents of the old and displaced authority are received also, they will have no rank, and to do this at all after an established state of things exists in the revolutionized country is an unfriendly proceeding, implying a hope that there may be a counter-revolution.

The privileges of ambassadors may be comprised under the terms inviolability and exterritoriality. As the privileges themselves are, in great part at least, due to comity, and as the feelings of men will change from age to age with changes of civilization and greater closeness of intercourse, these terms, especially the second, may vary somewhat in their extent of meaning. It will not be safe to give to exterritoriality the broadest meaning it can bear, and then from that meaning deduce the privileges accorded. We must inquire what is the general understanding of the present age in regard to the position which an ambassador may take in a foreign land, and then perhaps it may happen that his own country will somewhat contract his latitude of privilege. The privileges in question are *a* inviolability of person: that is, exemption from all violence, whether proceeding from the public authority or from private persons. The exceptions to this rule are that the public authority, when he has committed a gross crime, may send him beyond the borders, using so much force as is necessary for this end; and that private persons do not lose their rights of self-defence if he is an aggressor. *(b)* He has various privileges, summed up in the word exterritoriality, which amount to exemption from the operation

of foreign law. There is no departure from the theory of his office if when he returns home he is called to account for transactions pronounced to be illegal by his country's laws which take place while he resides abroad; but usually he is not called to account. His first privilege—which may be referred to his inviolable character, as well as to his exterritoriality—is his exemption from the criminal jurisdiction of the country where he is resident. If there he commits crimes, acknowledged to be such by the moral sense of mankind, he cannot be tried nor punished, but can be required to leave the land, and only in an extreme case, if he refuses to do this, can force be applied. He cannot commit treason, but he can abet treason and be a party to revolutionary measures, yet his punishment must be left to his own sovereign and country. Some of the older British lawyers, as Sir Matthew Hale, thought that any capital offence except treason, as rape, murder, or theft, might subject an ambassador to indictment and trial like other aliens; and still later it was held that for crimes committed by them against those moral laws which keep all societies together they might be brought to justice like other offenders. But this opinion would hardly find favor at present. Both the law and the feeling of England have increased in the respect they attach to these foreign representatives. The need of a rule is obvious, for if subject to arrest and trial an ambassador might not be able to discharge his functions. *(c)* The ambassador is exempt from the civil jurisdiction of the land where he is resident. This exemption is conceded to him everywhere, although it is not strictly necessary for the discharge of his duties. If he contracts debts, the only remedy is by appeal to his sovereign or by suit in his country's courts after his return home. The laws of the U. S. include distress for rent among other legal remedies which are denied to the creditors of a foreign minister. *(d)* The hotel also and the goods of the ambassador have the same immunity from local jurisdiction. As far as he himself and his retinue are concerned, his house is a sanctuary, but the immunity will not allow him to defy the law of the land by sheltering transgressors. It is admitted, we believe, at the present day, on all hands, that criminals belonging to the country of his residence, if not his servants at the time of the crime, may be searched for and seized in his hotel, and that all the force necessary for effecting an entrance for this purpose may be applied. *(e)* By national comity the personal effects of the foreign minister and the articles from abroad which he needs for himself and his family are exempt from duties. He may, however, be required to pay taxes on his hotel if it belongs to him or to his government, and he is liable to the payment of tolls and postage, but cannot be compelled to have troops quartered upon him. Formerly, ambassadors abused their privilege of having goods passed free of duty through the custom-house, and, as Bynkershoek, near the beginning of the eighteenth century, charges upon them, they imported merchandise which they afterwards sold. The same abuse continued for some time afterward, and was, when discovered, complained of in more than one country. Within a few years a minister of the U. S. in Spain has been charged with making importations for himself on account of certain merchants. It is plain that exemptions from duties were never intended to cover any articles besides those intended for the use of the embassy, and it would be no breach of comity to have even this privilege taken away. *(f)* Liberty of worship. This is allowed in all Christian lands, and even beyond their borders, to ambassadors, their families, and, by a stretch of comity, to other persons belonging to the same nation, but coreligionists with the ambassador, if subjects of the state in whose bounds he resides, are permitted only by sufferance to be present. This exemption, of course, has no significance where, as in the U. S., all religions are free; and it has, at least in one instance, been claimed that, where there was already a church of the religion which the foreign minister professes, the permission to set up another for himself might be denied him. The jealousies of Catholic and Protestant Christians, in times past, have led to the rule that the ambassador's worship must be private, and even house-worship, without bell, organ, or other sign making it known to the public, and that the chaplain must not appear in his canonicals. The reasons for this freedom of worship are obvious. No state could with any regard for its own dignity consent to send a minister to another court, where he was forbidden to exercise his own or his country's religion, and no honest or honorable man would be willing to represent his government where such prohibition existed. *(g)* That the foreign minister may freely discharge his functions, he must have some assurance of having his retinue at command. Accordingly, his family, the secretary of legation, and the other officials who compose his train have the same exemptions which are conceded to him. In this privilege his



servants are included, and as these may be subjects of the country, and "bad subjects" besides, this usage creates some difficulty. If it should appear that he took a knave, or even a political *suspect*, into his service in order to shield him from the law, this would at least be a ground of complaint against him to his own government. A custom formerly observed, then disused, then again brought into vogue in later times, is that of requiring from ambassadors official lists of their servants, to secure to the latter the protection desired. (b) If the state itself has no direct control over an ambassador's suite, it is evident that he ought to have, but how much power he may use over them is a matter, in part, for his own country to decide. In former times the jurisdiction of foreign ministers was almost as great as that of consuls from Christian states in Mohammedan countries. When Sully, then marquis of Rosny, represented the French court in England in 1603, one of his train having killed an Englishman in a quarrel, a jury of Frenchmen being called together found the man guilty, and delivered him over to the English authorities for execution. It is evident that the exercise of high justice would not now be allowed in any Christian state, and no notice would be taken of such a procedure. The ambassador now can only collect evidence in criminal cases and send a member of his suite home for trial. Nor has he properly any *civil* jurisdiction except that of a voluntary kind, such as receiving and legalizing testaments and affixing his seal. "The right of contentious jurisdiction is nowhere," according to Haller, § 216a, "conceded to ambassadors in Christian countries, even over the people of his suite." (i) An ambassador can be also a merchant, and merchants in former times not infrequently represented small states, or, it might be, the same person acted for several states. Furthermore, a native of a state formerly acted as the representative of a foreign state in his own country. None of these usages are common now, and some of them are almost unknown. While they existed, the double character of the ambassador gave rise to various questions. Thus, it was asked whether the ambassador had any more rights as a merchant than others of his class. The answer given to this was that as far as his commercial relations were concerned, he stood on the same level with everybody else, although, of course, his person still remained inviolate. Again, if he were an ambassador to his own government, and withal a resident there, while it might be free to refuse him recognition in this capacity, yet, as soon as his own country consented to receive him, it admitted that he had all the rights of other like persons. The case of Wicquefort, the author of *L'ambassadeur et ses fonctions*, was unique. He was not only a native of the United Provinces when he represented the duke of Lüneburg, but he also held an office under the States General, and was accused of betraying state secrets to foreigners. For this he was tried, condemned, and sentenced to confiscation of goods and imprisonment for life. The case so far differed from that of other natives employed by foreigners that, while they are in the act of accepting them in the character of agents clothed with the rights of agents, he could not divest himself of the responsibility which his being a public officer imposed on him. For aught that appeared, the Dutch had as much right to punish him for this crime as the duke of Lüneburg would have had if he had detected him in gross violations of his duty as an ambassador, and had been able to secure his person within the duchy. (j) Has the ambassador such a kind of inviolability that third parties—for instance, enemies of his country—are bound to respect his official immunities? The answer given by history is that one enemy has had no scruple at capturing negotiators of the other, and at treating them like every other foe in war. Further, although a friendly power would be regarded as committing a hostile act if it seized or imprisoned such a person, yet it might refuse him transit through its territory, and in the act of transit, if he were found passing into a hostile country, he might be prevented from pursuing his journey. Cases have occurred also where foreign ministers were arrested in a third country on account of pecuniary obligations contracted there. But there is no right to seize even an enemy's ambassador on a neutral ship, much less on neutral soil. (k) The ambassador's rights begin when he lands in the country to which he is sent, and continue until he leaves its soil; and this whether he is received or not, and whether peaceful relations continue between his country and that to which he is sent or not. On his arrival at the court to which he is commissioned he is expected to produce his letter of credence—which is sometimes accompanied by one of recommendation—and his *full power*, which indicates the subjects on which he is authorized to treat and the amount of power with which he is invested. According to their rank, some envoys are accredited directly to the sovereign of the country, and some to the minister or secretary for foreign affairs. When his

mission, for any cause not involving personal or national misunderstanding, is terminated, according to general usage the ambassador presents a letter of recall, and requests audience in order to take leave. Also when his rank is changed without his retiring from his mission he presents a letter of credence. As for the relative rank of ambassadors, the rules laid down by the plenipotentiaries of the eight leading powers concerned in the Congress at Vienna are generally followed, together with the supplementary rule adopted at Aix-la-Chapelle in 1818. The ranks are—(1) ambassadors, legates, or nuncios; (2) envoys, ministers, or others accredited to sovereigns; (3) resident ministers; (4) *chargés d'affaires* accredited to ministers of foreign affairs or secretaries of state. In each class or rank the diplomatic employés take precedence among themselves according to the date of the official notification of their arrival. When the ministers of several powers sign acts or treaties in common the order of signature is determined by lot. These rules cut off some of the quarrels between ambassadors of different nations in regard to rank and national honor, which were not infrequent in earlier times.

B. *Consuls*.—These are agents clothed with no diplomatic or political power, residing in a certain district in order to protect the interests, chiefly commercial, of the country which commissions them. Their special duties are determined by their own government, and they receive a permission to perform their duties from the foreign authorities. This is called an *exequatur*, and may be withdrawn for reasons judged sufficient by the same authorities. Consuls have no extraterritoriality unless by special treaty, but are subject to the laws of the country where they reside. A gross insult to the consular flag would be a ground of complaint, and so an insult to the consul's person might be resented as an insult to his country, but in general, and where his representative character is not attacked, he is like other men in his privileges. In Mohammedan lands, however, where for a long time diplomatic intercourse fell into consuls' hands, they have nearly the same rights as ambassadors. The duties imposed by the U. S. on their consuls are principally to receive the protests and other papers of masters of vessels, to aid destitute seamen and reclaim deserters, to act on behalf of the owners of stranded vessels, and administer upon the property of persons who have died within their consular province. The office of consul bears some analogy to that of the *proconsul* in Greek states, whose business it was to aid the citizens and pay attention to the envoys of the city which appointed them. They were, however, always citizens of the place where they acted as *prozeni*, and the office, which was an extension of the relation between host and guest, remained in the same family. But the true origin of the consul, in the modern acceptance of the word, is to be traced to the times when commerce began to be active in the Middle Ages. The merchants of the cities on the Mediterranean had already officers who were called by this name, and who settled disputes that arose in the course of business. It was a short step, when bodies of merchants from the same place went for business purposes to the eastern parts of the Mediterranean, that a consul should go out with them or should be sent to live among them, invested with similar powers. We have spoken in another place of the office of consuls in the East, which much resembles this institution of the Middle Ages.

5. *Treaties*.—There could be no intercourse between nations without some understanding in the form of a contract or treaty, and a confidence that it would be observed. The main work of foreign ministers is to make arrangements of this kind, either temporary or permanent. The history of international law is in great measure to be gathered from such arrangements between nations. The subject of treaties is one attended, in its general principle, with little difficulty, and the interpretation of them follows substantially the rules which settle the meaning of other written contracts. We pass over these points to dwell for a moment on one or two which need some explanation. (a) The treaty-making power is determined by the constitution of each separate state. In the U. S. treaties made by the executive and submitted to the Senate need two-thirds of the votes of that body for their ratification, and if the payment of a sum of money forms one of the conditions of a treaty a majority of the House of Representatives must concur. In this way it would be possible, in certain cases, to defeat the action of the Senate; but to do this, except in extreme cases, would oppose the spirit of the Constitution, which evidently intended to invest the President and Senate finally and absolutely with the treaty-making power. A similar conflict might take place when in Great Britain the king's ministers had made similar agreements with foreign powers, for, as money is voted for particular purposes and not in a lump, the Parliament might refuse to sanction a payment to which the treaty had pledged the country. A question has been



discussed as to the extent of power lodged in the hands of the President and Senate by our Constitution, as it respects the cession by treaty of land belonging to a State. Very high authorities on constitutional law have taken ground which would sanction the idea that the treaty-making power is practically omnipotent. But surely no treaty could alter the relations of the general government to the States, and as to cessions of land, the better opinion seems to be that while treaty can determine boundaries and so take away from a State what was supposed to be its territory, it cannot dispose of territory admitted to belong to a State without its consent, unless in the extreme case of conquest, when treaty simply admits the fact of actual transfer of territory to the jurisdiction of another power, and declares this to be inevitable. (b) The legitimate authorities of a nation may weakly or wickedly make a treaty greatly to its disadvantage. What is to be said of this case, and of treaties obtained by force? The true answer is that, as in the case of agencies, where both parties ought to be supposed to know the extent of the agent's power and the nature of a contract, so here, where a State's representative really transcends his power or acts under compulsion, the agreement is void. It is implied in all agreements that the parties are acting freely: to which we may add, and not under deception for which one of the parties is responsible. But the plea of compulsion must not be used to cover very wrong motives, such as may be supposed to have acted on Francis I. of France, when, to effect his liberation from captivity in Spain, he made a treaty which he renounced after he had procured his freedom. For it was not necessary for the French nation that he should be set free, nor was force, in the proper sense of the word, used upon him. Sometimes a subordinate authority, as a general, makes an agreement without having the requisite authority. A noted case of this kind, often referred to, was the *Spanio*, so called, of the consul Postumius (b. c. 321), when he delivered his army from captivity by a peace, which the senate of Rome afterwards declared null. This declaration was constitutional, but in good faith the whole army should have been given over to the Samnites as prisoners of war. (c) It is needless to say that, as an agreement to do a wrong thing can never make it right, a treaty for iniquitous purposes is invalid. (d) The term *treaty* includes various transactions, such as treaties of peace or of alliance, truces, conventions. Treaties may be for political or for commercial purposes, in which latter form they are usually temporary. In short, all the relations into which states enter between themselves take this form. Among the forms of treaty we mention only treaties of *guaranty*, in which a third party becomes a pledge for the good faith of one of the contracting powers. This kind of security for the faith of treaties was once much more common than it is now. The party giving this security is not considered as engaging to pay a sum of money, in case of the failure of the contracting party to discharge his obligation, nor as engaging to compel him to do this, unless one or the other of these acts were expressly mentioned, but as using his best endeavors to effect this end by urgent persuasion. He must in general induce the other party to perform his stipulated duty, but is not required to perform it himself. Guaranties therefore may mean comparatively little. They are a way of interesting the honorable sentiment of another state in the fulfilment of an agreement, and possibly the non-fulfilment may be a ground for unfriendly relations or even for force. This last is true when a strong power guaranties the independence of another. We can say as much, at least, as this:—that an attempt to destroy the independence thus stipulated gives ground for interference. (e) Treaties go into effect when they are signed, unless they contain some other specification of the time when they begin to be operative. In treaties of peace and of truce (to which we shall return when treating of war) it is customary, where the operations of war are scattered over a wide space, to fix on separate dates at which the treaty shall come into effect in different quarters. (f) A treaty becomes valid when the constitutional treaty-making power gives its consent. Here we may touch on the question whether, in forms of government where the executive is authorized to conclude a treaty, he is bound by the action of his negotiator, provided the latter proceeds according to instructions. It was formerly held that, if the agent who made the treaty proceeded according to his full power but not according to secret instructions, the principal was bound by his action, since the full power, being known to the other party, was the motive in consideration of which he consented to treat. But at present it is held by the best authorities that the principal may withhold his ratification, in certain circumstances, even when the negotiator has followed his private instructions. The refusal is justified in cases like these (see Wheaton, iii. ch. ii., §§ 256-263): (1) "On the ground of the impossi-

bility, physical or moral, of fulfilling the stipulations;" (2) "on the ground of mutual error in the parties respecting a matter of fact, which, if it had been known in its true circumstances, would have prevented the conclusion of the treaty;" (3) on the ground of "a change of circumstances on which the validity of the treaty is made to depend, either by an express stipulation or by the nature of the treaty itself." To which may be added the case where the treaty would involve injury to a third party.

11. *International Relations as Affected by War.*—Almost all the important questions and discussions of international law are connected with a state of war between two or more nations. War, of course, must interrupt intercourse between the belligerents, and it may also prevent neutrals from pursuing the same kind of commerce with either of the belligerents as before. It is thus an act or a state of relation of two nations by which other nations also may be seriously affected. Hence, we have to consider war first as if the belligerents were alone affected by it, and then what other nations must consent to endure, and what they have a right to do. Thus, the rights of war in the limited sense, the rights and duties of neutrals, and how far the belligerents may wage war to the prejudice of neutrals, are the principal subjects of consideration in this part of international law.

War itself is armed contention between two organized communities, and a *just* war is such a contention for the purpose of obtaining justice which has been denied. The power of waging it, and the decision when to wage it, must be left by the nature of the case to each of the independent communities of the world. If a state can wrong another and refuses to redress the wrong, the injured party, having no superior, must decide for itself what it will do. It may decide to take no steps to recover its rights, but to waive them as being trifling in the particular case or as not worth the cost of prosecuting them; or it may ask others, its equals, to interpose by way of mediation, or, if the other state will consent, of arbitration; or it may make use of armed force. The choice belongs to the injured party, just as, in disputes between man and man, if appeal to the courts and single combat were allowed, the offending party might employ either of the alternative methods he thought best. No one therefore can interfere in a just war, otherwise every war might become universal. But, as was said in the case of interference, so we must say here, that in wars judged by third parties to be unjust there may be armed interference in extreme cases on the part of the injured.

The particular causes of war are as many as the rights of an organized community or of the individuals under its protection which have been invaded; and to these must be added that an apprehension of intended injury may be so great as to justify the party concerned in striking the first blow. But war can never be right, although it may be undertaken to vindicate just claims, unless measures have been taken to obtain reparation in a peaceable way. This, of course, applies to the active party, as the passive or defensive party accepts a fact and wards off attempted harm. When two parties are in an alliance involving mutual protection or defence, each must judge whether the *casus fœderis* has occurred—that is, whether the assistance is called for by the other in order to prevent a wrong which the alliance contemplated. All these rules, however, are violated, especially by strong nations; and the most frivolous pretexts for war, for joining others in war, for refusing to abide by treaty-obligation, and in this way or by some other wrong bringing on war, have been employed many times over in the history of nations.

When nations have complaints against one another, there are several summary processes by which justice has been sought without recourse to actual war. These are *hostile embargoes*, *reprisals*, *partial blockades*. (a) We say *hostile embargoes*, because there are what may be called peaceful or civil embargoes. An embargo being a stoppage or prevention of a vessel's quitting a port, there may be occasions where such a measure can be adopted merely to prevent war by keeping the vessels of a country safe from collision with the rules of belligerent powers. In this case the complete non-intercourse does not generally begin until vessels, especially of foreign powers, have liberty to leave the ports, laden or in ballast. This was formerly thought to be an unexceptionable measure, but it is not much in use, and apparently will go out of use, for it puts obstacles in the way of commerce when all that is needed and must complain of. The *hostile embargo* here contemplated is a detention of the vessels of a port under a nation which may happen to be in the ports of the injured country. These are detained by way of effect for a wrong done by the other country, in the hope that this attachment of the property of its subjects may lead to a peaceful settlement and prevent actual war. (b) This is a form of



reprisals—a word which, taken in its large sense, denotes any seizure and detention of property for the same purpose, for which ships of a foreign power would be detained in the case already mentioned. Reprisals imply an attempt to obtain justice without having recourse to war, while *retorsion* or *retaliation* is not an attempt to obtain justice, but rather to express wounded feeling by unfriendly treatment similar to that which has been received from the other party. Reprisals have often been made the subject of treaty, and in many instances it has been agreed that a nation will not resort to them until several months—four months are named in a number of treaties—shall have elapsed after the threat to make use of them. The evil of embargo and reprisals consists in this—that an innocent subject or citizen suffers loss for the wrong or pretended wrong of his government. This evil can be prevented or compensated for only by distributing the harm which he suffers over the whole political body, and making him a compensation. (c) *Pacific blockades* are an invention of one or two of the leading nations of the present age, the object of which has been to prevent neutral vessels from entering or issuing from certain ports of an offending state just as in war, with the same rules of proclamation and arrest for violation of the rules as in war, while yet war is declared not to exist. The examples of the application of such a pretended rule all occurred between 1827 and 1838; that is to say, two of them continued for some time in or after the year last mentioned, but none began before or since the period mentioned. They may be said to have become obsolete already. Of the writers on international law who mention them at all, most do this to condemn them as an experiment unjust to neutrals. This appears to us to be evidently the correct opinion, because if any measure implies a state of war, blockade does so most decidedly; and no such new measure can be introduced into the law of nations without the consent of all. Neutrals, therefore, would have the right of making complaints against such a principle, which affects their commerce. In fact, when a Brazilian vessel was condemned in a lower French court for breaking such a blockade—France and England being nearly alone in this new experiment—on the ground of attempting to take contraband of war into a blockaded port, the higher court decided that as there was no war there was no contraband of war, and restored the article thus condemned. If a state of war did not exist, there was as much obligation to allow the vessel to go into her port as there was to restore the goods condemned on this ground afterward.

Besides these measures for the purpose of bringing another state to act justly, taken by the injured state itself, there are others attempted by one of the states, or through friends of both parties, the object of which is to commit the difference complained of to some impartial counsellor or judge. These measures are mediation and arbitration. *Mediation* is the intervention of a friend volunteering to pacify the minds of his friends, and offering them his advice towards a settlement of their difficulties. When two nations want a pretext for avoiding a war to which they are tending, this is a way of getting them out of their unpleasant position and yet saving their honor. But mediation binds no one: it is mere advice, without any pledge on either part of listening to it. Such a course was recommended in the protocol of the Congress at Paris, Apr. 14, 1856, in these words, which might include arbitration as well: "The plenipotentiaries do not hesitate to express in the name of their governments the wish that states, between which a serious disagreement might arise, should, before appealing to arms, have recourse, as far as circumstances should permit, to the good offices of some friendly power." *Arbitration*, to which in the introduction to this article reference has been made, is of two kinds—that by means of a permanent international court, and that by the special action of the states which are at variance. The first is a cumbrous, unwieldy thing in the present state of the world, and would hardly work very well if a few of the states governed by Christian international law should hold aloof. The other is simple, easy in its operations, and has often been tried with success. The parties agree on the court of arbitrators, on the points to be submitted, on the place, time, etc., on the law which is to govern the decision, and pledge themselves to abide by the result; it being understood that the decision does not go beyond or aside from the points submitted, and that the arbitrators are honest and impartial. The success of the late arbitration at Geneva between Great Britain and the U.S. has brought this kind of arbitration, by compromise as it is called, into greater notice, and inspired many with the hope that wars will be more frequently avoided hereafter in that method. The Parliament of Italy, on motion of one of the deputies, Prof. Mancini, a distinguished publicist, passed the following resolution in their session of Nov. 24, 1873: "The chamber expresses the wish that the king's government, in

its foreign relations, may endeavor to render arbitration an accepted and frequent means of settling, according to justice, international controversies in matters susceptible of arbitration; that it may propose on fit occasions to introduce into the stipulations of treaties the condition of submitting to arbitrators such questions as may arise in the interpretation and execution of the same; and may consent to persevere in the praiseworthy initiative which it adopted a number of years since of promoting between Italy and the other civilized nations conventions for the purpose of making uniform and obligatory, in the interests of the respective peoples, the essential rules of international private law." The unanimous acceptance of this resolution, accompanied by the advocacy of it by the minister of foreign affairs, the vote of the British House of Commons, to the same effect substantially, in the summer of 1873, and the earnest wish still more recently expressed of vast numbers, that arbitration may at length be an efficient and formally adopted way of terminating disputes between nations, make us hope that a better time is coming, when wars shall be less frequent.

War is an *open, public*, not a secret, covert, way of attempting to obtain justice. Not only must a demand have been made beforehand, which the complaining party conceives to be just, and a denial of justice, as he conceives it to be, have come from the other party, but there must be an *open* withdrawal from intercourse, an open commencement of hostile relations. The way of doing this is called a *declaration of war*. In the old times no war was thought to be rightfully commenced without such a declaration on the part of the assailing state. The Greeks made their declaration by a herald or by an ambassador and a herald. The Romans in their early times had a formal and ceremonial way of making complaint and declaring war through a college of *fetiales*. The notice here seems to have been given for the purpose of allowing time for reflection to the enemy. In the Middle Ages the declaration, accompanied, it might be, by challenge to combat, seemed intended to remove all suspicion of cowardly, underhanded conduct. A true knight, according to the ideal rule of knightly feudal honor, could take no advantage of his enemy. Open declarations continued until long after the practice of having resident ambassadors at foreign courts came to be the rule, but in modern times such declarations, formally made to the enemy, have ceased to be accounted necessary, although they have not always ceased to be desirable. Diplomatic correspondence and the increased publicity of political relations make nations aware of each other's intentions; and when two states are at variance, and military preparations are going on in one of them, the other is apt to demand the reason through its ambassador; it is thus possible to have earlier information of hostile intentions than could be obtained by simple declarations, and often the final breach is indicated by the ambassador's demand of his passports. Still, a war begun on slight grounds and precipitated upon the other party, like that of Napoleon III. in 1870, shows an intention to get the start of an enemy and attack him when he is unprepared. But, although declarations of war to an enemy are not now thought to be required by honor between nations, it is a very frequent practice to issue to other courts, or in some more directly public way, a justification of the determination to declare war. It is also common to give notice to one's own subjects in different parts of the world, so that they may protect their commercial interests against the foe, and make ready for a change of affairs. In our country, as war is in the hands of Congress, a resolution of the national legislature is all that is needed.

The commencement of foreign wars is now often notified by a neutral government to its own subjects in documents, to which the name of *proclamations of neutrality* has been given. These papers make known the fact of the foreign war, recite or refer to the laws of the nation made for the purpose of preserving its own neutrality, and warn its subjects of the penalties which they may incur by unneutral acts, and sometimes give notice to belligerent powers what will be allowed and what forbidden in neutral waters. By these proclamations a nation screens its subjects from the penalties for piracy in case they should be found on board of a belligerent vessel engaged in the work of war. It also takes from itself the power of complaining that its ships and goods are visited with the ordinary effects of lawful war, as the declaration of the fact of war is good against itself. Such announcements are of little use comparatively when two states, already long known as within the pale of international law, begin to carry on war against one another, but they are of great use when organizations calling themselves states rise up suddenly by a revolutionary process, because in this case there is generally no definite commencement of war, no point of time when what seemed a sedition blossoms into rebellion, and generally no willing-



ness on the part of the old state, against which the revolutionary proceedings are directed, to acknowledge that war exists. Proclamations of neutrality have not been long in use, nor do they carry with them any especial authority. They may, however, in the case last supposed, begalling to a state attempting to quell a revolt, because, according to the rule now usually adopted by nations— but adopted without necessity, as we think— the flag of the revolutionary organization meets with the same reception in the ports of the nations as any other flag. On the whole, although such proclamations may be issued too soon, and so may encourage a revolt that would otherwise be crushed, they do much more good than evil.

The effects of a state of war next demand our notice. The first of these is *non-intercourse* between the individuals belonging to the two belligerents. That is, all relations of commerce, all rights to reside in a country conceded by treaty unless in express terms perpetual—every means of communication by direct channels between the subjects of the opposing parties, come to an end. It follows that in strictness houses of business, in which one of the partners is a belligerent enemy's subject, must be suspended or dissolved, and that the portion of profits due to him, or in general debts due to a person pertaining to a hostile country, cannot be paid over. Sometimes slight exceptions are made by the government of a belligerent to this total non-intercourse by granting licenses to trade, which, however, do not make such trade internationally lawful, nor protect it against capture without the other hostile party's consent. There are also permissions, often given and sometimes conceded in treaties, that an enemy's subjects may reside during the war under protection of the other hostile government if conducting themselves peaceably; and generally time is given to them, on the outbreak of a war, to remove with their effects from the country. But this is a concession indicating the progress of humanity, and not a strict right. The strict rule would be that foreign residents, as soon as their hostile character began, were liable to be detained or deprived of their liberty, and their property exposed to confiscation. The Supreme Court of the U. S. decided, in accordance with the prevalent opinion of text-writers, that the property of enemy's subjects and debts due to them are confiscable, but added that an act of Congress was necessary to carry such a measure into effect. And the treaty of 1794 (ratified in 1795) with Great Britain provides that "neither the debts due from individuals of the one nation to individuals of the other, nor shares nor moneys which they may have in the public funds or in the public or private banks, shall ever, in any event of war or national difference, be sequestered or confiscated; it being unjust and impolitic that debts and engagements contracted and made by individuals, having confidence in each other and in their respective governments, should ever be destroyed or impaired by national authority on account of national differences and discontents." This is a permanent article of the treaty, and important as a declaration of what the U. S. regarded to be just. Many similar stipulations are contained in the treaties of other nations, and no example of confiscation of debts occurred for a century and a half before the French Revolution, with the exception of the Silesian loan in 1753. No example, we believe, has ever been known of *public debt*, whether due to the other belligerent or to his subjects, having been confiscated. As for the persons of the subjects of one enemy within the jurisdiction of the other, the treaty just now cited expresses itself to the effect that in case of a rupture merchants and others, subjects of the enemy, may remain and continue their trade so long as they behave peaceably; and in case their conduct should render them suspected, and the respective governments should think proper to remove them, the term of twelve months from the publication of the order should be allowed for that purpose. This provision, however, unlike the other before cited, is limited in its operation to twelve years. A multitude of similar provisions can be found in the treaties of other powers. It may be said, then, that at present—(1) debts and other items of property belonging to an enemy's subjects before the breaking out of a war remain intact; but (2) the owner has no power, while the war continues, of getting at his own by any process of law or in any way permitted by law, unless special treaties grant him the liberty; and that (3) at the end of the war the power is restored to him of prosecuting all claims for property held by him before its commencement. Also (4), that the enemy's subjects are generally allowed to remain in the other enemy's country if there resident before the war; and (5), if thought necessary to require their removal, that ample time be given to them to withdraw, taking their effects with them.

The effect of a war on previous treaties between the two belligerent powers deserves notice. Provisions of treaties, it is clear, which relate to the rules of war to be observed

between the parties, cannot be suspended by the fact of war, since only then can they come into operation. It is also clear that certain arrangements in their very nature are perpetual, and so do not terminate at the commencement of a war. Thus, the recognition of a state like the U. S., made by Great Britain in 1783, or of the South American republics by Spain, would not need to be renewed after the war was over, on the ground that such a transaction is in itself final, and that such a state has become an international entity, unless, indeed, conquest or some act of such a state as itself puts an end to its international character. The same may be said of boundary-lines and of rights named in a treaty deducible from the existence of a state as such. But when we depart from these clear cases, we find some diversity of opinion. Kent says that "as a general rule the obligations of treaties are dissipated by hostilities." Halleck says, *inter alia*, that "treaties of commerce and navigation are generally either suspended or extinguished by a war between the parties" to them. Of course they must be suspended at least, or war could not exist. Calvo says that "as for postal and custom-house arrangements, conventions relating to navigation and commerce, agreements relative to private interests, they are generally regarded as suspended until the cessation of hostilities." As commercial, postal, and similar conventions are very often limited in time by their express terms, it seems safe to say that such arrangements, and others, like them, liable to be changed in these particulars in a few years of peace, ought to be regarded as broken off by war, which brings with it new feelings and interests. We add from Calvo that opinions agree "in favor of admitting the definitive rupture of conventional obligations entered into expressly in view of a state of peace, of such as have it for their special object to favor the relations of good harmony between nation and nation, such as treaties of friendship, of alliance, and other acts of the same nature, having a political character." A distinction was made by some of the older writers between the effects of a new war arising from a cause independent of a treaty, which they thought would not affect the provisions of a treaty, and a war growing out of the breach of a treaty by which its provisions would be annulled. Hence, in a given treaty, if one of the articles had been broken, and a war arose out of the breach, the rest of the treaty would be unaffected. It is easy to see that this distinction would complicate affairs between parties wishing to make peace. The practical rule suggested by these doubts is, that as silence may be misinterpreted, it is best always to make mention of the old treaties by way of renewing and confirming them. It is said by Dr. Twiss that Great Britain "in practice admits of no exception to the rule that all treaties, as such, are put an end to by a subsequent war between the contending parties." In conformity with this rule, or to prevent doubt, the Peace of Westphalia and the Treaty of Utrecht were renewed a number of times over when the parties to them after war made new treaties with one another. It may be added to what has been said, that private rights, resulting from rules of admitted justice, are not extinguished by a war; and so a debt due by one nation to another, where the same rules of right prevail as are acknowledged in municipal law, survives a war. An interesting discussion arose between Great Britain and the U. S. after the war of 1812-15 whether the colonies, after the recognition of their independence, retained the rights of fishery on British coasts, as a matter of course, which they had had while dependencies of Great Britain. Mr. John Quincy Adams and others contended that they retained these rights, and in the discussion the question of the effect of war on treaties came up. To us it seems that the British side of the question had the soundest arguments in its favor. We placed our selves on the footing of an independent nation, and had no more rights than others; nay, even if we had been obliged to submit again to the British crown, this right of fishery might have been taken away.

A very important distinction, not always observed, but founded both in justice and in humanity, is that between active and passive enemies, or those who prosecute the war either as the responsible government of a country or as combatants, and those who obey the laws of the land in relation to a state of hostilities without any active participation in them. The latter being by far the most numerous class, and making no resistance to the enemy, can be said to be in a state of non-intercourse only, and are really not enemies. They suffer the ills of war so far as the unity of interests and destinies in a political body makes this necessary, but they are not in modern warfare even expected to annoy an invader, and are secure against devastation, and for the most part against requisition, while they remain in that passive state. The interests of humanity thus require that on the land, the treatment of non-combatants should be such as to interfere as little as the



necessary measures for prosecuting war will allow, with the occupations of peaceful industry and with the quiet of domestic life. On the sea, however, the rules of war have been much more free; the peaceful use of the sea by enemies' vessels has never yet been permitted. Ships and their cargoes have been lawful plunder until now, although to despoil an unoffending householder of his goods and to burn his house would be considered barbarous. This difference is due partly to the greater suffering of families produced by carrying the rigor of war to an extreme, and partly in this—that capture of vessels and goods weakens the capacity of an enemy to sustain a war. Not a few voices have been lifted up in favor of removing innocent traffic from the sea, whether belonging to friends or enemies, from liability to capture. So many steps have been taken in this direction, that capture of enemies' vessels engaged in innocent trade on the sea will henceforth be hardly worth the expense of employing cruisers for this purpose, and must ere long come to an end.

The *forces* lawfully employed on the land and on the sea in times past have been somewhat alike, with important differences. On land they are national or standing armies, and a militia, as well as volunteers; which latter bodies are often commanded by officers of the regular army. On the sea they are national vessels and privateers. The citizen soldier and the privateer armed vessel are as legitimate forces of war as national armies and navies. In fact, privateers date from a time in Europe when there were few or no navies, except such as were improvised out of merchant vessels. These vessels, with their crews, might be hired by the governments, or impressed into the sovereign's service, whether owned by natives or by foreigners—that which was called the *jus angaria* or *droit d'angarie*—or they might be vessels owned and manned by private persons, but kept up at the public expense; or public vessels with a crew and outfit provided for by private persons; or, finally, private vessels officered and sent to sea at the charges and risk of private persons under a government's commission. Of these four ways of sending vessels out to sea, the latter only has been in vogue in the most recent times. In commercial states this has been a favorite way of employing sailors and merchant ships when trade was crippled by war, and to a nation, with a small navy but with a large seafaring class, offered the prospect of something like equality on the sea with a nation possessing a good-sized fleet. The plan was for the government to put the owners and captains of such privateers under bonds. A letter of marque is given, which alone entitles a vessel to any share in a capture made from the enemy, and the absence of which exposes a vessel calling itself a privateer, with its crew, to harsh treatment, as almost having a piratical character. Any great irregularity or lawlessness will involve forfeiture of vessels and other penalties. But, in truth, lawlessness and harsh treatment of the enemy could never be prevented. The motive of the expedition being plunder, the captain and officers having no professional honor, the crews being often a motley collection of adventurers, privateering was long felt to be a great evil, and earnest voices were raised against it, especially by enlightened men belonging to our own country. At length, in 1856, the parties to the Declaration of Paris brought about a new era in international law by the four rules relating to warfare on the sea, one of which was that "privateering is and remains abolished." Other nations were invited to give their assent to these rules on the condition of accepting all or none, and nearly all Christian states accepted them. Several of them were such as the U. S. had always contended for, but our government refused to give in its adhesion, on the ground that we should have no adequate force, if we abandoned privateering, to cope with nations possessing a large navy, as our own policy was to have a small one. The offer, however, was made—but without effect—to adopt the rules, provided that the signers of the Declaration of Paris would go further and exempt all innocent traffic of enemies on the sea from capture. In 1861, Mr. Seward, being secretary of state, made offer to two of the principal European powers, on the part of the U. S., to come under the operation of the four rules; but as it was understood that the stipulation would be for the entire republic,—for the Confederate States, as well as for the loyal ones,—and as thus these powers would be parties in imposing a rule of warfare on the Confederate States, as, in short, it was a scheme to prevent them from using privateers by the aid of international law, the offer was declined.

The abandonment of the use of privateers by so large a number of states, together with the safety of enemies' goods on neutral vessels provided for in the same document, puts a new face on maritime warfare. At the outbreak of a war, if the risk of capture is great enough, neutral vessels henceforth will take the place of belligerent ones for commercial purposes, and the motive of capture is greatly

diminished for public cruisers, the only ones now remaining. Thus, it can be no very great concession that belligerents may safely use their own merchant ships, unless neutrals regard it of importance for them to get the business of times of contest into their hands. We add to this, as a hint in regard to the meaning of the four rules, that the parties to them may still legitimately employ privateers against the U. S. and other non-signers of the rules, the obligation to observe them being only a reciprocal one between the signers.

*The General Usages of War, especially on Land*, although somewhat vague, and dependent upon the temper of the belligerents, or still more upon the character of the commanding officer, deserve our consideration. We have no space to compare the present manner of conducting war with that of past ages, and to illustrate thereby the increased humanity that has taken possession of the Christian world. The principles of a humane and yet efficient war-code are principally these: that war is a way of obtaining justice when other means have failed; that it is waged between governments; that quiet inhabitants of a country are to be treated with humanity and with as little severity as will allow of the effective prosecution of the conflict; that, as soon as justice can be secured, armed contest ought to cease; and that retaliation, if necessary on account of the inhuman or deceitful conduct of an adversary, cannot go to the extreme of justifying that which is morally wrong. The *causes* which have brought on a more humane mode of warfare are various, such as the increased sway of the Christian spirit; the professional feeling in standing armies, coming down from the officers, which looks on the military forces of the foe rather as servants of the state than as enemies; the general practice of carrying supplies for troops on the march, and the system of commissaries and quartermasters, which prevents recourse to plunder in a great degree; and the use of weapons which do their work at a distance without exciting a feeling of rage between man and man. The rules of warfare have been codified in our country in *Instructions for the Government of the U. S. in the Field*—a manual prepared by the late Dr. Lieber, and which, we believe, is the first war code, properly speaking, that has ever been prepared. What we aim at here is nothing more than to give a brief summary of the leading provisions for preventing the excesses to which war is liable: (a) One of these relates to the weapons to be employed, as well as the other means for injuring the enemy. Here much is vague. On the sea a greater license is allowed than on the land. Torpedoes were used extensively in the late war between France and Prussia to protect the harbors of North Germany. On the land, weapons are to be condemned which merely give a ghastly wound without otherwise adding to the efficiency of war. (b) The troops employed in war must be such only as can be under military discipline. Hence, to employ savages, like our American Indians or like the Turcos used by the French, is, to say the least, questionable; and it increases the general ferocity of war, as the opposite party will return to regular soldiers the brutalities inflicted on them by this part of the foe's army. (c) Perfidy and solicitations to commit crime are not allowable. Military necessity, as our war-rules express it, admits "of such deception as does not involve the breaking of good faith, either positively pledged regarding agreements entered into during the war, or supposed by modern law of war to exist. Men who take up arms against one another in public war do not cease on this account to be moral beings, responsible to one another and to God" (§ i. 15). And, again (§ i. 16), "military necessity does not admit of cruelty,—that is, the infliction of suffering for the sake of suffering or for revenge,—nor of maiming or wounding except in fight, nor of torture to extort confessions. It does not admit of the use of poison in any way, nor of the wanton devastation of a district. It admits of deception, but disclaims acts of perfidy." (d) When prisoners of war are made, they must be humanely treated as it respects food and quarters. It is customary to allow officers their liberty, on parole of honor not to serve again until exchanged. Deserters, found among the prisoners taken from the enemy, may be dealt with as having committed a high crime. Escaped prisoners have committed no crime in seeking to regain their liberty, but when retaken may be subjected to more rigorous confinement. The treatment, however, of irregular troops, especially of guerilla-parties and of "bushwhackers," who lay aside the soldier's character or put it on at pleasure, is much more severe than that of regular troops. (e) Of the treatment of non-combatants and of their property we have already spoken in part. We add here, on this most important of all the points relating to the conduct of war, that nothing but military necessity can justify the seizure of private property, that domestic privacy is to be respected, and that the persons of unoffending individuals are to be considered



sacred. The code before referred to speaks thus of private property: "Unless forfeited by crimes or by offences of the owner, it can be seized only by the way of military necessity for the support or other benefit of the army or of the U. S. If the owner has not fled, the commanding officer will cause receipts to be given, which may serve the spoiled owner to obtain indemnity." (f) As for property not private, hospitals, even those for military purposes, and other humane or religious institutions, are to be respected. Public buildings and works of art are not to be wantonly destroyed, nor the latter scattered or given away by the captor. Booty taken on the field of battle is generally considered the property of the conquering army; but prisoners, according to our code, are not to be despoiled of valuables found on their persons or of extra clothing. It is, however, added that large sums found on the persons or in the possession of prisoners may be taken from them after leaving enough for their support. (g) In storming fortified towns the practice, even under humane commanders, has been to put little restraint on their troops. But nowhere is greater humanity needed, since the inhabitants are liable to a triple curse—to the horrors of bombardment, to the sufferings and discomforts arising from a multitude of troops cooped up within the same walls, and to the final storm. The forces of war can and ought to protect houses and persons from plunder at such a season. (h) The rules of war allow of certain communications between hostile countries or hostile armies, such as those by flags of truce, heralds, carrels for the exchange of prisoners. These persons, if admitted within the enemy's lines, have a sacred character, but it may be inexpedient to receive them, and of this the party visited must judge.

A few remarks need to be added here in respect to certain kinds of war, on account of something peculiar in one of the parties. One of these is war with *savages*, where the simple rule of humanity is all that can be required of the civilized combatant. The parties being unequal, and one of them ignorant, distrustful, and perfidious, there can be no law of nations to govern their intercourse. Another is war with *pirates*. A pirate is a sea-rover who preys on the vessels and goods of any nation that he falls in with, or makes descents on the land for a similar purpose of plunder. A privateer exceeding its commission might not be accounted as a piratical vessel, but one with a commission from the *two opposite* belligerents would be obnoxious to this character, since the only motive for such a double commission is plunder of both parties and of vessels bound to the ports of either. The vessel of a part of a state, organized for rebellion and independence, has been held to be piratical, because, although it may have received a commission from the rebel government, it carries a flag unknown to international law, and commits treason against its legitimate country. But the better opinion is that as such a vessel does not scour the sea for the purpose of plunder, and wages war with but one nation, it wants two important characteristics of piracy. Piracy, in the international sense of the word, is a crime against all nations, but each nation in its own criminal code may class other crimes under this head; thus, the U. S. made the slave-trade to be piracy for all citizens on any ship, and for persons not citizens on our vessels; yet, for all that, the slave-trade, though it might be made criminal by the laws of all civilized nations, is not piratical in an international sense. A slave-trading vessel from this country could not be captured by the cruisers of any other country without special treaty to that effect; but an act of strict piracy could be tried everywhere, for a piratical ship, as being at war with the world, could be captured by the vessel of any nation. Still a third kind of war with marked peculiarities is that between a mother country and a *rebelled colony*, or a state and the people of a seceding territory. Here the first question is, Does war exist? for the commencement of such a war is often difficult to be determined. It may be a secession or an insurrection; it may need only the civil power to quell it or a slight military movement. But organization under a new government, apparent determination to make the secession complete, laws and practical efforts for creating an army or a navy, positive acts of war following all this, can give such an aspect to the movement that other nations will have a right to regard the fact of war as manifest. For, be it observed, other nations have the same right of judging whether civil war or rebellion exists, as they have of judging when it has ceased to exist, and when the independence of the rebels ought to be practically acknowledged. And this judgment of theirs is the more justifiable, if the mother country conducts it by belligerent acts, such as proclamations of blockade or levies of troops. When, now, such a kind of war exists, the relation between the parties to it is peculiar in this—that every rebel is technically a traitor, waging war against his own lawful government, giving aid and comfort to its

enemies. Those, therefore, who are not killed in war may be hanged by sentence military or civil. But in general, at the present day, when so many revolutions are attempted, such severity would only awaken the spirit of retaliation or of revenge; and so also to act on the principle that rebel cruisers are piratical would only embitter the feelings of the rebels, shock foreigners, and provoke remonstrance, if not interference. The true policy is to treat such rebels as *justi hostes* on land and on the sea, entitled to the same rules of war as other belligerents. A nation can employ also against its rebels the same means of war as if they had been foreigners from the beginning—can obstruct the avenues of trade with them, and, after due notice, seize on foreign vessels attempting such trade. All this being incident to an international war, foreigners are bound to respect such proceedings. Further than this, What is the relation of foreigners to the two contestants? One of these is an acknowledged state; the other has no international existence, and so towards the latter foreigners have no international obligations whatever. If they give it aid, this is a cause of war for the parent state; if they recognize it, and so concede to it an international *status*, this too is a cause of war; but, on the other hand, they may help in its subjugation if they please, thus rendering service to a friend; they may refuse its ships admittance into their harbors; they may decline to acknowledge title gained by sales made of captured vessels under its authority. All that they are bound to do is to exercise towards its troops or ships the same spirit of humanity with which they would treat refugees from a battle or from a storm at sea. The common practice, however, as far as there is any, is to take a neutral attitude; to acknowledge the rebels' vessels as engaged in regular war; to give both parties the same privileges that are conceded to belligerents in any other contest. That such concessions must tend to encourage revolutionary governments, to give them the feeling of having reached the dignity of a world-power, is manifest.

War, whoever the parties to it are, contemplates capture and conquest. These are so far morally justifiable in a just war as they have it for their object to procure the means of compensation for wrong previously inflicted, to pay the expenses of obtaining justice, and to provide some security for the future. But as both belligerents generally claim to have the right on their side, and as there is no arbiter between nations, the facts and results of war are acquiesced in, unless outrages are committed, or wrong done which excites in a high degree the moral sense of the world. As for capture, which has been a title of the law of nations discussed and shaped by the courts more than any other in times past, its importance will be much less in times to come, since now neutral ships may carry enemies' goods with impunity, and therefore to a greater extent than heretofore will be used for that purpose. The motives of governments in sending cruisers out upon the sea for purposes of capture are to distress and annoy the enemy—to produce such derangements in the commerce of his subjects as to make him willing to come to equitable terms of peace. No one, as we have seen, can make captures unless under authority from a government. When a capture is made, a question may arise as to its validity, and then no property can be passed by sale with a good title, unless the proper court of the country to which the captor and his vessel belong, gives a title after examination of the facts. The ship and goods taken, however, belong presumptively to the government or country in the interval between capture and such judicial decision. Hence, if for any reason it is inconvenient for a captor to carry or send his prize into port, a very barbarous usage allows him to burn it. A great deal of destruction of ships and goods took place in conformity with this usage in our late war of secession, as the Confederates had no ports into which they could take their prizes. It has been sanctioned by the English courts under the condition, however, of responsibility of the captor or his government, and was practised by us in the Revolutionary war, and by France in the wars of the first part of this century. It is a dangerous practice if a neutral vessel is so treated. A better way of treating prizes, which it is very inconvenient to convey into port, is to allow them to proceed on their voyage under what is called a ransom contract. That is, as a prisoner of war or his friends formerly paid a sum of money for his liberation, or bargained so to do, so a captured vessel could be redeemed from captivity on similar conditions. The validity of such a contract is recognized by the law of nations, but may be against the laws of particular nations, whose cruisers, therefore, are under especial temptation to burn their prizes. The ransom-contract secures the captured ship against further capture from the vessels of the captor's country or of its allies, provided it goes on a specified course, so far as violence of the weather does not prevent. To secure the payment of the contract a hostage is sometimes delivered



over to the captor. The contract is forfeited if the capturing cruiser is itself taken with that document or the hostage on board. The various questions relating to ransom which may come before courts must be left to larger treatises, especially to such as Wildman's *Institutes*, written especially for lawyers practising in prize-courts. Nor have we any space for the doctrine of salvage or the reward paid for saving a vessel, which, although it comes within the province of international law, is for the most part determined by the law of each particular country, and has little more to do with war than with peace.

Recapture, or the recovery of a captured vessel by a cruiser of the same country or of its ally, has been treated of by most text-writers under the form of the Roman doctrine of postliminy. As, however, the principles of recapture differ almost as much from those of postliminy as they resemble them, we must refer the reader for the meaning of that term to the article on it in this *Cyclopædia*, and content ourselves with giving the briefest explanation possible of recapture. If a vessel, having been taken, is carried *infra presidia*—that is, to a place where by international law a capture cannot be made—and is condemned as lawful prize of war, its former owner's right of property ceases. If captured again after this, it is like any other property taken from a hostile owner. Recapture, then, holds good only when a prize is on the way to a place of security; if it is effected within these limits, the property reverts to the original owner, subject to the payment of such salvage as the law of the land prescribes. If men are recaptured, there is no salvage or ransom-money, as far as we are aware, that can be demanded for them according to international usage. If prisoners of war in a port of a neutral escape to the shore, they cannot lawfully be surrendered; and this is a point where Roman and modern law agrees. There is also a case bearing analogy to recapture on a large scale where after bearing a government is set up and the country is again recovered by its own troops or those of its ally. The point of difficulty here is, What are the rights of the restored government, and what respect is due to the ordinances of the conqueror during his temporary sway? It is easily seen that some very perplexing political questions may arise in such a state of things; we may refer the reader to Phillimore for the extended consideration of some of them. Supposing the conqueror to have not only occupied, but also politically organized, the land before being driven out, we may say, in general, (1) that whatever in this interim he does by virtue of his political power, legitimately exercised, is valid. Taxes paid to his collectors cannot be recovered from them on the ground of the unlawfulness of the government. Legal acts, done by officials or subordinates of his during his supremacy, are justifiable on their part. If he sells state property or borrows money on the credit of the state, this too is valid if done for ordinary state purposes, and not with a manifestly flagitious object in view. Thus, the acts of Napoleon as head *de facto* of France between his arrival at Paris in Mar., 1815, and his surrender to Capt. Maitland in July, had validity; taxes already imposed, but collected by his officials, were legally collected, and new taxes, if collected in this interval and paid over, could not be recovered by private persons. But (2) none of his changes in the constitution or law have any claim to permanence; and (3) the restored or legitimate government has not the authority of going back of its restoration and claiming whatever services or dues it could have claimed during the intermission. It is manifest that some such rules are necessary to avoid the perplexity of private persons in regard to obedience, and to mitigate the sway of a tyrannical conqueror.

The last point relating to war, as considered in relation only to the belligerents, is its suspension and termination. (1) There are suspensions of war with a special and particular object in view, or having effect only so far as certain individuals are concerned. Here belong licenses to trade, which need no explanation, except the remark that they are of strict interpretation, which is true also of passports and safe-conducts or permissions to enter a hostile territory for certain specific and temporary purposes. Here we may mention also conventions relating to the war, such as a commander is allowed to make, or makes under necessity, arrangements respecting the manner of carrying on war, cartels and ransom-contracts (before mentioned), capitulations, conventions relating to exchange of prisoners or to requisitions. (2) *Truce*.—This is a suspension either of all the operations of war, or of those in a particular quarter or before a particular place. Such agreements are made by a sovereign, or by a military commander so far as he has authority for such a purpose. They commence and terminate at a certain day, and need no notice of their expiration. Or, if the truce is general, different days may be appointed for the beginning and end in different quarters of the world. Truce allows generally a return to peaceful (or rather

to non-warlike) relations for a definite period, but does not involve withdrawal of armies from before a fortress or from a special theatre of war. A question on which considerable difference of opinion prevails is, What can be done during a truce, and especially whether a besieged place may repair its walls and construct new works in such an interval? An answer which would perhaps fail of removing all difficulty might be, that anything might be done which would have been directly prevented by war, or which is not in itself a directly hostile movement. Thus, a besieging army cannot lawfully add to its works of siege, and a fortress cannot be repaired—at least in places which would have been commanded by the guns of the enemy. (3) *Treaties of Peace*.—The only rational object of war is to secure a state of justice involving reparation and security for the future. Treaties of peace, being appeals to force, do not always bring the adversaries to just terms, but, whatever their result, they are the most important acts of treaty-making powers; they often form epochs in national or in continental history. To name only one or two: the Peace of Westphalia, those of Nimeguen, Ryswick, and Utrecht-Baden, the Treaties of Paris and of Hubertsberg in 1763, the Peace of Paris and that of Versailles in 1783, the two treaties of Paris in 1814 and 1815 respectively, the Peace of Zurich in 1859 and of Prague in 1866, and the Peace of Paris in 1856 (on account especially of its international character), indicate memorable changes of relative strength, or mark a new policy, or bring in a new dynasty, or are in some way the eras of some kind of progress. They are the hands of a clock, but the war was the moving force.

Treaties of peace are subject to the same rules of interpretation with others made by the constitutional power in the state, etc.—We have already considered the effect of war on previous treaties, and on particular arrangements of those treaties. Only two additional points remain to be considered: (a) When do treaties go into effect? They bind the parties, as we have seen, when they are signed or when they are ratified. They bind individuals when they receive news that such treaties have been made. In the interval between ratification and knowledge of the peace by military officers or by cruisers, injuries must be made good by the country to which the party committing the injury belongs. Captures made after a peace, but without knowledge of it, have been held to subject the capturing officer to civil damages, for which he would have a right to demand compensation from his government. Captures, again, made before the time for the termination of hostilities, but with knowledge that peace has been concluded, are held to be invalid and subject to restoration. (b) The effect of peace is to put an end not only to a war, but also to all complaints relating to the subject for which war was undertaken. It is an oblivion or amnesty of all past difficulties. A new war can be undertaken for similar causes of complaint, but not for the same. They are forgotten and forgiven, whether mentioned in the treaty or passed over in silence. In regard to the state in which the war leaves the parties, if the treaty makes no mention of this point, the principle of *uti possidetis* is admitted. Territory stays in the actual occupant's hands unless passed over by express agreement, and a strong place must be restored without injury to its works. When a part of a country is yielded up at peace to the enemy, the former sovereign is neither bound to make compensation to those who suffer by the change of jurisdiction, nor to secure the new sovereign against resistance from the inhabitants to his authority. All he does is to renounce his own sovereignty and jurisdiction.

Two topics remain to be considered, both of which are of prime importance—the rights and obligations of neutral nations, and the liabilities and rights of neutral trade. In modern times neutral interests have become of such moment that a war between any two states under our modern international law produces wide-sweeping effects such as ancient history never knew. All industry and finance is filled with apprehension; the neutral asks what he can do to avert the effects of war from his borders by changing the course of trade, or how he can interfere by influence to prevent or abridge war. And it may ere long become a serious question whether, considering the increased amount of disaster that war brings on the world in modern times, the nations should have unlimited power to declare war—whether neutrals ought not to have a voice in the matter—whether, in short, as civilized nations are brought by their closeness of interest into something like a confederacy, they ought not to have something like the political authority of a confederacy, so as to have a deciding influence, at least, in all external wars.

A neutral is a state which is a friend to both the belligerents and takes no part in the war. Sometimes, according to an earlier treaty, a power of Europe has been bound, on the breaking out of war, to furnish troops to one of the



belligerents; but it is plain that the other may regard this as the act of an ally if he chooses. There is also a neutrality or *neutralization* now known to public law, by which a certain territory and its inhabitants have put on the character of permanent neutrality, so that no armies can cross the boundaries of such a state, and it can itself engage in no war. Such, since the year 1815, has been the condition of Switzerland and of part of Savoy—which last-mentioned country, so far as it was placed in this condition, continues in it since its cession to France in 1860; such also that of Belgium became, after its disruption from Holland in 1830. And, again, the northern powers of Europe in two instances (in 1780 and in 1800, formed what was called *armed neutrality* for the purpose of maintaining certain alleged maritime rights against both the belligerents; but a league like this might turn into a secondary war. A neutral state must be impartial in rendering the same favors to both belligerents, but this is far from being enough. It must stand aloof, and keep its territory and its subjects aloof from the war as far as possible. Impartiality may, in fact, be a great privilege and assistance to one of the parties, but none at all to the other. For this reason especially the modern idea of neutrality is stricter than that of a century or of two centuries ago. While the neutral state thus stands aloof, it must be humane to both parties, receiving their vessels into its ports when driven in by stress of weather or, as it would receive fugitive troops on the land, admitting them into its waters when escaping from the enemy; yet in such sort that on the land the troops are disbanded, while the vessels can do nothing more than make the necessary repairs and procure provisions. The neutral is not bound to allow cruisers to enter its ports with prizes unless obligated by treaty; and the safest, most neutral course, is not to allow this. Much less can vessels of war of the enemy procure military stores. Coal is an article of use in both war and peace: by modern practice—and there is no other—vessels of war are furnished with enough to take them to the nearest port of their own country; but war-steamers are too modern for any well-understood rule to have grown up in this respect. It was formerly not thought to be unnatural to allow transit to foreign armies in a time of war; and Switzerland supplied by treaty more than one state of Europe with mercenaries, but the age of such concessions has passed.

It has become of far more importance in the present age than it ever was before to decide what neutrals may not do and may allow to be done within their territories that may have a bearing on the fortunes of a war. Looking first at the second point, what neutrals may allow or suffer, we remark that a distinction is to be made between those private transactions and those ordinary proceedings of trade which cannot be prevented without considerable *surveillance*, and those acts of individuals which are open to inspection. If a neutral's subject lends money or goes abroad privately to serve as a soldier, or exports articles to a blockaded port, or such as are contraband of war to any belligerent port, he does these things without sanction of law; and the courts both in Great Britain and in the U. S. will refuse to help him to recover money lent to a belligerent, on the ground that the transaction is contrary to the law of nations. (See Phillimore, iii. § 151.) But hitherto, neutrals, whilst forbidding or warning against most of these things, do not make them punishable. It is otherwise with more public acts, such as building war-vessels for a belligerent or enlisting men for his service. Even here commercial cupidity and the tricks of foreign agents can often prevent the purpose which they are attempting to accomplish from coming to light. A neutral, however, if it be his duty to prevent his territory from becoming the starting place for carrying on war against friends, can make effectual laws and maintain an active police. It is not the office of foreign ambassadors and consuls, but of the home government, to look into such trespasses, and the more, because they otherwise expose themselves to complaints from the injured belligerent. On the other hand, the conduct of neutral governments themselves is tolerably clear. They cannot lend money or troops to either belligerent, or open their ports for hostile purposes, or permit their courts to be used for deciding questions of prize where either of the belligerents is concerned. To secure the neutral conduct of their subjects, neutrality laws are enacted by several nations, perhaps by all who are under the Christian law of nations. Thus, the U. S. passed one in 1817 which is still in force, and Great Britain one (59 Geo. III. ch. 69, which continued in force until 1870, when a new act was passed, entitled, like the first, a "foreign enlistment act," but far more stringent and conceding far more power to the administration. Under the first British act vessels destined to prey on the commerce of the U. S. in the interest of the Confederates slipped out from British ports and did their work effectually. Great complaints arose on our side, until in May,

1871, the Treaty of Washington was effected, containing three rules which the parties agreed to have applied in deciding their past difficulties, to observe for the future between themselves, and to urge on the acceptance of other nations. These rules are—that "a neutral government is bound, first, to use due diligence to prevent the fitting out, arming, or equipping, within its jurisdiction, of any vessel which it has reasonable ground to believe is intended to cruise or to carry on war against a power with which it is at peace; and also to use like diligence to prevent the departure from its jurisdiction of any vessel intended to cruise or carry on war as above, such vessel having been specially adapted, in whole or in part, within such jurisdiction to warlike use; secondly, not to permit or suffer either belligerent to make use of its ports or waters as the base of naval operations against the other, or for the purpose of the renewal or augmentation of military supplies or arms, or the recruitment of men; thirdly, to exercise due diligence in its own ports and waters, and as to all persons within its jurisdiction, to prevent any violation of the foregoing obligations and duties." In regard to the meaning of these rules, we observe that "due diligence," as well as "reasonable grounds of belief," is necessarily indefinite; only the facts of the case can determine whether one neutral has reason to complain of the other as to these points. A most important question of interpretation is whether "to prevent the departure from its jurisdiction" relates only to the original departure, when the vessel is ready for sea, or to any future departure, if it should enter the ports of the same neutral. We have good reason to believe that the commissioners of the U. S. understood the words in the latter sense, and so also did the judges, or the majority of the judges, at the tribunal of Geneva. In other words, the crime rests on the vessel, and the flag which it floats does not protect it; which is thus true of the vessel of any established government, but *much more* of a vessel belonging to an organized revolutionary body, which has no rights or status under the law of nations.

Neutrals, on the other hand, have important rights against belligerents, the principal one of which is that their territory or the sea within their jurisdiction shall not be touched by operations of war. Accordingly, a capture made within neutral waters, even if in hot pursuit and flight the contending vessels pass out of the open sea, is vitiated; and the same is to be said of captures following a contest in neutral waters which is completed on the high seas. The neutral has a right to demand from the belligerent captor satisfaction for such invasion of his rights, to seize the prize if brought within its waters, and perhaps to chase and arrest the captor on his way from the scene of the offence. So any attempt to compromise the neutral's position by enlisting men to serve in war, or by inducing them to go aboard for the purpose of enlisting, is an infraction of the law of nations, connivance at which on the part of the British ambassador in 1856 led the U. S. to demand his removal.—The subject of arresting neutral vessels on the high seas will be considered under the head of *Search and Visitation*.

*The Liabilities and Rights of Neutral Trade.*—(a) Here, when we speak of neutral owners and neutral property, the word *neutral* is taken in a qualified sense. He is a neutral owner who is resident in a neutral country, and that is neutral property which is owned by a neutral and is the product of neutral soil. That, on the contrary, is hostile property which belongs to a person resident in a hostile country, and hostile property is his property or the production of hostile soil. It may happen that one partner is hostile and one neutral; if capture takes place, their respective interests in the concern will decide how much is exempt from, and how much is liable to, the laws of capture. If a person resident in a neutral country has a place of business and capital in a hostile one, he has so far forth a hostile character; but the English courts have ruled that a person domiciled in a hostile country, but having a commercial house in a neutral one, is not neutral, but hostile. To these particulars we add that a hostile flag or license to trade makes a ship hostile; that papers relating to the nationality of a vessel cannot be changed during a voyage without strong evidence of fraud; and that produce of soil which a neutral owns in a hostile country follows the character of the soil.

(b) A subject of a neutral may identify himself with one of the belligerents in several ways: he may carry contraband of war, or try to break blockade, or take out a trading license, whether between the belligerent mother-country and a colony or between ports along the belligerent coast. Most of these actions would be regarded as criminal, and as exposing a vessel to pains and penalties. But the questions arise, What may a neutral vessel do? what may it not do? That it can do neutral acts is undoubted; that the belligerents ought not to stop neutral trade, unless in



self-defence, will be generally admitted. The great difficulty always was, until the Declaration of Paris, to decide whose goods the neutral trader might take on board of his vessel. Numberless were the contentions, the diverse arrangements by treaty, on that subject. The second and third rules of that Declaration laid the basis for uniformity of practice among the signers; and as they are such as the U. S. always strove to have come into operation, they may be said to be all but universal, although we have never given our adhesion to them. They are, that the "neutral flag covers the enemy's goods with the exception of contraband of war," and that "neutral goods, with the exception of contraband of war, are not liable to capture under an enemy's flag." Enemies' goods on enemies' vessels are still liable to capture, whatever be their quality; but as the cautious trader, to avoid risk, would employ a neutral vessel, the amount of property on the open sea exposed to the vessels of the other enemy will be very small; the number of captures hereafter may be expected to be very small; and as privateers will cease to be employed as an auxiliary to national vessels, it is not unlikely that ere long no goods or ships will be exposed to capture but such as directly aid in war. The law of the future, in short, will provide that there shall be no difference between neutrals and enemies in regard to the right of undisturbed passage over the sea.

(c.) The history of past rules and opinions touching liability to capture is too large a subject, and withal too antiquated, for us to enter into in an article like this. We will only add on that point one or two sentences which may serve to aid in understanding former practice and historical allusions to it. Two rules, then, may be said to have been in conflict heretofore—one making capture to depend on the nationality of property conveyed over the sea; the other, on the nationality of the conveying vessel. By the first rule the neutral's goods were safe on any vessel, the belligerent's unsafe on any vessel. By the second, the neutral's ship protected the goods, the belligerent's exposed them to capture; or, to put this into another form, free ships made free goods, enemies' ships made goods hostile. As for the last part of this rule, it was of slight importance what usage should prevail in regard to enemies' ships carrying neutrals' goods, for in war the neutral would naturally do more of his own carrying than before. But it was of great importance to the belligerent that the neutral flag should not protect his enemy's goods, while it was of great importance to the neutral that a rich carrying-trade should be opened to him in time of war. In this conflict of practice the belligerent interests, especially those of a nation, like Great Britain, with a naval force strong enough to protect itself and annoy its foe, prevailed; and so, on the whole, the first of these two rules had the most vogue when treaty did not intervene—the rule, namely, that the property of a neutral is safe under any flag, and that of an enemy unsafe under any flag. This rule exposed the neutral to great annoyance, as his cargo might be mainly hostile; but we must regard it, after all, as most just that not the vehicle but the property should determine liability to capture. For the reason for capture is—apart from cases of blockade and contraband—that the thing in question belongs to an enemy; and a neutral certainly has a right to take his friend's goods on his vessels, and to use his friend's vessel for the same purpose. The war-right of his friend's enemy may subject him to inconvenience, but neither his property nor his right of payment for freight ought to be taken from him. The present rules—that is, the rules of 1856—are not more just, but they are more humane, than those which Great Britain and our Supreme Court held to be the true law of nations. (See *Introduction to International Law*, by the author of this article, §§ 143 b. 171.)

(d) When, under the old rules of capture, a neutral ship was found with an enemy's goods on board, freight was paid by the captor for the voyage, capture being considered equivalent to delivery; but when a hostile vessel was captured with neutral goods on board, if the captor conveyed them to their original destination, he was allowed to charge freight, otherwise no freight was due.

(e) When a neutral used an armed vessel of the enemy for conveying his goods, he exposed them to capture, according to British doctrine, as thereby showing an intention to resist the inconveniences of search and capture. But our courts held a different language, for why would the neutral run the risk of the total destruction of his goods in consequence of an engagement, as he was safe already from capture? A rule for this case is now of no great importance, whichever way it be decided, since privateering has ceased in great measure, and ships of war are not much in the practice of carrying the goods of private persons.

(f) *Contraband of War.*—The word "contraband," originally signifying that which it was against a ban, edict, or

proclamation to export or to import, now denotes those articles which a neutral cannot send to a country in a state of war consistently with the neutral character or without violating the law of nations. These are articles which directly aid the operations of war, and to send these to an enemy identifies the neutral with him. I may assist in war as effectually by sending arms or gunpowder as by getting men to enlist in a belligerent's service. What these articles are is, for the most part, pretty generally admitted, although there is a dispute about several of the more important ones. The U. S. have a formula which has been inserted into a number of treaties with South American republics. This list includes—"(1) cannons, mortars, howitzers, swivels, blunderbusses, muskets, fuses, rifles, carbines, pistols, pikes, swords, sabres, lances, spears, halberds, hand-grenades, bombs, powder, matches, balls, and all other things belonging to the use of these arms; (2) bucklers, helmets, breastplates, coats-of-mail, infantry belts, and clothes made up in a military form and for a military use; (3) cavalry belts and horses, with their furniture; (4) and generally, all kinds of arms and instruments of iron, steel, brass, and copper, or of any other material, manufactured, prepared, and formed to make war by sea or land." Besides these, on which there would be a very general agreement, naval stores and materials for ship-building are mentioned in a number of treaties as having this character, and provisions may assume it, according to some authorities, when there is a prospect of reducing an enemy by famine. Ships made ready for war are not found in some lists, but would probably be regarded as contraband *par eminence*. So the machinery for steam-ships, an article of modern times, might be classed in the same list. Whatever article is of contraband character, thus much may be said—that belligerents have no right to add to the list, nor neutrals to take away from it. To restrict the trade of neutrals, especially by an arbitrary act, is not a thing to be endured in the present age. We are thus prepared to condemn the doctrine of *occasional* contraband,—which has not received the assent, nor been sanctioned by the practice, of all nations,—according to which naval stores, and provisions especially, are declared contraband by a belligerent when the circumstances seem to require it. The fluctuating character of such a doctrine is shown by the rules of the English judges in the early part of this century, as that such articles were viewed with greater indulgence if they were the produce of the country from which they were exported, or if unmanufactured or destined to a commercial port, than if shipped from a country where they were not grown, or in a manufactured state or destined to a naval station. Afterwards the English judge, Sir William Scott (subsequently Lord Stowell), withdrew this indulgence as to the commercial port, on the ground that the articles might there be used to fit out privateers. (See the author's *Introd.*, § 180.) The complaints of neutrals led to a new modification of the harsh practice in regard to provisions and naval stores. Their whole trade might consist in such articles, and the belligerent doctrine be ruinous to them. The rule of *pre-emption*, which had some support from ancient precedents not strictly applicable, was now applied by way of relaxation of the rule, and consisted in this—that a cruiser at sea was allowed to detain vessels laden with provisions or naval stores, and bound for the enemy's ports, and to take them into a port of his own country. The articles thus intercepted were paid for at the market-price, and with a fair profit added, but not at the price which the neutral expected to obtain in the country to which he was conveying them. The U. S. in one treaty, that of 1794, sanctioned this principle. When a vessel is taken with contraband articles on board, the modern very mild rule is to confiscate such articles, and let the vessel with the other goods go free, unless both or either of them belong to the owner of the contraband, in which case, or where false papers show privy in carrying them, the guilt passes over to the remainder of the property of the same owner, or also to the owner of the vessel.

Special cases of contraband trade are the conveyance of ships of war or of transports with their crews, of persons in the military service, and of despatches. All but the last would have been considered by older writers and by courts as highly criminal. Despatches do not seem to have been spoken of before the beginning of the present century. The doctrine, first brought out in the English courts, but now pretty generally accepted, is that a shipmaster who knowingly conveys hostile despatches exposes his vessel and the cargo, if he is the agent of it, to confiscation. But what are hostile despatches? They are in substance defined to be "official communications of official persons respecting the public affairs of government." Such despatches as keep up the intercourse between a belligerent and a neutral country are not hostile despatches, nor has the other belligerent the right to obstruct it. It seems likely that



vessels carrying the public mails, especially if on a certain stated course, would not be exposed to suffer from the operation of this rule.

According to received doctrine, neutral governments are under no responsibility to restrict private persons from conveying any kind of contraband to either or both of the belligerents. The articles are not contraband until they have left the neutral limits, it has been said, and the neutral is not obliged to maintain an expensive police of the sea. If two nations choose to fight, they must guard their own coasts; the world suffers enough from their contests without adding them in any respect. But there is another side to the doctrine of the responsibility of neutrals. They thrive by the quarrels of their friends; they supply the materials for death; and in so doing they demoralize society almost as much as if they entered upon the slave-trade. Furthermore, the articles that are contraband are in some cases almost indistinguishable from those which could not be sent abroad without exposing the nation itself to charges of unequal conduct. A ship of war made to be sold in the ports of a belligerent, if without a crew, is contraband, but a ship made by contract for the belligerent government is more—it is something which neutrals must not allow to slip out from their harbors. The difference between the two cases is almost annihilated if the neutral merchant has a secret understanding with the belligerent to make the ship for him while acting as the owner himself. Add to this, that nations rush the more readily into war if they know that a supply of arms and ammunition will be on hand when they want it. For these reasons we think that not only what Dr. Phillimore contends for—the making it unlawful for belligerent private vessels to get materials of war—should come to be a rule of international law, but also that no neutral vessel should be allowed to export such articles to either of the belligerents. This might be effected by requiring sufficient bonds from all vessels before sailing that they have no contraband on board, and imposing a penalty besides in case of transgression. Let all merchant ships of every nation be free to carry innocent articles to the theatre of war; let no ships of any kind be allowed to carry articles contraband of war.

(g) There was formerly a special prohibition against a certain kind of trade, called the rule of 1756, which England insisted and acted upon, but which never fully passed into international law, and has now become of no significance. It related to trade closed in peace, but open in war. Such trade might be *coasting* or *colonial*, the first of which nations generally do not open to foreigners, while it was for a long time a principle to confine the other to native-born subjects or open it only under limitations. Such trade at first was allowed, we believe, in all cases, only to foreign vessels that had obtained a license. There was reason enough to regard a licensed vessel as identified with the belligerent's interests, and so far the rule was not harsh; but when the trade was opened to all neutral vessels, the same rule was urged with somewhat less of justice; the neutral saved a state from some of the embarrassments into which it might be brought by its enemy. Our government contended against the rule in its application both to coasting and to colonial trade, but some of our publicists were willing to let the rule have force in regard to coasting trade which has an especially national character. Since the Declaration of Paris of 1856, by which the neutral ship has a right to take enemies' goods, this rule has necessarily expired.

(h) *Blockade*. This word might be used of all obstructions put in the way of approach either to a besieged town on the land or to a besieged piece of water; but, as facility of approach is confined chiefly to water, all the questions under this title relate to that element and to neutral vessels upon it. The right of blockade is admitted on all sides; the true ground for denying it is the same that would make it dangerous to bring supplies to a besieged place in the interior. If I allow neutrals to aid my enemy by provisions and military stores, I can never terminate a war. He assists his friend to my injury, and this, if there be any rights in war, I ought to have a right to prevent. Only harbors and mouths of rivers, and perhaps passages through straits, can be blockaded. A stretch of coast does not admit of this unless the number of vessels is augmented in proportion to the local limits of the blockade. Mouths of rivers cannot be so blockaded as to obstruct the commerce of the riparian states that are neutral. A blockade is a fact or event that may begin or end, and therefore there must be some notification of it to traders, to neutral governments, or to both. The French rule is to give two notifications—the diplomatic one, and that communicated to the vessel at the mouth of the harbor—and at no stage of the operation to neglect the latter. M. Molé, minister of foreign affairs, writes in 1838 to another French minister of state: "I will not recall here the reasons why, independently of the offi-

cial and diplomatic notice of a blockade, every ship showing itself before the blockaded port ought to receive the warning from the commanding squadron." The French, however, hold, if we are not mistaken, that at the outbreak of a war, before notice has had time to travel over the commercial world, a simple warning to a ship is sufficient, and that an attempt to break through into the port after this would expose the vessel to seizure and trial. The English and our own rule does not require the double notice. It is enough to send the diplomatic notice to all neutrals, and only at the very commencement of a war, especially before notice has had time to fly abroad, to warn off any approaching vessel. If, meanwhile, a vessel should seek to enter the blockaded harbor under the plea of ignorance, the length of its voyage and other circumstances must decide whether the plea is just. The diplomatic notice must be sent everywhere, and if only common fame has carried it to a particular country, that is not sufficient to involve in guilt a vessel of that country, when seeking the blockaded port. If we compare the two rules, we shall give the preference to the English. The diplomatic notice is intended to prevent voyages, which may be useless or losing, to places in an actual condition of siege. Should a vessel now appear at the harbor's mouth with the claim of not knowing the state of facts, the presumption is against the story, and she must prove her words as she can. But why give a new warning here, any more than to a burglar at your door? It is highly criminal to break blockade; the purpose to do it is a hostile purpose, and no indulgence is called for by such traffic.

The amount of force necessary to make blockade legal and effective is somewhat indefinite. The fourth rule of the Declaration of 1856 is that "blockades, in order to be binding, must be effective; that is to say, maintained by a force sufficient really to prevent access to the coast of the enemy." It may be asked what "sufficient to prevent access" means. Suppose a number of trim, swift blockade-runners slip through a cordon of ships, does this destroy the effectiveness of the measure? Certainly not. Apparently, as far as its affirmative meaning is concerned, this rule left things as they were before. If there is real danger of capture, and a force is stationed before the harbor intended to create such danger, the blockade would be considered effective. On the other hand, all paper blockades, like those of the Berlin Decrees, the two British Orders in Council, and the Milan Decrees, all of 1807, by which whole coasts for hundreds of leagues were put under a blockade-ban—the two parties concerned, Napoleon and the British government, in turn going beyond each other in their diplomatic war—are entirely forbidden.

A blockade, being a fact, lasts only so long as the vessels are on hand to make it such, unless, indeed, a temporary storm drives them from their posts, to which they return as soon as possible. When they are driven off by the superior power of the enemy, or discontinue their operations by orders of the government or commander of the squadron, the blockade ceases, and needs the same formalities for its renewal as for its commencement.

When a vessel is taken, and found by the proper court guilty of attempting to enter or quit the blockaded port during the blockade, the penalty is confiscation of the vessel, and the cargo shares the same fate, unless some proof can be given that the breach was against its owner's will. The liability to be tried and condemned rests on the vessel, according to English decisions, until the end of the return voyage.

On the doctrine of blockade and of contraband has been engrafted that of *continuous voyages*. The English courts, in order to prevent neutral captains from evading the rule of 1756 in regard to colonial trade by stopping at a neutral port, there landing and reloading cargoes, and getting a new clearance, made the decision that if an original intention could be proved of carrying the goods from the colony to the mother-country, the proceedings at the neutral port were to be regarded as a mere sham, and the ultimate destination was to decide in regard to the nature of the trade. In our late war with the Confederates many vessels brought contraband of war or other articles to a port in the West Indies, especially to the port of Nassau, and either took a new start from there or put the goods on blockade-runners better fitted to send by a squadron that might happen to be on the lookout. To avoid the mischief growing out of these proceedings our government applied the English doctrine just now mentioned to these cases of *continuous voyages*. In some one at Nassau, or any papers making that the destination of the vessel, would not screen it if an original destination could be established of sending the goods ultimately to a blockaded port, or, in the case of contraband of war, of a destination for the hostile coast. Such intention would subject them to capture from the time of setting sail. Still more stringent was the application of the rule to goods



bound up the Rio Grande for Matamoras on the Mexican side of the river, if, when they were intercepted, it could be made to appear that there was an intention after landing them to carry them overland into territory of the U. S. (Comp. note 27 in the author's work, before cited, p. 466, ed. 3.)

(i) *Search*.—To carry out the rules of nations respecting contraband goods, blockade, and enemies' goods on enemies' vessels, search is necessary; that is, the process by which it is ascertained in war what is the nationality of the vessel and the nature of her freight. This right is essential to the others, so that if certain writers, as Hübner (1759), could have made it out that a ship on the open sea is under the same law as territory, a great part of the effectiveness of war on the sea would have ceased. Being, however, an acknowledged right, it must be submitted to, and resistance would authorize force on the part of the cruiser: the search, however, must not be made annoying. If the vessel is on an innocent, lawful voyage, she is to pursue her way; if otherwise, she may be seized and taken into a port for the purpose of adjudication. Search being a very irritating process for the neutral, the northern states of Europe around the Baltic attempted to introduce the so-called right of *convoy*, by which a public vessel, escorting merchant vessels and having their papers on board, could be a security for their being engaged in a commerce permitted to neutrals, and thus might free them from the necessity of being visited. This was a rule which the armed neutrality of 1800 endeavored without success to establish. It has hitherto been unable to find a place in the law of nations, although a large number of treaties have provided for it. It is attended with the practical difficulty that a fleet of merchant vessels under escort may often get separated from the conveying ship of war, and thus a belligerent cruiser may meet one of the merchant ships at a distance from such conveying ship.

The right of search is properly a *war-right*, to be exercised in the case of merchant ships only. It is still a war-right, whenever vessels suspected of piracy are required to lie to and submit to examination, because pirates are enemies of the human race. It may happen that such suspicion unjustly attaches to a particular vessel. This is like the arrest of an innocent person at night under suspicious circumstances by the police. He is bound not to resist and to give an account of himself for the sake of the peace of society. So the vessel is bound to satisfy those who are engaged in the search, because it is for the good of the world; and if the detention can be shown to be unreasonable, or to have been made annoying without reason, the commander has a right to complain. In one case a small Spanish government ship was stopped in order to ascertain whether she were or were not a pirate, and the court of the U. S., in speaking of this, says that ships of war, acting under the authority to arrest pirates or other offenders, "may approach any vessels desirous at sea for the purpose of ascertaining their real character." There is likewise a permissible search on the high seas in peace when frauds are suspected against the *revenue*. This may take effect when a vessel that has committed an offence within the waters of a country flees from justice, in which case the public ship may chase her into the high sea and arrest her there. An English ordinance prohibits the transshipment of foreign goods within four leagues of the coast without paying duties, and a law of Congress of 1799 contains similar regulations. "The exercise of jurisdiction to that distance for the safety and protection of the revenue laws was declared by the Supreme Court to be conformable to the laws and usages of nations." (Kent's *Comm.*, i. 31, lect. 2.)

In the early part of this century England claimed the right of detaining and visiting neutral vessels in war in order to ascertain whether any of her subjects were on board, and, if so, of taking them out, that they might render military or naval service to the British sovereign. This claim was founded on the doctrine that an Englishman owed perpetual and indissoluble allegiance to his country. The evils of such a summary process bore hardest on the U. S., as many emigrants or residents in England were among our sailors. This was one of the causes of the war of 1812. The claim was distinctly stated by Lord Ashburton at the Treaty of Washington in 1842, but since then the supply of seamen for the navy by the impressment of persons on British soil has gone into disuse. As for the right involved, it must be most emphatically denied. A seaman, or even a criminal, can no more be forcibly carried off from a neutral vessel than a similar person could be taken by force from a neutral territory. The fact of war, also, had properly nothing to do with the case. The neutral was not violating a war-right, but had hired a man to be a sailor on his vessel. The rights to require indefeasible allegiance and military duty are as truly such in peace as in

war, so that the pleas for their exercise would apply to a state of peace as well. But it is not probable that the English principle in regard to allegiance would be equally rigid now, since a treaty of 1870 with the U. S. allows renouncing allegiance and resuming it, and since an act of the British Parliament, passed in 1844, gives authority to one of the principal secretaries of state to grant to an alien, on his petition, nearly all the rights and capacities of the native-born subject. Moreover, as far as taking a person out of a neutral vessel on the sea is concerned, in the case of the Trent the British government committed itself to the principle, that it is illegal to detain a neutral vessel and take from her even persons at war with their country and liable to the penalties of treason.

A right of search, on suspicion that a vessel was engaged in the slave-trade, was mutually conceded by Great Britain and the U. S. in 1862. The treaty confined the right to certain tracts of the sea near Africa and Cuba; it was carefully guarded; it granted damages for losses incurred by the wrongful detention of vessels; and could be terminated after ten years. Before this there had been several discussions between the governments, the British government claiming that there is a distinction between *visit* and *search*, of which the first relates merely to the nationality of the vessel, the other to the character of the cargo and whatever else needs to be found out. It was said that a British police-vessel on the coast of Africa could not have control over slave-traders breaking the laws of England if the flying of the American flag was a security against visiting any ship that might hoist it. On the American side it was contended that no distinction was made, in text-writers on international law or elsewhere, between *visit* and *search*, and that a ship of war stopping a reputed slave-trader of another nationality must do so at its peril. In a certain sense both views can be justified. An innocent vessel detained on the high seas has a claim for any damages arising out of the detention, and its government, on complaint, would naturally inquire into the matter. But the flag that is hoisted is no good evidence of the nationality of the vessel or crew. There is, then, a real distinction, and a necessary one, between *visit* and *search*; or, in other words, there is a kind of search, call it what you will, which does its work when the nationality of the vessel is ascertained. Great Britain had treaties with Portugal, Spain, the Netherlands, and Sweden concerning the mutual right of searching vessels suspected of slave-trading. How could a Spanish ship be searched if the hoisting of our flag could prevent it? Then, again, a nation has a right to search its own merchant vessels on the seas in time of peace. Suppose an English ship should grossly break the law just before sailing with the intent to go out on an illegal expedition. The nation must have the right of sending out a cruiser in pursuit of it, and a vessel supposed to be the offending one could be made to lie to until the fact could be ascertained, or else all police over vessels is nugatory. Suppose, again (see the author's *Introduct.*, 2 201), two nations mutually to give up the right of search in war. Would it not still be necessary for the cruisers of one of them, if war should break out with a third party, to ascertain the nationality of the merchant ships fallen in with, in order to give to the vessels of the other the sole benefit of the provisions of the treaty? Otherwise, such nations would have to abandon the right altogether, as everything afloat would wear the protected flag. We conclude, then, that search, so far as to discover the nationality of the vessel carrying a certain flag, is oftentimes necessary, and is just, but that for mistakes in carrying out this right the government of the cruisers making such a search are responsible.

We have given a brief account of the principal rules of international law, and we close with one or two brief remarks: (1) International law is founded on justice, and contains the noble idea that universal, world-wide justice can be realized. (2) Its principal division is that respecting a state of war, but its whole spirit is to avoid war, both by having fixed rules and by the possibility of arbitration through the help of some impartial power or court. (3) Its progress is greatly encouraging. It has grown in definiteness, in humanity, in justice, in the extent of its sphere of operation. (4) It is, however, destined to become less important with the increasing humanity of the world. As laws and courts would sink in their importance if all men became thoroughly just and unselfish; as law, according to the apostle, "is not made for the righteous man, but for the lawless and disobedient;"—since the love in the righteous man's heart is the fulfilling of the law,—so a day may come when men shall wonder at the mass of controversies between nations, at the numberless treaties on international law—above all, at the prominence given to the laws and usages of war, because in their better age they will look abroad on universal peace and righteousness.

THEODORE D. WOOLSEY.



**International Private Law** is the branch of jurisprudence which regulates the reciprocal relations of subjects (transiently or otherwise) of different states. The notion of such a community of law was foreign to the ancients. To supply its felt need the Roman jurists and their successors fashioned congeries of precepts concerning the conflict of laws, whence the maxims and nomenclature now in use have been largely drawn. Much is indeed still lacking and doubtful in the science, but there is so marked a tendency toward a unity of civil and commercial legislation that certain publicists look for the recognition by all civilized states of a common system, affording all men everywhere liberty and security in private transactions. To this three conditions seem necessary: 1st, every one should be assured of the enjoyment of his civil rights abroad as well as at home; 2d, every one should be able to foresee, with tolerable certainty, what laws will govern the rights attaching his person, his property, and his acts; 3d, the basis of international regulations should be conformable to right, reason, and the nature of things, so as to ensure permanence to the rules themselves, and the rights acquired under them.

The first and most general maxim of international private law results directly from the independence of states, and is—Each state has an exclusive sovereignty and jurisdiction within its own territory. Consequently, the laws of every state govern all persons and all property within its limits. The second general principle is the converse of the former, and—No state can by its laws bind persons or objects outside its own territory. An important consequence of these two general principles, or converse sides of the same principle, is that all deference paid to foreign laws depends upon domestic regulations—upon the consent, express or implied, of the state where the foreign laws are applied. International private law rests, then, for its sanction upon considerations of utility and reciprocal convenience or comity. "It is not a question of the comity of courts, but of states, in that the legislature decrees what effect shall be given to foreign laws, and leaves the courts nothing to do but to carry out the directions of the statutes." When the legislature has supplied a law for the case, the applicability of a foreign statute cannot come in question. Its pertinence can only be assumed by a judge in the absence of express provision, and when conformable to established custom or the analogy of his own jurisprudence.

The applicability of a particular law to a given case mainly depends upon the connection of the person concerned with a certain legal territory. To determine this two *criteria* are contended for—nationality or domicile.

**Nationality** is the quality attaching by birth in, or formal adoption into, a particular community. It has of late lost so much of its significance (by the adoption of the Roman principle that children follow the condition of their parents, and that adults are free to choose their own country) as to be considered by some solely of political moment. Nationality, however, remains of importance concerning rights not political; e.g. claims under treaty stipulations securing special rights to citizens, and the whole category of the disabilities of aliens. The character impressed by birth is so indelible that it, upon a due change of residence and intention, easily effaces the supervening character of domicile. It has also the advantage of being directly ascertainable, while domiciles are divided by very indistinct lines.

**Domicile** may be defined as "a residence at a particular place, accompanied by positive or presumptive proof of continuing there for an unlimited time." Thus, it answers very much to the common meaning of the word *home*. Where it may be said of a person having two residences that he makes one his home, that is to be taken as his domicile. Intent, the element which determines the question of domicile, may be evidenced in various ways. If such intent be proved, the fact of residence for the briefest time will suffice. A person may elect to regard his place of business as his domicile, and he may even have different domiciles for different specific purposes, but he can only have one principal domicile. This is the accepted test of the general national character of his business relations, and impresses itself upon his affairs and property.

Minor children, if legitimate, take and follow the domicile of their father until competent to choose one for themselves. Illegitimate children generally follow the domicile of the mother. It is usually held on the continent of Europe that the death of the father fixes the domicile of a legitimate child, so as not to be changed by the mother or guardian without act of law. The domicile of a wife generally merges in that of her husband, unless he suffer for a crime or be under restraint for lunacy or like incapacity. Envoys, consuls, prisoners, lunatics, exiles, students, and, in general, officers, acquire no new domicile.

**Status** is the sum of special rights and duties belonging

to a person, over and above the general rights and duties which he shares with all the members of the community. To determine the status of a person outside of the country of his domicile many theories have been proposed. The one most accepted is, that status is determined by domicile, with the qualification that in case of doubt laws favoring capacity are favored, and the contrary disfavored. Laws abridging capacity for rights—e.g. concerning slavery—have admittedly no extra-territorial force. Natural incapacity, such as lunacy, accompanies the person everywhere. In other respects, the general tendency is to respect the law of the place of the transaction, as that imposes the least burden upon business.

**Ownership and Property.** Whether any particular thing be an object of ownership is admittedly determined by the law of the place of controversy. The capacity of a person to acquire and dispose of property generally depends upon the law of his domicile. A distinction which reconciles many embarrassing contradictions in the books is into a capacity to act and a capacity for rights. The former, proceeding from the personal status, depends upon the law of the domicile; the latter, upon the law of the situation; e.g. the inability of aliens in New York to transmit property results from a local incapacity for rights. The elder jurists sharply distinguished immovables from movables and other means of estate. The former, including not only land, but also all dismemberments of the property in land and the rights to their enjoyment, are admitted to be under the domination of the law of their situation, except when massed for purposes of succession and the like. By the tremendous fiction that movables cleave to the person, all personal property, however ponderous and permanent it might be, was subjected to the law of the domicile of the owner. The increase of personal property in comparative value and importance, with other considerations, has, however, led to a rejection of this distinction, so that outside of England and the U. S. the now prevailing rule is that "movables, when not massed for the purposes of succession or marriage-transfer, and when not in transit or following the owner's person, are governed by the law of the situation, except so far as the parties interested may select some other law." Like considerations, particularly those of public interest, are tending to incorporate the same rule into Anglo-American jurisprudence.

**Real Rights**, or claims upon things obtaining against all persons, are, for the most part, governed by the law of the place where the subservient property, movable or immovable, exists. Implied real rights are not favored internationally, and are not upheld unless recognized by the laws of both places. Thus, the hypothecation of an obligor's entire estate, implied by certain contracts in certain countries, is not recognized in others where such constructive covenants are not known, although such a claim might support an equitable action to compel the obligor to execute a formal hypothecation. Liens on movables are extinguished by removal, though eminent jurists have maintained that real rights should not be so defeated. It is also admitted that a lien unknown at the place of contract cannot be created by a mere removal of a chattel. Whether it may be asserted by special proceedings depends upon whether the lien be regarded as a part of the contract, or as extraneous to it, and simply a matter of procedure. The priority of liens "depends upon the place where the property lies, and where the court sits."

**Incorporeal Chattels**—e.g. letters patent, copyrights, and trademarks—are the creatures of local laws and clearly have no validity beyond the territory of the authority conferring them, unless extended by treaty stipulations. Thus, it has been held in France by the court of last resort that a Frenchman may stamp the unprotected trademark of a foreign manufacturer upon his wares with impunity.

**Obligations**, in the sense of international jurisprudence, include all legally coercible duties, whether arising by act or accident, voluntarily or involuntarily, conformably to good morals or the reverse. A normal or unilateral obligation restricts the liberty of one party, debtor, obligor, and enlarges the rights of the other, creditor, obligee. While the essential properties of obligations are, from motives of public policy, held beyond the interference of parties making engagements, no small freedom is allowed in the determination of their natural properties. Among the latter is the law by which the obligation is to be governed, and which, under certain restrictions, is left to the choice of the parties themselves. Whenever, therefore, it may be assumed or shown that the parties have chosen a particular territorial law, their obligations are to be determined by that, so far as they are at liberty so to elect, and have their will respected at the place of suit. Two palpable facts are distinguishable in every obligation—intention and fulfillment. The law of the place of inception under most circumstances regulates, according to very gen-



eral agreement, the formal conditions of a transaction. It is commonly said, therefore, that an obligation valid at the place of its origin is valid everywhere. The converse, that a transaction invalid at the place of origin is invalid everywhere, is also asserted, though subject to more exceptions, in that courts are disposed to recognize engagements in accordance with their own laws, even if formally defective under the law where actually entered into. The law of the place of performance governs, according to most jurists, the obligation itself. Plausible and ingenious arguments are put forward for other rules, particularly that of the debtor's domicile, but it is urged in opposition and with reason that the parties presumably purpose, unless stipulating otherwise, to be governed by the law of the place where a specific act is to be done or thing delivered. Where other indications of an intended submission to a particular law are at hand, these are to be respected; thus, the obligations arising out of a continuous course of business are to be determined by the law obtaining at the permanent seat of that business; e. g. liabilities under a foreign policy of insurance are subject to the law of the place of the permanent seat or principal office of the company whence it is issued, though the obligation to pay the premium is subject to the law of the domicile of the insured. So, again, an obligation arising under circumstances warranting the expectation that it will be discharged at the same place is governed by the local law; e. g. that of a guest to pay his hotel-bill. In other cases the applicatory law is that of the debtor's domicile at the time of contracting the obligation.

Obligations arising from delicts or torts—wrongful acts as connected with private redress—cannot, of course, be considered subject to a certain law because the same has been chosen by the obligor (wrongdoer, *tortfeasor*). The principle of many of the foregoing conclusions is therefore inapplicable to them. Wherever a wrong is done, there the perpetrator of it, whether a transient passenger or a domiciled subject, is justiciable, and must answer for the consequences. The law of the place of commission of an admittedly wrongful act determines the measure of damages. It has been judicially intimated that an act unmotivated by the law of the place of perpetration, but treated as tortious by the English law, would sustain a suit for damages in England. The more approved doctrine is, that what is legally innocent where it occurs cannot be made a delict elsewhere. English and American courts have assumed jurisdiction over torts committed abroad, even where the suitors were non-resident foreigners. There is a growing inclination to disfavor such suits.

The consideration of every valid obligation should be meritorious. To vitiate an engagement on its account the moving cause must offend against universally accepted views of public morals and public safety, and not be illegal only by reason of special statutes. Thus, claims arising from sales of lottery-tickets in Kentucky are enforced in New York, where such sales are contrary to law. Still further, a foreigner, unless he be an accomplice, can recover in England the price of goods sold with the explicit understanding that they were to be smuggled into the latter country. What is intrinsically contrary to public morals is far from well settled. It might be supposed that a polygamous promise would be disregarded throughout Christendom, but a learned and respected judge has said from the bench that the proclivities of a Turk would be protected in North Carolina. The belief as to the best means to attain the same end is as varied as nationality. In this wise the consideration of illicit cohabitation is so variously treated that it has given rise to more conflicts than any other. In France and some other countries regard for decency and morality interdicts all inquest concerning paternity; in others, as Scotland, obligations arising therefrom are considered but "obediential and natural."

In actual practice the application of recognized legal principles is embarrassed by the fact that a majority of obligations are not simple or unilateral, but reciprocal or bilateral. However involved the process, the separation of the latter into the several unilateral obligations of which they are composed will often prove the most convenient if not the sole solution of the problem. Thus, each party to commercial paper is liable according to the law governing his particular engagement; so again, as has been intimated already, premium for insurance may be collectible by a very different law from that deciding claims under the policy—often a vital distinction in states forbidding insurance by foreign companies.

Marriage is so hedged about, from reasons of moral and religious policy, by positive coercive statutes as to lose much of the nature of a contract, and become an institution differing widely in different states. Admittedly, it must be a conjugal union between competent parties for life. The conditions—or, as they are commonly discussed,

the impediments—to it depend, according to the Anglo-American and elder doctrine, upon the capacity of the spouses under the laws of their respective domiciles. On the ground that the bride submits herself to the bridegroom's domicile, this is regarded by the later German opinion as controlling both, excepting where her domicile cannot be changed by her own act. The formal conclusion of marriage is regulated by the law of the place of celebration. The true seat of the relation (wherever contracted) is the domicile of the recognized head of the family, the husband. Mutual rights of property are fixed by the man's domicile at the consummation of the marriage, for it could not be endured that the husband should be able to change the rights of his wife over her own property by a change of residence. Laws restricting liberality during marriage depend upon the domicile at the time of the act; being intended for the protection of moral purity, they are designed to control all persons in the territory. Intestate succession between the spouses is regulated by the last domicile of the deceased.

Divorce is governed by the law of the country where it is sought, in that the law, resting upon the moral nature of the union, is strictly positive and compulsory upon the court, which, too, must be that of the actual domicile, as it alone can have jurisdiction.

Paternal power over legitimate children depends upon the law of the domicile of the father at the time of the birth; over children legitimated by subsequent marriage, upon the domicile of the father at the time of filiation.

Guardianship is to be instituted under the law of the ward's domicile. There is a strong presumption in favor of the competency of an administering court.

Succession, testamentary and intestate, to immovables is governed by the law of their situation. Movables commonly pass by the law of the decedent's last domicile. But the disposition of personality in a will validly executed under the law of a former domicile is respected in Europe; it is otherwise in most of the U. S.

Civil jurisdiction is called contentious or voluntary according as it is exercised in litigated causes and the execution of decisions, or in affording public authentication to matters not in controversy. Of the voluntary jurisdiction of magistrates and officials the foreigner may commonly avail himself equally with the native, and a compliance with formalities required by local law is accepted every other where as sufficient. In most countries, and saving such restrictions as giving security for costs, an alien can ordinarily contend in the courts on the same footing as a subject. In France, however, non-domiciled foreigners can sue their fellows only for certain causes of action; e. g. commercial obligations. Subjection to a certain jurisdiction is a question of territory. Nothing, movable or immovable, can be judicially disposed of unless it lie within the purview of the court. Power to pass upon property abroad has been asserted in England and in some States of the American Union, but such decrees are of no foreign force. Judicial power over persons can be had only through personal service and domiciliation in the country; domicile in the lesser sense of comorancy will suffice. By English law English courts assume jurisdiction over causes of action arising in England, although the assumption is disregarded elsewhere. Procedure is regulated solely by the place of suit; if a particular remedy be essential to the enforcement of a right, resort must be had to a court administering the remedy. Evidence is admissible or inadmissible according to the law of the country of the court, albeit tribunals are prone to admit foreign modes of proof when indispensable to the judicial establishment of facts. Foreign judgments have no effect unless sanctioned by domestic authority. If the competency of the court pronouncing them be unimpeachable, they may, as conclusive upon the merits, be enforced by new judgments of the same tenor or made directly executory.

Criminal jurisdiction depends upon the relation of the government to the place of the offence and to the person of the offender. The former consideration has been magnified in Great Britain and the U. S.—the latter upon the European continent. To meet modern exigencies, both systems have been modified, by statute and interpretation, into a very general approach to the rule that courts of the country of arrest have jurisdiction over all offences committed within its territory, and also over those perpetrated abroad distinctively against its sovereignty. Independent states administer only their own penal laws. They assist the enforcement of others by surrendering foreigners upon presumptive proof of crimes not political. That the obligation so to do does not arise purely from treaty provisions was aptly set forth when an eminent Frenchman said, "*Le principe de l'extradition est le principe de la solidarité, de la sûreté réciproque . . . contre l'ubiquité du mal.*"

CHARLES F. MACLEAN.



**International Workingmen's Association.** The, was founded Sept. 28, 1864, at a large meeting of workmen from nearly all European countries, in St. Martin's Hall, London, at which the manifesto and statutes, as drawn up by Dr. Carl Marx, were adopted for publication, and a provisional administration established. It is an association of trades' unions, intended for the defence of the interests of workmen against the encroachments of the power of capital, and aiming ultimately at the abolition of all labor paid with wages as a form of slave labor, and the establishment of associated labor on a national scale. The statutes of the association were not finally established, however, until sanctioned by the first general congress, held at Geneva Sept. 3-7, 1866. Here the programmes of Mazzini and Bakunin were rejected, and that of Marx adopted. As reasons for the formation of such an association it was proclaimed that the emancipation of the working classes must be conquered by the working classes themselves; that the struggle for the emancipation of the working classes means not a struggle for class privileges and monopolies, but for equal rights and duties and the abolition of all class rule; that the economical subjection of the mass of labor to the monopolizer of the means of labor—that is, the sources of life—lies at the bottom of servitude in all its forms, of all social misery, mental degradation, and political dependence; that the economical emancipation of the working classes is therefore the great end to which every political movement ought to be subordinated as a means; that all efforts aiming at that great end have hitherto failed from want of solidarity between the manifold divisions of labor in each country, and from the absence of a fraternal bond of union between the working classes of different countries; that the emancipation of labor is neither a local nor a national, but a social problem, embracing all countries in which modern society exists, and depending for its solution on the concurrence, practical and theoretical, of the most advanced countries; and that the present revival of the working classes in the most industrious countries of Europe, while it raises a new hope, gives solemn warning against a relapse into the old errors, and calls for the immediate combination of the still disconnected movements. A constitution was then adopted, and the association was actually started. It held its next general congress at Lausanne, Sept., 1867; the third in Brussels, Sept., 1868; the fourth in Bale, Sept., 1869; but the fifth, destined to take place in Paris, Sept., 1870, was prevented from meeting by the Franco-Prussian war. Meanwhile, its influence was widely felt. The strikes of the bronze-workers in Paris in 1867, and of the builders in Geneva in 1868, were supported and carried through by English money, and in England, where trades' unions and strikes were institutions of older standing, they were made much more effective, as the association prohibited cheap labor from being imported from France, Belgium, and Germany. In different countries, especially in France and Austria, the government began to interfere, but this only made the association more popular among the workmen. It received a severe check from the Franco-Prussian war. No general congress has been held since. Many members of the Paris Commune belonged to the association, and the excesses of the Commune were defended by the association, both in a pamphlet written by Marx and published by the general council in London, and in other ways. Nevertheless, in spite of the less conspicuous part which the association has played in public life during the last four years, its importance can hardly be said to have decreased. The number of its members is increasing, and in most countries it has established organs of its own for the diffusion of its ideas. C. PETERSEN.

**Interpleader**, in law, is the right which a person who holds a fund, or has possession of any item of property, or owes a duty or obligation, has, when there are rival claimants to the fund, etc., and he cannot determine to whom it belongs, to require them to settle in court their conflicting claims as between themselves, and to be allowed on his part to make over the property, etc. to the court, to abide the events of the litigation or to hold it under its direction. The jurisdiction of courts of law over this subject is very limited and imperfect, and this branch of jurisprudence may now, in practice, in the absence of statutes, be said to be exclusively administered in courts of equity. The method in which relief is obtained is by bill in equity. (See BILL IN EQUITY.) These bills are of two kinds—strict interpleader, and bills in the nature of an interpleader.

(1) *A Strict Bill of Interpleader.*—The function of such a bill can be most clearly stated by putting the propositions appertaining to it in the form of rules. *Rule 1.* There must be two or more persons claiming from the plaintiff the same debt, duty, or thing. This rule is of easy application when an item of property is in dispute.

It is, however, quite difficult in some cases to ascertain whether the same debt or duty is claimed. An illustration may be found in the case where a tenant under a lease is called upon by his lessor for rent, and at the same time a third person asserts that he is the owner, and that the amount of the rent should be paid to him. This would not be a proper case for a bill of interpleader, since the lessor claims under a contract, while the stranger asserts that the tenant is in possession by wrong. Some other method must accordingly be resorted to in order to determine the rights of the parties. On the other hand, if a person is taxed in two different towns for the same property when he is only liable to be taxed in one, and it is doubtful to which town the right to tax belongs, he may file a bill of interpleader to compel the tax-collectors or towns to settle the rights as between themselves. In this case the debt or duty is the same. *Rule 2.* As a general rule, a bill of interpleader will not lie when the holder of a fund stands in confidential relations towards one of the claimants, and the other is a mere stranger, claiming by an independent and paramount title. Thus, if an agent, consignee, or bailee have goods committed to his care, in legal phrase there is a "privity of contract" created, which will prevent him while he retains possession from disputing the title of the person for whom he acts. The agent or bailee must defend himself from conflicting claims as well as he may. *Rule 3.* The second rule must be confined to the case where the agent, consignee, etc. seeks to dispute or test the original title of his principal or consignor. It frequently happens that after such a contract relation has been created the title by subsequent acts of the principal or employer becomes complicated. He might, for example, make conflicting assignments of doubtful validity to different persons. So his assignee in bankruptcy might claim the goods as against one to whom it was insisted that the owner had made a transfer in fraud of the bankruptcy act. In such cases as these the holder of the goods might demand an interpleader. It is manifest that he in no respect controverts or denies the fiduciary relation, but, while he admits its existence, asserts that the acts of his principal have since its creation so complicated their relations that he is uncertain how to proceed. *Rule 4.* In cases where both claimants assert wholly distinct and independent titles, according to the weight of authorities no interpleader will lie. The ground of this rule appears to be that there is an objection to the interference of a court of equity in trying legal titles upon a dispute between parties where there is no privity of contract. It has been held that a sheriff who seizes property on an execution cannot bring an action of interpleader upon account of an adverse claim existing to the property seized by him; for as to one of the claimants he necessarily admits himself to be a wrongdoer. This rule appears to be highly technical, and the narrow construction put upon the jurisdiction of the court is much to be regretted. This action is plainly a beneficial one, and should have been encouraged rather than discounted. There is certainly room for legislation whereby the power of courts to allow an interpleader may be placed upon a more satisfactory foundation. *Rule 5.* It is not necessary that the claims of the respective parties should be both legal in the sense of being recognized in courts of law. One may be legal, and the other equitable, or both may be equitable. *Rule 6.* The rights of the respective claimants must be doubtful. If the case shows no claim of right in one of the co-defendants, there is no ground for an interpleader. *Rule 7.* The holder of the fund, etc. may commence an action, although he has not yet been molested by either of the claimants. It is enough that he is in danger of sustaining injury from conflicting rights. He may, however, wait until an action is brought against him by one of the claimants, and then in turn commence his action of interpleader, making all of the rival claimants parties. *Rule 8.* A matter of detail should be referred to in this connection. There should be in the bill an affidavit that there is no collusion between the plaintiff and any of the other parties; and in the case of money it should be brought into court, or there should be at least an offer to bring it in. (Further details may be found in the books on equity or chancery practice. See *Daniel's Chancery Practice*; *Barbour's do.*)

(2) *Bills in the Nature of an Interpleader.*—A suit of this kind may be instituted by one who is not strictly a stakeholder. It may be brought by a person who is interested in a fund to ascertain his own rights, and at the same time to settle the conflicting rights of third persons. An illustration is supplied by the case of a mortgagor who desires to pay off a mortgage, while different parties lay claim to the mortgage money. It is plain that he would naturally seek to accomplish a double result—to redeem his property from the lien of the mortgage, and at the same time to pay the money to the party who was really entitled to it. An



important instance of a bill in the nature of an interpleader is one filed by an executor or trustee to obtain the construction of a will when there is a doubt or uncertainty as to the meaning of its provisions. In this case the provisions of the will are set forth, and the conflicting claims of the parties interested, accompanied by the statement that the executor cannot safely proceed in the matter without the direction and judgment of the court. In these cases the duty of the executor is said to be performed when he has brought the parties in interest before the court, and they may appear by counsel, who represent their respective claims under the will. As a general rule, in a strict bill of interpleader, the stakeholder is entitled to be paid his costs from the fund in controversy as a matter of right; costs in a bill of the nature of an interpleader are discretionary.

By recent legislation in England the courts of law have jurisdiction to a certain extent in matters of interpleader. (See 23 and 24 Vict. ch. 126, § 12.) So, under the New York Code of Procedure, and that of other States resembling it, a defendant against whom an action is pending upon contract or for specific property may at any time before answer, upon affidavit, that a person not a party to the action, and without collusion with him, makes against him a demand for the same debt or property, upon notice to such person and to the adverse party to the action, apply to the court for an order to substitute such person in his place and discharge him from liability on his depositing with the court the amount of the debt, etc. This statute does not supersede the regular jurisdiction in equity, but is an additional remedy given to a stakeholder who has been actually sued, by allowing him to assert his rights in an answer, and by way of defence, instead of instituting an action. The rules applied are substantially the same as in the bill of interpleader. T. W. DWIGHT.

**Interpolation** [Lat. *interpola*], the operation of inserting a term between two consecutive terms of a tabulated function that shall conform to the law of the function. A table of the kind referred to is generally computed from a formula containing two variables—one of which is the function, and the other the independent variable, or, as it is usually called, the argument. The table is formed by giving successive equidifferent values to the argument, computing the corresponding values of the function, and then writing the results in a table; this operation is called *tabulating* the function. Thus, to compute a table of logarithms, we assume some convenient formula expressing the relation between any number and the corresponding logarithm; in this case, the quantity that represents the number is the argument, and the quantity that represents the logarithm is the function. We next make the argument equal to all the successive natural numbers from 1 up to the limits of the table, and compute the corresponding values of the function; these results, when properly arranged, constitute a table of logarithms, from which we may, by simple inspection, take out the logarithm of any whole number within the limits of the table. We may find the logarithm of a mixed number, as 2½, by the method of interpolation. The object to be obtained may be illustrated graphically: let  $AN$  be the logarithmic curve whose equation is  $y = \log x$ , and let  $BK, CL, DM$ , etc. be ordinates corresponding to the abscissas 2, 3, 4, etc. Knowing these ordinates, we have the points  $K, L, M$ , etc. of the curve; it is then required to find an ordinate,  $st$ , whose abscissa is 2½.

This ordinate might be computed from the formula used in computing the tables, but this would, in most cases, be entirely too tedious. What we actually do is to pass a parabola through a sufficient number of the points  $K, L, M$ , etc., and then compute the ordinate of this parabola corresponding to the given abscissa. This ordinate will approximate the more closely to the required ordinate the greater the number of points taken. If we take two points,  $K$  and  $L$ , the parabola is of the first order—that is, it is a straight line, whose equation is of the form  $y = p + qx$ ; if we take three points, the parabola is of the second order, whose equation is of the form  $y = p + qx + rx^2$ ; if we take four points, the parabola is of the third order, whose equation is of the form  $y = p + qx + rx + sx^3$ , and so on. By taking a sufficient number of points, as  $m + 1$ , we have a parabola of the  $m$ th order, which may be made to coincide with the curve of the given function to any degree of approximation in the neighborhood of the required ordinate. In most cases a parabola of the third or fourth order is amply sufficient. We can find the equation of the auxiliary parabola by the method of finite differences as follows: Let the successive

ordinates,  $BK, CL$ , etc., be denoted by  $a, b, c$ , etc.; then let each be subtracted from the one following; the remainders thus found form a new series called the *first order of differences*. Now, let each term of the new series be subtracted from the following one; the remainders will form a series called the *second order of differences*; and so on, as indicated below:

$$\begin{array}{ccccccc} a & b & c & d & e & \text{etc.} \\ b - a & c - b & d - c & e - d & \text{etc.} \\ c - 2b + a & d - 2c + b & e - 2d + c & \text{etc.} \\ d - 3c + 3b - a & e - 4d + 6c - 3b & \text{etc.} \\ \text{etc.} \end{array}$$

If we denote the first terms of each of the orders of differences by  $d_1, d_2, d_3$ , etc., we shall have

$$\begin{array}{l} d_1 = b - a, \quad \text{whence, } b = a + d_1; \\ d_2 = c - 2b + a, \quad \text{whence, } c = a + 2d_1 + d_2; \\ d_3 = d - 3c + 3b - a, \quad \text{whence, } d = a + 3d_1 + 3d_2 + d_3, \\ \text{and so on.} \end{array}$$

If we denote the ordinate which has  $n$  ordinates before it by  $y$ , we have, by continuing the above process,

$$y = a + nd_1 + \frac{n(n-1)}{1 \cdot 2} d_2 + \frac{n(n-1)(n-2)}{1 \cdot 2 \cdot 3} d_3 + \text{etc.}$$

If we now regard  $n$  as a variable abscissa, this will be the equation of a parabola of the  $n$ th order, passing through the extremities of  $n + 1$  of the consecutive ordinates  $a, b, c$ , etc. In this case the origin of co-ordinates is at the foot of the first ordinate, and  $n$  is expressed in terms of the distance between two consecutive ordinates taken as a unit. By giving a suitable value to  $n$ , we may interpolate an ordinate between the first and second, or between any two consecutive ordinates of the series  $a, b, c$ , etc. The result will usually be more accurate if we take the values of  $a, b, c$ , etc., so that the interpolated term shall fall about midway between the extremes. As an illustration of this mode of using the formula, let it be required to find the right ascension of Venus at midnight between the 2d and 3d days of Nov., 1875, knowing her right ascensions at noon on the 1st, 2d, 3d, and 4th of November, as follows:

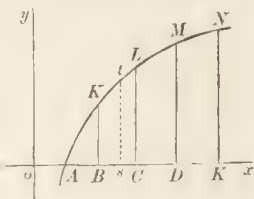
	1st diff.	2d diff.	3d diff.
Nov. 1..... 15h. 5m. 47.27s.			
" 2..... 15 10 47.40	5m. 0.13s.		
" 3..... 15 15 48.76	5 1.36	1.23s.	
" 4..... 15 20 51.35	5 2.59	1.23	0.0s.

Finding the successive orders of differences as already explained, we have  $d_1 = 5m. 0.13s.$ ,  $d_2 = 1.23s.$ , and  $d_3 = 0.0s.$ ; since the first right ascension corresponds to noon of Nov. 1, the value of  $n$  is 1½; the value of  $a$  is 15h. 5m. 47.27s. Substituting in the formula, we have  $y = 15h. 5m. 47.27s. + 1.5 \times 5m. 0.13s. + .75 \times 1.23s. = 15h. 13m. 18.39s.$  which is the required right ascension.

Other formulas for interpolation have been deduced, but the one just explained is, in a majority of cases, the one most readily applied. W. G. PECK.

**Interpretation** [Lat., in law, is the application of legal rules to the ascertainment of the meaning of language or other signs of thought. In its ordinary significance it is confined to the meaning of written language; in its legal aspect it is but a branch of a larger subject, since the same general principles must be adopted in every department of literature and science to discover an author's meaning. The subject may be considered under two general divisions: I. The principles of interpretation; II. Their application to particular cases, *e. g.*, statutes, contracts, wills, etc.

I. The great object of interpretation is to ascertain the meaning of a writing, or, in technical phrase, of a "text." This is not to be obtained by conjecture, but only by the application of settled rules. A distinction has been drawn between interpretation and construction. The former word has been taken to mean the sense of the writer as included within his language. Construction, on the other hand, would embrace the inquiry whether topics that were not expressed in the writing were not included within the general intent of the author, or, as is sometimes said, within "the spirit" of the text. So, in some instances, the law forbids the exact accomplishment of the author's intent. It then becomes important to know whether the intent shall be carried out, though not precisely, yet as nearly as the law will permit. There is an important branch of law depending upon this distinction, known as the doctrine of *cy pres*, or of approximation. It is frequently resorted to in the construction of wills or of statutes. Thus, if a person should be prohibited by law from creating a trust in property for a child whereby the income of a fund should be converted into principal beyond the attainment by the child of the age of twenty-one, and the parent should direct the accumulation of the profits until the child reached the age of twenty-five, the last four years might be discarded by the courts, and the direction be sustained until the age of twenty-one. This doctrine requires that the illegal direction should be in its nature capable of separation from that which is legal. Otherwise, the entire pro-





vision will be void. This doctrine has had in England a large application in the construction of wills endowing charitable institutions or creating charitable trusts, *e.g.*, for the support of colleges, hospitals, schools, etc. (See TRUSTS.) The intention of a donor, instead of being carried out, has frequently been perverted by the court; yet when properly applied, the doctrine is both rational and useful. Having pointed out the distinction between interpretation and construction as made by some authors, no further use will be made of it in this article. Text-writers upon this subject enter into various nice and minute distinctions. They speak of interpretation as being either close, or extensive, or free, or limited, or predestined, or extravagant. These terms are used to point out the general difference between correct and erroneous principles. Interpretation cannot properly be "predestined" or "extravagant." In the one case, the supposed interpreter has preconceived views and is laboring under a strong bias, and thus makes the writing subservient to his wishes. In an extravagant interpretation one ceases to follow rules, and, in fact, does not *interpret*, but guesses or conjectures. The distinction, however, between a close and an extensive interpretation is founded in reason. There are cases in which it is proper that words should be taken in their narrowest meaning, while in others a broader and more comprehensive signification should be adopted.

The leading rules of interpretation will now be referred to. *Rule I.* The meaning of a writer is to be ascertained not merely from what he states, but also from all that is implied by usage or otherwise. It would be intolerable if every subordinate proposition included within the written statement were required to be expressed. This distinction frequently becomes of political consequence. A striking illustration is found in the difference between the powers conferred upon Congress by the old "Articles of Confederation" and the present Constitution. In the former instrument it was provided that each State retained every power, jurisdiction, etc. which was not *expressly* delegated to the U. S. in Congress assembled. In the present Constitution (Art. X. of Amendments) the word "expressly" was designedly omitted from the corresponding clause, thus leaving open to the powers expressly conceded the doctrines of implication. In this way the Supreme Court of the U. S., as the final interpreter of the Constitution, has frequently been called upon to decide as to the implications to be derived from the words used in that instrument. *Rule II.* The whole of the writing bearing upon the subject in hand must be taken into account. In other words, the interpreter must have regard to the context. It will not do to wrench a particular sentence from its connections. In this way an author's meaning may be wholly perverted. This rule, as will be seen hereafter, is of great consequence in the interpretation of statutes. *Rule III.* Only the writing and its implications are to be considered. It will not do for the interpreter to go beyond the writing in search of a supposed sense. The true view is that it is of no consequence what the intent was, so long as it is not expressed or reasonably to be implied from the words used. This rule is applied with great inflexibility in courts of law. There is a well-known rule to the effect that oral evidence is not to be resorted to in order to add to or to vary the terms of a written instrument. Accordingly, the courts cannot supply by interpretation an unexpressed intent of the legislature or of a testator. This rule does not prevent the courts in certain cases from correcting mistakes; that is, from supplying or omitting words that were inadvertently inserted or omitted. *Rule IV.* Where there is nothing in the writing or its surroundings to lead to the contrary, the general rule is that words are to be taken in their ordinary and popular sense. On the other hand, if the subject of the writing is a matter of art or of science or other technical nature, the presumption is that the words are used in a special and technical sense. *Rule V.* Good faith is to be observed and sound sense exercised by an interpreter. The great object is to ascertain the intent and to carry it, if proper, into effect. Out of this principle spring a number of subordinate rules; such as, that where two senses are possible, one of which is agreeable to law and the other opposed to it, the former is to be preferred. So inadvertent omissions are to be overlooked; apparent repugnancies, if possible, are to be reconciled; words inconsistent with the main intention are to be rejected; stress is not to be laid on accurate grammar or orthography. It is a further rule that the situation of the writer and the circumstances surrounding him may be presented so as to put the interpreter in the position of the author. For example, if a testator should direct his property to be divided equally "among his children," it would be impossible for a court to carry out his direction without ascertaining from extraneous evidence the number of his children and identifying them. It is plain that this testimony would not alter the

instrument, but would enable the court to regard the subject from the testator's point of view. It should be added that in ordinary cases the meaning of a written instrument is a matter of law for the court rather than the jury. In this way fixed rules are established and an erroneous interpretation by a lower court becomes the subject of review by an appellate tribunal. Where the words are technical, it may be necessary to ascertain their meaning through the testimony of experts, and to submit the matter to the jury as a question of fact.

*II. Application of the Rules of Interpretation to Special Cases.*—The leading cases in which the subject is presented to courts of justice are treaties, political constitutions, legislative acts, contracts, and wills. It will not be possible to consider the special rules governing all of these cases. A few will be referred to in connection with the last three of the instances mentioned. (1) *Statutes.*—The intention of a legislature in passing a statute is to be ascertained by the application of the general rules already stated, together with others of a special or subordinate nature. (a) It is a general rule that the words of a statute are to be taken in their ordinary and popular sense. This is just, as they are intended to govern the action of the public, who would naturally give them such a signification. Still, if the statute were intended to govern the action of a special class of persons, another rule might prevail. For example, a commercial tariff law, enacted by Congress to prescribe duties to be paid upon imports, would be in the main intended to govern the conduct of importing merchants, and technical words would be used, requiring a corresponding interpretation. (b) It frequently happens that a series of statutes is enacted to govern a particular subject. These may be called into existence from time to time during a long period of years. Such statutes are said to be *in pari materia*—upon the same general subject. The ascertainment of the meaning of the latest in the series may require the examination of all. (c) The rule that the meaning must be found in the text to be interpreted has its full application in the case of statutes. The courts cannot ascertain the legislative will by conjecture. If not expressed or implied from the words used, the supposed meaning must be discarded. The technical expression is, *volunt sed non dicit*—the legislature may have had an intention, but it remains unexpressed. Where, however, words that are obscure are used, it is a strong argument in favor of a particular signification (if that is possible) that, unless it be adopted, there will be no rational meaning. (d) In the interpretation of a statute it is often essential for the court to know the circumstances existing at the time of its enactment, or, in other words, to become familiar with contemporary history, to understand existing defects in the law, and to ascertain what evils the legislature designed to remedy. This rule is well illustrated by the interpretation of the recent suffrage law in England, where the question was, whether the word "man" as used in the act included "woman," so as to give her the right to vote. The court, in deciding the case, had much recourse to the general history of the right of suffrage in England as tending to show the legislative intent. The words in a statute, though of a general character, must be confined in their application to the defects to be remedied. One branch of this rule is referred to by law writers in the technical expression that regard must be paid to the "old law, the mischief, and the remedy." A single illustration may be useful. Suppose that a former law permits the bishop of an established church to lease church-lands for any length of time and any rent that he may see fit. The "mischief" of this rule may be that he may lease them for a very long term and at a low rent, and thus *impoverish his successors* in the bishopric, whose income may be reduced to a minimum. A statute is passed preventing a bishop from making a lease for more than twenty-one years. After this a lease is made for the bishop's own life, which may, of course, exceed twenty-one years. This lease is not within the "mischief" of the statute, as it does not tend to "impoverish his successors." It is thus necessary in many instances to go beyond the letter of the statute and to discern its true intent and spirit. Thus, if a law should prescribe that when two vehicles were passing along an ordinary highway in opposite directions, each should turn to the right with a view to avoid collision, it could have no application to the case of an omnibus and a street car, as there could be no danger of collision by the non-observance of the rule. Accordingly, the omnibus might pass either to the right or to the left of the car. (e) Penal statutes, *e.g.* those which inflict punishment, are to be interpreted with much strictness. This rule was formerly carried to absurd lengths, but in a rational sense still prevails. It is founded in reason, since punishments should not be inflicted unless the transgressor of the law was able clearly to know its meaning and to ascertain the legal consequences of his acts. (f) Statutes to prevent



frauds are, on the other hand, interpreted liberally, in order to relieve the injured party from the consequences of the fraud. The same statute may have a double aspect, or be both remedial and penal, when the application of these distinct rules may lead to opposite conclusions derived from the same phraseology. For example, if a statute should provide that if one of two gamblers should win from the other more than fifty dollars at "one sitting," he should not only restore the money won, but should forfeit three times the amount, and afterwards a game should take place which was interrupted by an adjournment for dinner, and subsequently continued, the two periods might be regarded as "one sitting" for the purpose of returning the money, as that would be remedial, while it would not be so considered in reference to the forfeiture. (g) It is a cardinal rule of interpretation that a statute shall in general be construed to operate as a rule for the future, and thus not have a retrospective operation. The rule is particularly strong when the retrospective operation would destroy vested rights. In that case the words giving a retrospective operation to the act must be extremely clear. On the other hand, if the words are used to confirm existing rights defective in form or to add to the means of enforcing existing obligations, a retrospective effect will readily be allowed. Under American law, if the words are plainly retrospective and affect vested rights, another question may arise. They may be repugnant to some provision of the U. S. or State constitution, and for that reason be inoperative. (h) Another instance of the desire of the courts to protect vested rights is found in the rule that all statutes in derogation of private rights must be strictly construed and their provisions closely followed. This rule finds much practical illustration in the sale, under statutory provisions, of land for the non-payment of taxes. Where the authority is not strictly pursued the sale is void. This rule has been carried to such extreme lengths in some instances as almost to embarrass the operations of government. (See *Blackwell on Tax Titles*.) There is a tendency in some parts of the country, e. g., New York, so to frame the tax laws as to give less practical operation to this rule than formerly. (i) A distinction of some importance is taken between words that are simply directory and such as are mandatory. The former class are not obligatory in the same sense as the latter. Thus, if an act is directed to be performed on a given day, it may, in general, be performed on some other day: the words are "directory." On the other hand, when the interests of the public are concerned or the rights of individuals are involved, even permissive words may be regarded as obligatory or "mandatory": the word "may" will perhaps be construed to mean "must." (j) If an unlawful act be committed for which there is, in behalf of the public, an existing remedy, and a new mode of redress be given by statute, the former one will not in general be displaced. The remedies become cumulative, and resort may be had to either. This would not be the case if the new provision were inconsistent with the former law, for the latter would then be repealed by implication. On the other hand, if the act be made unlawful by the statute, and a specific mode of redress be provided, that must be resorted to. (k) Where a statute prescribes a penalty for the commission of an act, it is thereby made unlawful, and a contract to perform the act in question will be declared void. A penalty implies a prohibition. (l) It is a general remark that the courts strive as far as possible to effectuate the legislative will: discordant clauses or statutes will, if possible, be reconciled. Where there is a plain repugnance, the later statute, so far as it is inconsistent with an earlier one, displaces or repeals it. The same rule is applied even to inconsistent clauses or sections in the same statute. So a saving clause repugnant to the general scope of the act is void. A repealing statute of course does away with that which it repeals. Where a repealing statute is itself repealed, the former law revives without express words of revival. It may be added that in arriving at conclusions by way of interpretation, the general opinion of the legal profession is considered as of importance. (See also *Dwarris on Statutes*.)

(2) In the case of *Written Contracts*, the court seeks to ascertain the intention of the parties, and, having found it, to carry it into effect if the rules of law and public policy will permit. The intention, however, must be found in the *writing itself* by the application of rules of interpretation. If it is claimed that the intention was really different from that which the words indicate, it is not a case of interpretation, but rather of a mistake, which, if material, must either be corrected or must vitiate the contract. If the mistake be material, a court of equity will "reform" or correct the instrument by supplying or omitting words, so as to make it express the real intention of the parties. If the minds of the parties did not concur in the writing, it

will be a case of no contract either through fraud or mistake. Assuming that there is no question of this kind, but that the writing contains what was intended, the court resorts to fixed rules in ascertaining the intent. These rules are numerous and complex in their operation, and cannot be fully stated in an article such as the present. A few of them will be indicated. (a) Words are, according to the general rule, to be taken in their ordinary and popular sense. In many cases the contract concerns a particular trade or calling, when the meaning is ascertained through the testimony of merchants who are skilled in it. (b) If the contract cannot be carried into effect precisely as the parties intended, the court will strive to uphold it on some other theory which will render substantial justice to the parties. This rule becomes of much importance in the construction of instruments of a technical character, such as deeds. These instruments frequently assume a special form, known as a "bargain and sale," or a "release," or a "confirmation," etc. etc., as the case may be. It is a well-settled rule that if the parties should erroneously resort to one of these instruments when they should have adopted another, the courts will effectuate the intent by construing the instrument wrongly selected as practically amounting to the one which should have been adopted; as, for example, construing a deed of bargain and sale to be equivalent to a release. This rule is one most beneficial in its operation and is highly favored, and tends practically to obliterate, or at least to make harmless, useless legal distinctions. (c) It is frequently necessary to determine whether an instrument is executed or executory; as, for example, whether it is a lease or an agreement for a lease, a deed or a contract for a deed. This is ascertained not so much by interpreting particular words as by a view of the entire instrument and of the main intention of the parties. (d) An instrument is in some cases of doubt to be taken most strongly against the party who executes it (*contra proferentem*). Not so much use of this rule is made as formerly. Many instruments are of such a mutual character that it is inapplicable. Still, in special cases it may be resorted to. It has never been applied to grants by the sovereign power. Whatever is not contained in the words of such a grant is not conceded by the grantor. It was at one time supposed by some jurists that if a grant was made by the sovereign power of the right to have a public ferry or a bridge, there was an implied contract on its part that it would make no grant of another right of a similar kind that would interfere with the franchise conferred. (See *FRANCHISE*.) This doctrine is now exploded, and no exclusive right can be claimed unless it is shown by a fair construction of the words of the grant itself. (e) Instruments are sometimes partly printed and partly written. If there is a conflict between the two, the written are to be preferred, as being more clearly indicative of the intention of the parties, the printed words being regarded as a general formula, while those which are written are specially employed for the occasion in hand. (f) Usage is of much importance in the interpretation of written contracts. Where a contract concerns a matter in any trade or business in which there are known and well-defined usages, there is a presumption of law that the contract was made in reference to the usage. This doctrine has been in some instances carried very far; its exact limits have not yet been fixed by the courts. A well-known English case illustrates the difficulty. There being a written contract for the sale of rabbits at a fixed price per thousand, the court allowed evidence of a custom in the trade that "thousand" meant "twelve hundred." This decision has not met with universal acceptance. There is a disposition in some courts to hold that such evidence is inadmissible to contradict the plain and ordinary meaning of written words, e. g., words of number. Rules are laid down by the courts to test the validity of a custom; such as, that it must be certain, reasonable, established, and undisputed. There is only a presumption that parties intend to follow the custom, and it may accordingly be excluded by sufficient evidence of their intent. The words "usage" and "custom" are often used indiscriminately, but in accurate language the former is rather evidence of the latter. (g) There are other presumptions or implications acknowledged by law; such as, that a contract binds the representatives of the parties as well as the parties themselves, or that a contract made by two persons is joint rather than several, or if no time is mentioned for performance that it must take place within a reasonable time. Some of the rules above stated, as is manifest, apply to unwritten as well as to written contracts. (h) Reference has already been made to a rule of law that extrinsic evidence of the intent of the parties is not to be allowed to alter the terms of a written instrument. This rule means that the parties are to be conclusively supposed to have merged all their stipulations and propositions anterior to the contract in the instrument itself. That is the final and



sole repository of their intentions. This rule is of great consequence both in the interpretation of contracts and of wills. While, in its correct form, it is inflexibly applied, there are some qualifications or apparent exceptions to it which should be stated. It does not include evidence by way of explanation of obscure or technical terms in the contract. It allows all contemporaneous writing to which the contract refers to be introduced. It does not bear upon clauses which are intentionally left incomplete. It permits evidence of the circumstances surrounding the parties when the contract was executed, so that the court can stand in their position and see with their eyes. Under it there may be evidence offered to show that the supposed contract is wholly void for fraud or other legal ground, for then there is no contract. Nor does the rule interfere with the correction of mistakes, such as the insertion of clauses accidentally omitted. What is really meant is, that one of the parties shall not be allowed as against the other to introduce any evidence by way of interpretation, where a written contract is in its exterior form complete, of clauses which were not intended to be inserted, but to be left to oral understanding. If that were allowed, the certainty and precision which a written contract was intended to secure would be wholly lost. The rule can, however, be pressed no further than its circumstances will warrant. Accordingly, it cannot exclude oral evidence of subsequent modifications or of additions to the contract, as these could not possibly have been included in the contract when it was executed. There is an important inquiry applicable both to contracts and wills concerning the explanation of ambiguities and uncertain clauses which can be more conveniently considered under the next head (*Wills*). (i) Subject to the rules already stated, there is a strong disposition to effectuate the will of the parties so far as that accords with the rules of law. Incorrect grammar and spelling are but of little importance if the sense is not obscure. Clauses may be transposed in construction, if necessary, and the intent sought as to the most solemn instruments, without reference to regularity of form. Still, it is unwise to draw important instruments in an inartificial manner, as it may lead to obscurity or perversion of the meaning. The courts will prefer a construction that will make the instrument legal rather than illegal, as they will one that will uphold and effectuate it rather than one that will destroy it.

(3) *Wills*.—This is a very important subject for interpretation, and special rules prevail. In executing these instruments the testator is frequently without legal advice, and the courts seek to give scope to his intention, however inartificially it may be expressed. Still, it remains true that the intention must be found in the instrument. Conjecture, no matter how plausible, cannot be resorted to. The rule already referred to in the expression *vult sed non dicit* has full application. The following among other rules may be laid down as proper to be followed: *Rule I.* Technical words are not necessary to give effect to any disposition in a will. Still, if the testator uses those words, he will be presumed to employ them in that sense, unless there is evidence from the context to the contrary. *Rule II.* Words are in general to be taken in their ordinary and grammatical sense, unless an intention can be shown to the contrary. This rule, where language is unambiguous, is not to be departed from, though it should result in inconvenience or absurdity, or in consequences which the testator did not foresee. Still, where the intention is obscure, it is to be sought in a rational and consistent rather than in an irrational and inconsistent purpose. *Rule III.* All the parts of a will are to be construed in relation to each other, and so as, if possible, to form one consistent whole. Words and limitations may be transposed, supplied, or rejected where that course is warranted by the context or the general scheme of the will. Words obviously miswritten may be corrected. So the word "or" has been made in many cases to read "and," and conversely. Where the intention cannot operate to its full extent, it must be made to operate as far as it can. While a construction is not to be strained to bring a devise within the rule of law, if two constructions are admissible, one of which will render it void and the other valid, that is to be preferred which will make it valid. *Rule IV.* Under the same general view as prevails in Rule III., the following special statements may be made. Words occurring more than once in a will as to the same subject are presumed to be used in the same sense unless there is something to show the contrary. Express and positive devises are not to be controlled by the reasons assigned, nor is a plain devise to be affected by a subsequent inaccurate reference to its contents. Devises not grammatically connected or united by the expression of a common purpose must be construed separately and without relation to each other, unless there is a manifest intention to connect them. *Rule V.* An heir is not to be disinherited without an express devise or necessary implication.

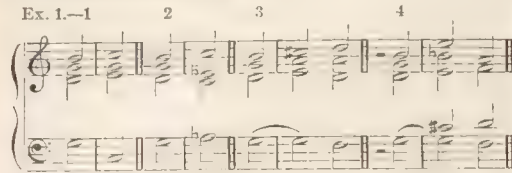
Nor can he be disinherited by an expression of an intention that he should take nothing; the estate must be given to some other person. *Rule VI.* A will of real estate, wherever made, must be construed according to the law of the place where the land is situated; one of personal property, according to the law of the testator's domicile. *Rule VII.* A will speaks for some purposes from the time of its execution, but does not take effect until the testator's death. *Rule VIII.* Extrinsic evidence is not to be resorted to for the purpose of adding to or altering the terms of a will, though the court may receive it to show the circumstances under which it was made; such as, the state of the testator's property, his family, and the like. This branch of the law was first reduced to symmetrical form by Vice-Chancellor Wigram in his admirable work on the *Admission of Extrinsic Evidence in Aid of the Interpretation of Wills*. The principles are in a masterly form reduced to a number of leading rules. Without stating them at length, the substance of them is that where words in a will have two senses, a primary and a secondary sense, they are presumed in general to be used in the primary sense, unless there is some evidence in the context to the contrary. If there is no such context, and the testator's words are sensible with reference to extrinsic circumstances, the rule is inflexible that no evidence will be allowed to show that the words are used in a secondary sense. On the other hand, if the words are not sensible in reference to extrinsic circumstances, it may be made to appear that the words are used in a secondary signification. A single illustration will show the bearing of these propositions: If a testator should direct his property to be divided among his "children," the primary sense would be intended. If the fact were shown that he had legitimate children, it would be impossible to introduce any extrinsic evidence, no matter how strong, that he intended illegitimate children. On the other hand, if he had none that were legitimate, it might be shown that the illegitimate were intended. While it is proper, and sometimes necessary, to introduce evidence relating to the person claiming to be interested under the will, as well as to the circumstances of the testator and his affairs, yet if after this it is uncertain who was intended (except in special cases, to be hereafter noticed), no evidence of intention will be allowed, and the will is void for uncertainty. The special cases in which the evidence of intention is allowed are where the object of the testator's bounty or the thing intended to be bestowed is described in words which are equally applicable to more than one person or thing. This last proposition leads to the long-recognized distinction between latent and patent ambiguities, on which much stress is laid by Lord Bacon. The characteristic distinction, as he understood it, between the two is that the one appears on the face of the instrument and the other does not. Thus, if a testator should give his property to William Gordon of New York, and extrinsic evidence should show that there were two persons of that name, there would be a latent ambiguity not appearing on the instrument. If the will itself should show by its different provisions that there were two such William Gordons, it would be patent. Such a distinction is plainly useless and unfruitful. Bacon would hold that extrinsic evidence of the person intended offered in the first case, and not in the last. No such distinction is maintainable in reason, and it is just as proper to identify by extrinsic evidence the person really intended in the one case as in the other. The real distinction is between an ambiguity as here used and an uncertainty appearing on the face of the will. This last admits of no correction. A bequest of a sword to "the bravest general in the American army" would be incurably void, unless the testator on the face of the will supplied the mode of determination.

Under these rules the courts of equity cannot supply an omission in a will as they can in a contract. This jurisdiction has never been assumed, as a will is a mere bounty, and the beneficiary has no claim as a party to a contract would have. It is therefore an important practical remark, applicable to draughtsmen of wills, that the greatest care should be taken to include all the provisions intended by the testator.

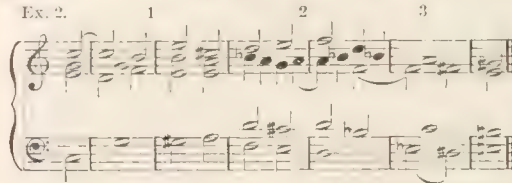
It is proper to add, as a general rule applicable to all branches of the law, that the rules of interpretation are the same both in courts of law and equity. While the latter courts assume a special power to correct mistakes, when they are simply engaged in ascertaining the meaning of words used they adopt the same rules as courts of law. In addition to the works already mentioned in the course of this article, see Lieber's *Legal and Political Hermeneutics*; Sedgwick on the *Construction of Statutes*, etc.; Smith, *Statute and Constitutional Law*; and Chitty or Parsons or Addison on *Contracts*, and Jarman or Relford on *Wills*, etc., etc. Reference should also be made to approved digests and volumes of law reports for the application of principles to adjudged cases.) T. W. DWIGHT.



**Interrupt'ed.** Certain musical cadences are called interrupted when they terminate in a manner foreign to that naturally suggested by the previous harmony. In the following example see the perfect cadence at 1, and several interrupted cadences at 2, 3, and 4:



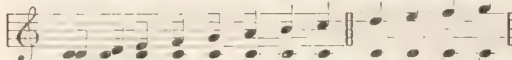
The cadences called *deceptive* differ little from the interrupted. They are often found succeeding each other in a flowing movement, and surprising the hearer by the unexpected turns assumed by the harmony. See Ex. 2, at 1, 2, and 3:



WILLIAM STAUNTON.

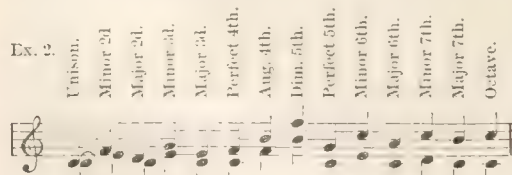
**In'terval**, in music, the distance or difference between any two sounds in respect to gravity or acuteness, or of any two notes as measured on the degrees of the diatonic scale, both extremes being counted. Thus, from A to B above is a second; from A to C, a third; from A to D, a fourth, and so on. Intervals are either *simple* or *compound*, the former being those which are comprised within the limits of an octave, as the second, third, fourth, fifth, sixth, seventh, and eighth; and the latter, those which extend more or less into the region of a second octave, as the ninth, tenth, eleventh, etc., as in Ex. 1:

Ex. 1. *Simple Intervals.* *Compound Intervals.*  
Unison. 2d. 3d. 4th. 5th. 6th. 7th. 8th. 9th. 10th. 11th. 12th.



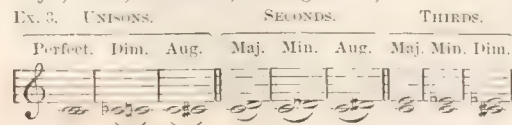
In another sense the term "simple" interval is applied to a *semitone*, because this interval is practically indivisible in the modern system of music, and *whole* tones, as thirds, fourths, etc., are said to be "compound," because they comprise two or more semitones. Of semitones also there are two denominations—viz. the *diatonic* and the *chromatic*, called also *major* and *minor*. When the semitone includes an advance from one degree of the scale to another (as from C to D♭ or C♯ to D), it is diatonic, but when the degree on the scale is unaltered (as from C to C♯ or D♭ to D), it is chromatic.

In the classification of intervals they are regarded as *perfect*, *imperfect*, *diminished*, or *augmented*; to which some add the *double* (or *extreme*) *diminished*. In Ex. 2 the nature of most of these distinctions will be perceived by reckoning the number of tones or semitones comprised in the various thirds, fourths, fifths, etc.:

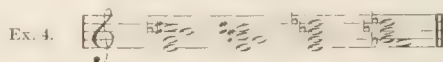


Of each of these intervals, except the augmented fourth and the diminished fifth, the scale furnishes several instances. Thus, e. g., the perfect fifth is made not only by C—G, but also by D—A, E—B, F—C, and in two other cases.

A more full and accurate view of intervals, as now recognized by all composers and schools of music, we proceed to give in Ex. 3 (in which abbreviations are used for the terms major, minor, diminished, and augmented):



Intervals larger than these, as tenths, elevenths, etc., are (except in a few peculiar cases) regarded and treated as merely octaves of the third, fourth, etc. The *unison*, though not strictly an interval, being merely the concurrence of two similar sounds, or of two notes on the same grade of the scale, is nevertheless treated in harmony as an interval, because it frequently happens that two parts or voices meet on the same degree, and such cases are subject to certain rules regulating their progression. By a close analysis of Ex. 3 it will be found that several of the intervals are identical in the number of tones and semitones which they comprise, though named and treated as of different magnitude. Thus, the augmented second and the minor third, or the augmented fourth and the diminished fifth, are struck upon the same keys on the organ or pianoforte, and appear thus to be identical. But they are not so in reality, because they belong to the scales of different keys, and take their designations from such scales. For the same reason each particular finger-key on the organ, etc. is used for several distinct notes, according as the music performed is in one key or another. Thus, the finger key for F is used also for E sharp, and a D key may become C double-sharp or E double-flat. In Ex. 4 the very same keys are struck for each of the chords, and yet different intervals are made, as is evident to the eye:



To aid still further in the analysis of Ex. 3, we give in the following table the contents of the principal intervals in tones and semitones. It should be borne in mind that the diatonic scale, whether major or minor, contains in the octave *five tones* and *two semitones*. Consequently, any other interval and its inversion, when added together, will make up the same amount as the octave, because such interval is a *portion* of the octave, and its inversion is the remaining portion or complement:

Ex. 5

	T.	S.	T.	S.	T.	S.	T.	S.	T.	S.	T.	S.
Perfect Unison.	0	0	0	0	0	0	0	0	0	0	0	0
Perfect Octave.	0	0	0	0	0	0	0	0	0	0	0	0
Perfect Fifth.	3	1	2	1	2	1	2	1	2	1	2	1
Perfect Fourth.	2	2	2	2	2	2	2	2	2	2	2	2
Major Third.	2	0	2	0	2	0	2	0	2	0	2	0
Minor Sixth.	1	1	1	1	1	1	1	1	1	1	1	1
Minor Third.	1	1	1	1	1	1	1	1	1	1	1	1
Major Sixth.	4	0	4	0	4	0	4	0	4	0	4	0
Major Seventh.	5	1	5	1	5	1	5	1	5	1	5	1
Minor Second.	0	1	0	1	0	1	0	1	0	1	0	1
Minor Seventh.	4	2	4	2	4	2	4	2	4	2	4	2
Major Second.	1	0	1	0	1	0	1	0	1	0	1	0

A perfect or major interval becomes *augmented* by the addition of a semitone, and a perfect or minor interval becomes *diminished* when reduced one semitone.

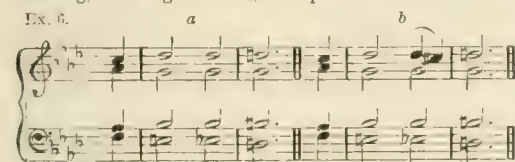
The next distinction of intervals is into *consonant* and *dissonant*. The ear immediately recognizes a difference between one interval and another in regard to their connection and relation. Some are pleasing, satisfactory, and conclusive in themselves; while others, though equally pleasing, are so indefinite as to create a kind of yearning for something further, or rather for a line of progression in a particular direction, forming what is called their *resolution*. Those intervals, then, which are more or less conclusive or independent are said to be *consonances*, while the others are known as *dissonances*. There is also a distinction of consonances themselves into *perfect* and *imperfect*, as already noticed. The former are the perfect unison, fourth, fifth, and octave, which cannot admit of change without converting them into dissonances. The latter, or imperfect, are the minor and major third and the major and minor sixth. Among consonances also are the fifth in the diminished triad, and its inversions. The dissonances are the remaining intervals—viz. major and minor seconds, major and minor sevenths, ninths, elevenths.



and all diminished and augmented intervals. By some theorists, fourths of all kinds are ranked among the dissonances, while by others the *perfect* fourth is treated as a perfect consonance.

Intervals are also either *fundamental* (i. e. when the lower term is the prime or root, or *inverted* when the prime, on which the harmony depends, is moved so far upward as to become the higher term). The fundamental intervals are four in number—viz. the unison, fifth, third, and seventh. When inverted, their corresponding intervals will be the octave, fourth, sixth, and second.

*Enharmonic* intervals, or those which are less than a semitone, are not practically in use, except in the case of organs like those of the Temple church, London, and St. John's, Calcutta, which instruments are specially constructed to express quarter tones, or even smaller divisions of the scale. In point of fact, there is a real difference between C♯ and D♭, G♯ and A♭, etc., but by the modern system of temperament a middle sound (in the way of a compromise) is adopted and used as representative of both those elements, though it is really neither C♯ nor D♭, etc. Theoretically, and in musical composition, the distinction is still observed, as, e. g., in cases of enharmonic changes, where one and the same chord (or component of a chord) is taken in two different relations, thereby serving to effect a transition into some unexpected key. Thus, in Ex. 6 the seventh on the dominant at *a* is assumed to be the *extreme sharp sixth* on E♭ (which it exactly resembles in sound), and the harmony is then suddenly thrown into the key of G major. In this case, the D♭ at *a* is supposed, while sounding, to change into C♯, as explained at *b*:



WILLIAM STAUNTON.

**Intestacy.** See ADMINISTRATION and EXECUTOR, by PROF. T. W. DWIGHT, LL.D.

**Intes'tinal Juice**, the mucous secretion of the intestinal canal. It contains granulated cells and cell-nuclei, and usually fat and epithelium. When filtered it is a tolerably clear, mucous, alkaline liquid, which does not coagulate by heat. Its constituents are the same as those of mucus. In 1000 parts of the juice from a dog were found—water, 965.3; solids, 34.7; pancreatic and intestinal ferments, with insoluble salts, 9.6; biliary matters, 16.6; tannin, 6.3; fat, 0.7, etc. Intestinal juice converts starch into sugar, and digests albuminous substances, flesh, etc., though much more slowly than gastric juice. (See *Watts's Diet.*)

C. F. CHANDLER.

**Intes'tine** [Lat. *intestinus*, "that which is within"], that portion of the alimentary canal which extends from the stomach to the anus. It consists of two distinct portions, the small and the large intestine. The former passes from the pyloric orifice of the stomach to the ileo-cæcal fold. The intestine consists of three layers: (1) an outer, serous layer, continuous with the peritoneum by means of the mesentery, a fold of serous membrane which connects the bowel to the spinal column; (2) a muscular coat of pale, non-striated, involuntary muscle-fibre, whose contractions give the small intestine a peculiar movement called "vermicular motion;" (3) an inner or mucous coat, having (a) folds called *valvulae conniventes*; (b) the glands called glands of Brunner; (c) the follicles of Lieberkühn; (d) the solitary glands; (e) the agminated glands called "Peyer's patches;" and (f) the intestinal villi. The small intestine is divided into the duodenum, the jejunum, and the ileum; the large, into the cæcum, the colon, and the rectum. The total length in man is not far from 10 feet, three-fifths of which length pertains to the small intestine. The more important of the above-mentioned divisions are described under their alphabetical heads.

**Intona'tion.** A musical term denoting, in a general sense, the utterance or delivery of any series of sounds formed on the scale. This, when correct in time, accurate in pitch, and refined in taste and expression, is said to be *pure*. The contrary, but more especially a failure in correctness of pitch, is called *false* intonation. In church music the name of "intonation" is given to certain introductory notes in Gregorian chants which are sung to each verse of a psalm or canticle on festivals, but only to the first verse on other days.

**Intone'.** This word is popularly used for the recital of prayers, psalms, versicles, etc. in monotone, with or without inflections. Properly, it refers only to the recital

of a few notes called the "intonation" standing at the beginning of a chant.

**Intoxica'tion** [Lat. *in*, and *toxicum*, "poison"], the cumulative effect of an acro-narcotic poison on the nervous centres. The term is most commonly used to designate the condition of a person who has been brought under the influence of *alcohol* by successive imbibitions during a short space of time, but should not be confined exclusively to the poisoning by alcohol; opium, stramonium, cannabis indica, and all the poisons belonging to the above-mentioned class, will produce intoxication when taken in sufficient quantity.

Intoxication may be divided into the acute, sub-acute, and chronic varieties. Acute intoxication is a disease very rarely seen, even by the physician. It is produced by drinking a large quantity of some spirituous liquor in a very short space of time. This is followed soon afterwards by sudden coma (loss of sense, sensation, and voluntary motion) (*Abasco Clark, M. D.*), which may be complete or incomplete. We have present here the symptoms of coma—viz. stertorous respiration, deviation of pupils, frothing at the mouth, etc. Unless assistance speedily arrives these symptoms generally terminate in death in from half an hour to five or six hours. Every endeavor should be made to arouse the patient from his lethargic condition. An active emetic, as sulphate of zinc, may be administered, or, better still, the stomach-pump should be used to evacuate the stomach. Ammonia may be given as an antidote, and if the patient be able to swallow he should take large draughts of tea. The sub-acute form may be seen any and every day in the week. It is the ordinary form of intoxication indulged in by persons either voluntarily, for the pleasant and exhilarating effect on the senses during one of its stages, or involuntarily, in consequence of a depraved appetite growing out of the former method. We see some men—and, unhappily, women also—who are seldom or never in a sober condition; others who imbibe a little at all times, and get intoxicated whenever they are under undue excitement or depression; and still others who "go on a burst" once every three, six, or twelve months, and in the mean time totally abstain from any of the intoxicants. To this last class belong those individuals who inherit the tendency to inebriation. Alcohol, taken to a degree to produce sub-acute intoxication, excites the vascular and nervous systems; all the secretions are at first arrested, and the temperature of the body is lowered, and not, as has been generally believed, increased. If taken by a person who is not accustomed to it, it occasions derangement of the stomach, and nausea and vomiting are the result. The principal effect, however, is noticeable upon the nervous system. There is a general feeling of increased physical power, and the mental faculties are exhilarated. The patient at first talks rationally, but is very verbose and grows confidential. Incoherence follows upon this, and then delirium and sopor. The effect is also seen on the cerebellum by the impairment of the power of co-ordination, causing at first the staggering gait, and ending in complete loss of muscular power. When this stage occurs the individual generally falls into a deep sleep, from which it is almost impossible to waken him. When consciousness is restored there is a feeling of depression, which the patient seeks to relieve by a resort to stimulants. Little can be said of the palliative treatment of this variety of intoxication. With the exception of the employment of emetics to unload the stomach, and the administration of ammonia and tea as antidotes, the patient should be allowed to "sleep it off." (For the chronic effect of acro-narcotic poisons, see INEBRIETY.)

EDWARD J. BIRMINGHAM.

**Intrenched Camps.** From the earliest times armies have enveloped by intrenchments positions which they defend or which they temporarily occupy. Such camps or such fortified positions, of which the Romans made frequent and remarkable use, do not, however, constitute what are known at the present day as *intrenched camps*. The term was first applied to intrenched areas connected with, and under protection of, fortified places; it has subsequently been extended to large intrenched areas containing in their centre a fortified nucleus. An intrenched position without nucleus, but defended by permanent works, as that of Lutetia, takes likewise the designation of an "intrenched camp." Camps which, though intrenched, are to be occupied merely for the period of a campaign, or which serve as refuge for a few days only to an inferior army, are styled "lines" or "temporary positions." To the camp of Buntzelwitz and the "lines" of Torres Vedras, constructed by order of Frederick II. and of Wellington, these designations apply.

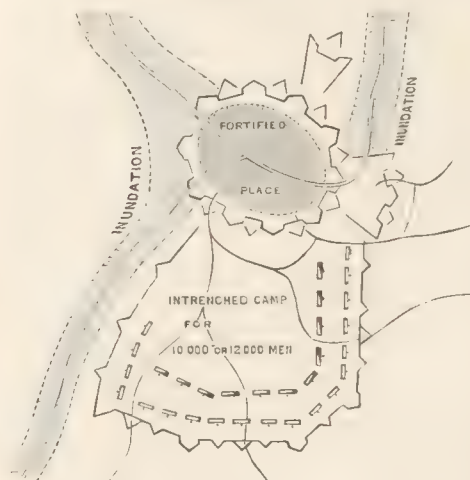
Permanent "intrenched camps," destined to serve as

\* "Campes de séjour" ou "de passage," the French phraseology can only be rendered as above. TH.



pivots of operations or as places of refuge to an army operating in the field, are of modern creation. Not the germ even is to be found in the memoir of Vauban (1696) upon *Les camps retranchés*. In this memoir the illustrious author advocates small provisional camps for 10,000 or 12,000 men, connected with and auxiliary to fortresses. More recent writers, as Montalembert, D'Arçon, Bonsmard, Carnot, Noizet de St. Paul, Dufour, etc., recognized only in intrenched camps an agency for prolonging the defence of places, and of giving to small fortresses properties inherent to those of the first order. Modern strategy has singularly augmented the importance of intrenched camps. In the time of Vauban what were so styled were merely excrescences, so to speak ("annexes"), of fortresses, which consequently played the principal part. "They must," said Feuquières, "be protected by the place which they protect, and their flanks must be secured by the artillery of the place and outworks, and under the fire of musketry from the covered way." Such is exemplified in the typical plan of Vauban in his last work, *Traité de la défense des places*. (See Fig. 1.) The camps of this epoch served to

FIG. 1.



augment the defensive and offensive power of fortresses; and they were, in the language of Vauban, "the surest expedient for hindering the siege of a place."

Modern intrenched camps, on the other hand, have for their sole object the augmentation of the defensive and offensive powers of *armies in the field*; and in them the fortress, instead of being the principal, become only an accessory of so little importance even that, as at Lintz, it is sometimes suppressed, while quite recently distinguished engineers have proposed vast intrenched camps *without* a fortified nucleus. It should be remarked, however, that Vauban took a larger view of the question, and that in connection with the defence of Paris he laid down principles which have since been carried into effect in the construction of intrenched camps destined to serve as pivots of manoeuvres or places of refuge to entire armies. These principles are set forth in his remarkable memoir entitled *De l'importance dont Paris est à la France*, in which are found the fundamental ideas which in 1840 received the sanction of the French legislature in its *ordonnances* concerning the then initiated fortifications of Paris. Vauban counted, however, on having for the defence of that capital an army of only 30,000 regular troops and of 10,000 indifferently good auxiliaries raised within the walls, estimating that this force would suffice to render Paris (provisioned for one year) *inexpugnable* even though besieged by an army of 250,000 men. But in 1840 it was assumed that the capital of France would have, in such an emergency, a much larger garrison; hence the substitution for the external enceinte, proposed by Vauban, of a girdle of large forts with free intervals of 1500 to 2500 metres.

The first engineer to set forth the properties of camps intrenched by isolated works with intervals was the general Rogniat in his work *Considérations sur l'art de la guerre*, published in 1816. "Intrenched camps should be capable," he says, "of containing, at need, 100,000 men, while they demand but few troops for mere defence; they should allow for the army that takes momentary refuge in them perfect liberty of action and free development when it desires to resume the offensive. These conditions are best fulfilled by establishing four forts about each place (fortress), forming an immense square of which the place occupies the centre." "These forts, wholly enclosed,

should be established on the most advantageous summits or commanding points, at distances of about 1200 to 1500 toises\* from the works of the place, and of 200 to 300 toises from each other." "The interval between one fort and the next would form a position of battle for an army of from 50,000 to 100,000 men, which may be considered as *inexpugnable*." "The forts armed with heavy cannon would give perfect support to the wings. As to the centre, where, on account of their distance, the aid of the forts would be little felt, it may be strengthened by field-works thrown up for the emergency and supported by the guns of the place. Thus, these four forts would constitute about the place a vast intrenched camp presenting four different positions of battle, in which to confront a hostile army coming from whichever quarter." The ruling idea of this project is the creation of four fields (or positions) for battle around fortresses, having their wings sustained by forts and their front by field-works. That the idea should be realized, it would be necessary that the four positions constituting the "intrenched camp" should be as they are affirmed to be—*inexpugnable*; which is far from being the case. Small forts 2000 to 3000 toises apart and field-works along the interval would doubtless furnish efficacious support to the centre and wings of the defensive army, without, however, rendering the position *inexpugnable*; especially if the army had fallen back after a reverse, disorganized and shaken in *morale*. The designers of the fortifications of Paris of 1840 have not drawn their inspiration from the ideas of Rogniat; they have preferred rather to improve upon the project of Vauban in substituting a line of forts for the external enceinte of that project. Better advised than the author of the *Considérations sur l'art de la guerre*, they have spaced the forts 1800 and 2500 metres apart, instead of 2000 and 3000 toises, giving at the same time to the detached works more development and defensive strength.

The only intrenched camps established before the publication of Rogniat, and realizing in some degree the combinations now received as essential for the fortification of great strategic pivots, are that of Ulm, which enabled Kray with 80,000 men to arrest for five weeks the advance of Moreau (with an army equal in numbers, but greatly superior in the *morale* of success) upon the Danube; and that of Genoa,† in which Masséna was able with 15,000 men not only to hold his own for two months against quadruple forces, but to harass them incessantly, to pursue them to considerable distances, killing or making prisoners in his different sorties 18,000 Austrians. These camps, more especially those of Genoa, approximated more to modern intrenched camps than that of Buntzelwitz constructed by Frederick II. upon an eminence two miles distant from the fortress of Schweidnitz; more also than that of Torres Vedras, constructed by Wellington from the Tagus to the ocean, covering Lisbon.

The camp of Buntzelwitz was composed of a line of temporary works skirting the crest of the plateau on which the Prussian army had taken position, making a rectangle of about 3000 metres base and 5000 metres depth. Large intervals were reserved in this line to facilitate the exit and entrée of the troops. In advance of all, and upon commanding points, there were lunettes and redoubts for taking in reverse all practicable approaches. This camp, defended by 460 guns, enabled Frederick with 60,000 men to arrest the march of 130,000 Austrians, and finally to compel their retreat (1761). It was, however, rather a *provisional* camp, like those of the Romans, than a *great strategic pivot* in the modern acceptance.

The lines of Torres Vedras approximate more nearly this last type, not only by the disposition of their works, but by the part they played. They were composed of two lines of redoubts. The first had a length of 9½ leagues,‡ and the second, 12 kilometres in rear, a length of 8 leagues. At 25 kilometres in rear of the second line was another intrenchment enveloping the Fort St. Julien, destined to cover, if necessary, the re-embarkation of the troops. When Masséna arrived before these lines in 1810, they comprised 126 closed works, defended by 29,751 men and 247 cannon. In 1812, when entirely finished, there were 152 forts, armed with 537 cannon and defended by 34,125 men. The works of St. Julien had an armament of 94 guns and a garrison of 5350 men.

We have deemed it necessary to give a sketch of these camps, all prior in date to the project of Gen. Rogniat, to show that the last is far from constituting a progressive step, and that, though its author may have been instrumental in bringing to notice the tactical properties of intrenched camps, it is the essay of Vauban on the defence

\* The French *toise* exceeds slightly 6 English feet.—Tr

† A chain of forts had been constructed around Genoa in 1747 to prevent the close investment of the place; thus was constituted the *intrenched camp*.

‡ The French league (*lieue*) is about 2½ English miles.



of Paris which more than any other writing has established the principles applied to the construction of modern intrenched camps. The triumph of these principles was the result of long and arduous discussions, in which the most distinguished engineers of Europe have taken part, and by which the arguments adduced in favor of a system of which the works should consist of a single enceinte have been demonstrated to be untenable. At the present day, when the armies of occupation, instead of consisting of 50,000, as Vauban contemplated, reach three or four times that number, and when mortars of 2500 or 3000 mètres range are replaced by rifled cannon of 8000 mètres range, the last-named system is totally out of the question, owing to the enormous development required for the enceinte. It has become now indispensable to constitute intrenched camps of detached works established at distances sufficiently great to shelter the place which they environ from bombardment.

"Detached works with large intervals, can alone prevent blockade, prevent offensive returns, and oblige the enemy to abandon the position." On this there is no longer question, but not so as to other conditions to be fulfilled. The questions in controversy are: 1st. Ought intrenched camps to be constituted by a line of forts only, or by a line of forts and an enceinte? 2d. What should be the character of the enceinte? 3d. And what that of the intrenched camp? We will examine in succession these questions, which subdivide into several others.

I. Concerning the first. Since the time of Vauban to the present the most distinguished generals and engineers have, with rare exceptions, pronounced in favor of the combination of a line of detached forts and a continuous enceinte. Nevertheless, the recent investments of Metz and Paris have given rise to indications of opinion, sufficiently marked, in favor of the suppression of the enceinte. We must, therefore, discuss the question from the standpoint of governing principles. When there is only a line of forts, or when there is only an enceinte, the decisive battle will be waged (after the fall of one or two of the forts or after the assault of the enceinte) in the interior of the place, and always under unfavorable conditions for the defence. To avoid this, Vauban provided his grand enceinte with a fortified nucleus, which would allow the defensive army to deliver battle outside of the place upon ground well adapted to the action of the three arms. The great utility of enceintes was clearly exhibited in 1870 at Metz and at Paris. There is no doubt that if these two intrenched camps had been destitute of a fortified nucleus, the Prussians might, after the battle of Gravelotte and the combat of Châtillon, have at once made themselves masters of the two cities, and forced the beaten armies to capitulate or to evacuate their positions. The intrenched camp of Lintz (now condemned and partially demolished) is the only one which has not a fortified nucleus.

In the work (by the writer) published in 1865, *Études sur la défense des États*, etc., we suggested, in addition to arguments already furnished by Gen. Jomini and others, the following consideration, which alone would decide for the system of Paris in preference to that of Lintz: "After a fatal disaster, such as those of Ulm, Jena, Leipsic, or Waterloo, it may happen that the defensive army falls back, precipitately and in disorder, on one of the places of refuge or on the fortified capital. In such a case it is by no means impossible that an energetic pursuit may enable the victor to penetrate into the intrenched camp before the beaten army can offer effectual resistance. The wider the intervals between the forts the greater this danger. A new battle must be accepted therefore in rear of the defensive envelope, and as the defensive army must necessarily be, physically and morally, inferior to that of its enemy, it cannot be expected that its advantages of position will counterpoise this double inferiority. Suffering another defeat—this time without places of refuge—it cannot fail to become—men, material, everything—the prey of the victor. An intrenched camp without nucleus is only a line of defence returning into itself; now, every line once forced is irretrievably lost. Hence, the duke of Wellington took the precaution to construct behind his first line of Torres Vedras a second line, and in rear of this last the continuous intrenchments of St. Julien, destined to cover a forced re-embarkation."

In writing these lines it could not be foreseen that the disasters of the French army in 1870 would furnish such vivid illustration of the correctness of the ideas expressed. If Metz and Paris had been fortified only by a line of detached forts, the first of the places would not for two and a half months, the second for four months, have held at bay the victorious German armies. These armies, after Gravelotte and Châtillon, must have penetrated within the line of the forts, closely pursuing the defeated forces, and would have compelled them to lay down their arms, or to continue their retreat in abandoning to their fate the great dépôt and capital which these intrenched camps enclosed.

The existence of an interior enceinte, armed with cannon and proof against assault, sufficed to render impossible this prompt solution.

II. We have now to consider the character which should be given to this enceinte or nucleus. This enceinte to an intrenched camp, destined to serve as a pivot of manœuvre or place of refuge for the army of a great military power, will fulfil all necessary conditions if it be proof against assault ("attaque de vive force"). Such was the opinion of Vauban, of the generals Bernard, Schneider, Paixhans, and Rogniat—of Marshal Soult and of the various "commissions" which since 1818 have been named in France for the study of the defence of Paris. The actual enceinte of that capital is on a greater scale ("à plus d'importance") than necessary. This is due to the necessity of enlisting in support of the project of the government the advocates of an enceinte alone made strong enough for protracted defence. That government might have contented itself with a much simpler and (hence) less costly enceinte. The type which it adopted is not only heavy and costly ("onéreuse"), but at the same time very defective. In fact, it presents high scarps exposed to plunging fires, flanks subject to ricochet, uncovered guns ("à ciel ouvert"), ramparts without traverses or sheltering masses ("abris"), and an interior ("corps de place") destitute of casemates and bomb-proof quarters. As a mere enceinte of support it would have accomplished its purpose at half the expense if it had been composed of rectilinear fronts, each of about a kilomètre in length, flanked by small encongniers, and secured against escalade by a detached scarp.

An exception to the principle just laid down for the constitution of the enceinte may be made in the case of intrenched camps destined as the place of refuge for the troops, in field, of small states, and especially when these camps are near the frontiers. Surprised by a sudden invasion in the midst of preparations for hostilities, the sole army may be defeated or cut off from its pivot. In this case an enceinte is desirable which can be held by the usual garrison alone till the succor of friendly powers be received. Such are the reasons which have induced the Belgian engineers to provide the intrenched camp of Antwerp with an enceinte capable of sustaining a siege.

III. We have now to consider the manner of constituting the perimeter of the intrenched camp. This problem has received different solutions. At times a system of small forts, reciprocally flanking and defending each other, has been advocated; at others, a system of forts each self-defensive. The towers of Lintz, connected by a palissaded covered way, and the little forts of Gen. Paixhans connected by epaulments, belong to the first system. The forts of Paris, of Verona, Cracow, and Antwerp belong to the second. The best intrenched camp being that which offers the greatest resistance to an assault ("attaque de vive force") preceded by a hot cannonade, the system of large forts, self-flanking, is preferable to that of little forts, reciprocally flanking. This last mode of flanking fails to give confidence to the defenders, because it is more distant, more uncertain, and sometimes wholly ineffectual, as at night and in time of fog or snow. The garrison of a little fort will never have a high morale, depending as it does on the ability and vigilance of the commanders of the neighboring forts, and being necessarily weak in its own numbers. For such and other reasons it is now conceded that intrenched camps should be constituted of a line of forts of sufficient magnitude to be self-defensive; but there is yet room to discuss—1st, the dimensions of the forts, their tracé, and their internal organization; 2d, the intervals between them; 3d, their distances from the enceinte.

A fort will possess its maximum value when, while occupying a favorable position, the neighboring forts cross their fires before its fronts of attack. The intervals of the forts must therefore be regulated by the effective range of artillery; this finds a limit in the difficulty of clearly distinguishing troops and works of attack at more than 3000 mètres. Hence, the intervals from fort to fort will be taken at about 2500 mètres, in order to secure a thorough mutual protection; but frequently the nature of the site and the too great multiplication of works justifies a departure from this rule. In this case the following rule is obligatory: *The forts ought not to be so far separated that the guns of the lateral fronts cannot efficiently sweep the intervals.* Under this rule the forts may have about 5000 mètres distance between their axes. In determining the dimensions of the forts and their internal organization it must suffice here to state in general terms that the greater the distance of a fort from its neighboring works and from the place (or nucleus, the greater the strength or power of resistance it should have. In virtue of this principle, to the fort of Mont Valérien, the most remote and the most isolated work of the intrenched camp of Paris, has been given dimensions greatly exceeding those of the other forts. The



distance from the forts to the enceinte must be sufficient to place the enclosed area of the enceinte out of reach of bombardment. Before Paris it proved that the long rifled gun of 15 centimètres (6 inches) calibre of the Prussian system has a range of 7500 mètres (8250 yards), and more recent experimental firings have indicated that still greater ranges must be guarded against. Hence, our intrenched camps should have a depth of 7000 mètres (from enceinte to line of forts), by which there will be about 9000 mètres distance between the enceinte and the enemy's batteries, which cannot be established under favorable conditions nearer than 2000 mètres from the line of forts.\*

So far as there may be choice, the more remote points for locations of forts should be preferred, to give more area and to allow of the troops being encamped out of range of shells; but this choice will be especially determined by the necessity of sweeping with fire all the ground in advance of the line to a distance of 2500 or 3000 mètres. The more perfectly this external zone is exposed the greater will be the difficulty of investment or of regular attacks (siege). Hence, sites in rear of ground furrowed by ravines or wooded should be avoided. To sweep portions of the ground which may escape the action of the guns of the forts, temporary batteries may be thrown up in the intervals, or permanent batteries, according as they may or may not be near enough to effectually protect them. The enormous depth now required for intrenched camps has this advantage, that it renders more difficult the investment; but it has also the disadvantage of increasing the number of the forts, and of exacting for their ordinary garrison too great a proportion of the defensive army.

To the end of diminishing the cost of construction, the armament, and the ordinary garrison, it has been proposed to substitute for the *grand permanent forts* little forts destined to serve as *réduits à grand feu* (or provisional) forts, to be thrown up at the outbreak of war. But this solution, so seductive in appearance, is inadmissible, because the time is, in most cases, not allowed for their construction. The experience of erecting such works at Florisdorf, at Dresden, and at Paris in 1866 and 1870 proves that to construct works of the character required ("*bonne fortification mixte*") six to nine weeks are necessary: now, modern wars run their course so rapidly that it would be rash to count upon being allowed such a period of time. Besides, temporary works are ill suited to resisting a regular attack ("*pied à pied*"), or even a prolonged cannonade. Their parapets of fresh earth offer less resistance to projectiles than those of permanent works; their gun-platforms have less stability, their batteries less command above the natural ground, their ditches less depth, their scarps and flanking batteries less resistance against plunging fires; finally, their traverses, covering masses, magazines, and barracks are weak against the action of rifled projectiles, so formidable for blindages and new masonry. Moreover, the weaker a work is in profile and internal organization, the greater number of troops and guns it needs for its defence. The resort to temporary works is therefore not an effectual means of diminishing the pecuniary expenditure for intrenched camps, nor the number of troops for their ordinary garrisons. It will, then, be proper to construct beforehand the forts of the intrenched camp, and to reserve for the moment of war only the batteries and intrenchments necessary to complete the defences of the intervals. With whatever care the forts be constructed, there will always be some external area which their batteries will not see or will but imperfectly sweep. It will, hence, generally be necessary to throw up epaulements between the forts, not only for this reason, but also in order to divide the fire of the attacking batteries, which otherwise will be concentrated on the batteries of the forts, which they will promptly silence. The experience of the siege of Paris has proved that it is a matter of great importance; it has also proved that these low batteries, thrown up during the siege, the tracé and internal organization of which are unknown to the enemy, are more difficult to destroy than the elevated batteries of the forts.

We now consider the principles which determine the disposition of the works, or, in other words, the *form* of intrenched camps.† The application of the foregoing statement of principles leads to the *circular*, or approximately circular, form of these camps. Such are the intrenched camps of Paris, Verona, Cracow, Metz, Ports-

mouth, and Antwerp; such are likewise to be those which the Germans have, since 1870, decided to construct. The writings recently published in France and England upon the defence of Paris and of London are all based on the same notions. The project of the commandant Ferron, who proposes to surround Paris with a girdle of 37 forts on a perimeter of 32 leagues; that of Gen. Tripiér, who proposes for the same capital, with a *tactical line of defence* (a girdle of forts to protect from bombardment) and a *strategical line of defence* (a line of 150 kilomètres, or 30 leagues development), serving as base of operations to the defensive army when it moves outside of the intrenched camp (properly so called); that of Col. Jervois, for the defence of London (50 forts on a circumference of 4 leagues radius); that of Maj. Paliser of 31 forts on an elliptic perimeter (of 20 and 10 leagues, major and minor axes respectively), are all illustrations. The authors of these projects have removed the forts farther than mere security of the enceinte against bombardment absolutely demands. This is to be commended; where it concerns the defence of a great strategical pivot (the political or military capital of a nation), the capture of which marks the termination of national resistance, an excess of precautions can hardly be taken to retard the fall or to render the attack impracticable. Now, the events of the recent war (Franco-German) have proved that the principal if not the only danger to which intrenched camps are exposed is that of investment ("*blocus*"); an operation of which the difficulties are proportioned to the extent of the zone of investment. To successfully defend an investing line against the sorties of an energetic garrison requires, generally stated, four men to every metre of development. That of the Prussian line before Paris had 83 kilomètres, and the numerical force of the investing army did not exceed 236,000 men, or 2½ men per metre. At Metz the line of investment was about 50 kilomètres in development, and the besieging army had a maximum effective strength of 200,000 men, or 4 men per metre. Doubtless, increment of perimeter for the intrenched camp entails increased numbers of inactive troops (for garrisons), but these disadvantages are largely compensated by the obligation imposed on the enemy to increase the numerical strength of his army by 4000 men for every additional kilomètre of line of investment.

Admitting the great depth of intrenched camps as an imperious necessity, and accepting as a consequence the obligation of separating the forts by intervals of 4000 to 5000 mètres, the question has occurred to us whether a better arrangement might not be made than to dispose the forts on a line enveloping the capital to be fortified. Such a line has the disadvantage of offering the enemy a large gap as soon as he has gained possession of one or more of the forts. To remedy that, we proposed as early as 1863‡ to construct, in rear of the forts, transversal lines of defence, dividing the intrenched camp into several sectors. These lines were composed of a double epaulement, forming a kind of caponnière, the anterior extremity of which was covered by a fort, and the rear extremity was within range of small-arms of the enceinte. That this line (which would sometimes be 3000 or 4000 mètres long) should be defensible throughout (*pied à pied*), it could be interrupted at intervals by redoubts destined to serve as traverses to the double caponnière and to flank the epaulements of which it is constructed. At the epoch when we wrote it was not admissible to remove the forts more than 3000 or 4000 mètres from the enceinte. At the present day, when double, triple, and even quadruple these distances are allowed, the palliative offered by these lines of double defence can no longer be entertained. For this reason, in generalizing the idea we advanced in 1859, to defend London by means of an intrenched camp at Croydon, and three double *têtes-de-pont* on the Thames at Gravesend, Woolwich, and Kingston, we recently§ proposed to fortify great capitals by means of two or three intrenched camps, disposed as indicated by Fig. 2 (abstraction made of topographical features of the ground, which must necessarily influence the form and location of the camps). The three camps would be established with approximate symmetry at such a distance that between the interior forts and the place there would be a zone of 8000 or 9000 mètres (extreme range of the cannons of the place) of width. The movable troops would be encamped or placed in cantonments in this zone, in rear of the camps, or preferably in their intervals. A triple railway and two or three paved roads would unite all these camps. By aid of such dispositions one of the three fractions of the defensive army could, in a single night, be reinforced by the other two, even without recourse to the encircling railways.

The form of these camps, the number, location, and character of the forts, will be regulated by the following con-

\* Peculiar circumstances rendered it practicable to establish the batteries much nearer at Paris, but such will not present themselves in future.

† We necessarily omit here all that concerns the tracé, internal organization, dimensions, profiles, the arrangement of the ramparts and of flanking batteries, and the computation of garrisons, etc., as belonging to a more technical treatment of the subject, and also to that of permanent fortification. (See FORTIFICATION.)

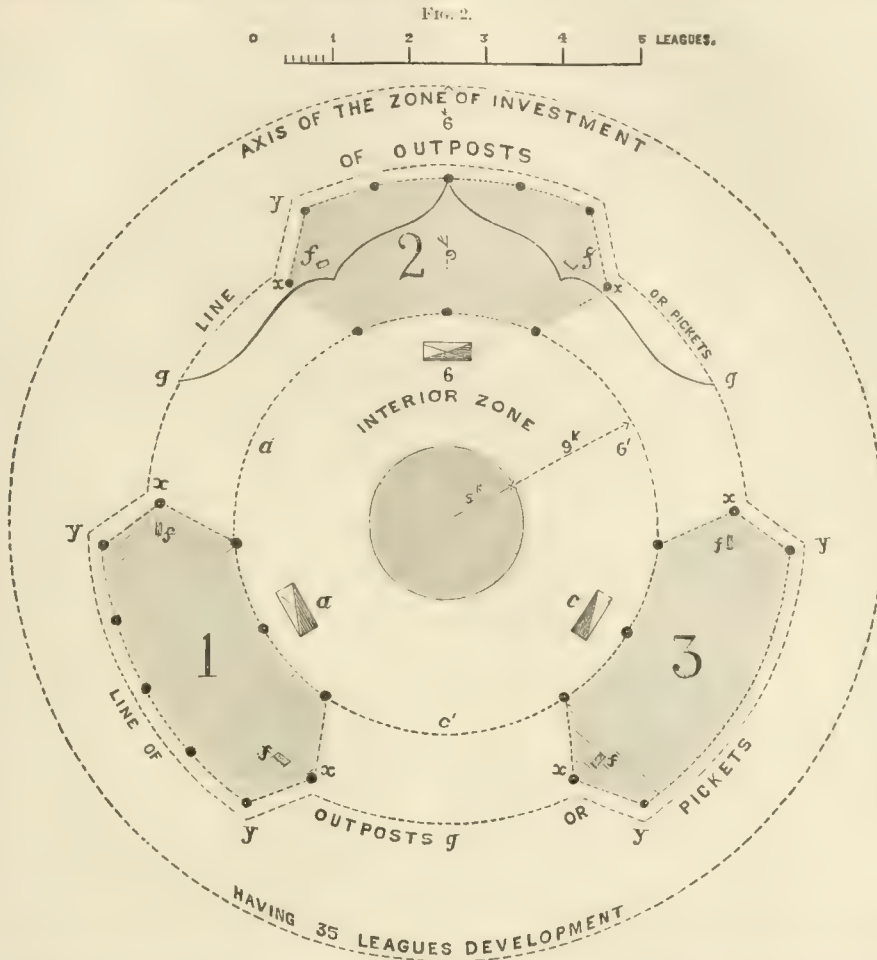
‡ *Étude sur la défense des États, etc.*

§ *Étude sur la fortification des Capitales* (1875).



siderations: A. Each camp will have four sides. The most important, facing the enemy, will be called the *exterior* side; the opposite one, facing the place, the *gorge*; the two

others, facing the intervals between the camps, *lateral* sides. B. The exterior side will be longer than the others, and the forts which constitute it will be the most important; the



intervals will be about 5000 mètres. If for local causes greater intervals be given, one or two permanent batteries, proof against assault, will be interpolated. C. Besides these batteries, there will be provided, in all the intervals of threatened attack, epaulments for siege and light guns to be thrown up simultaneously with other preparations for immediate defence (*en moment de la mise en état de défense*). We recommend likewise the use of low batteries established on each side of the forts, at the foot of the glacis of the lateral fronts in the prolongation of the gorge front. D. The forts of the gorge will be arranged to serve as dépôts of provisions, arms, ammunition, and supplies of all kinds. On account of this destination, and so that there may be in each camp a zone exempt, by distance, from the fires of the attack, these forts will be placed at more than cannon range from the line of the exterior forts. To these forts of the gorge will be given simply that degree of resistance to exempt them from being carried by *coup de main*. They may be placed 7000 to 8000 kilomètres apart. Let us assume that the capital city has a radius of 5 kilomètres, and the central zone 9 kilomètres of depth. The circumference which defines the position of the "gorges" of the camps will have a development of about 84 kilomètres. Giving to these gorges a length of 11 kilomètres, occupied by three forts, and to the exterior sides a length of 20 kilomètres, occupied by five forts, and supposing that the mean distance between the sides be 9 kilos., we shall have the arrangement shown by Fig. 2. The lateral sides are broken intervals, so that the forts  $x, x$  are thrown forward into the intervals, the better to sustain the contiguous forts  $y, y$ . The troops of the defence are divided into three armies of two corps each. One of each of the two corps is employed, alternately, on the external line ("*cordon de surveillance*"); the other is established in close cantonments, or in barracks constructed either in rear of the camps ( $a, b, c$ , Fig. 2), or in rear of the intervals ( $a', b', c'$ ). E. If the zone of investment has 7500 metres of depth, and

if it is 2500 mètres beyond the exterior forts, the axis of this zone will have about 35 leagues of development. Suffice it to say, that it would be impossible for the largest army in the world, and even to an aggregate of several allied armies, to invest a place like Paris, London, Berlin, or Vienna to which has been applied the model plan here sketched.

This plan would doubtless require a greater number of forts than that for a single camp constituted by a girdle of forts, and therefore more expensive, more guns, more troops for garrison; but, on the other hand, it would afford much greater certainty to the defence. In the one case the besieging army after having carried two or three of the forts of the single camp, may crush the army within, and commence his approaches upon the interior enceinte if there be one, or if not, penetrate once into the city. In the other, these operations would be impossible on the hypothesis of a triple intrenched camp; for if the enemy, after taking two or three forts, should seek to penetrate into one of these camps, he would be taken in flank by the forts of the lateral sides and confronted by the forts of the gorge. The defending army may decline battle by withdrawing into the other camps, without detriment to its own safety or that of the place ("*rien d'insécurité serait compromise*"). The besiegers must obtain possession of the lateral forts and of the forts of the gorge in order to make themselves masters of the evacuated camp; then recommence the same operations against the other camps. Such a succession of efforts and of sacrifices would exhaust the most powerful army.

To give the same properties to an intrenched camp constituted by a girdle of forts, it would be necessary: 1st, to provide the capital with a safety enceinte ("*enceinte de sûreté*"); 2d, to construct several *radial* lines of forts from the enceinte to the line of forts, enabling the defensive army to withdraw laterally in order to continue the struggle. These radiating lines, by dividing the single



camp into several intrenched and juxtaposed camps, would realize indeed, though in an incomplete and defective manner, the germinal idea of our model plan. One great advantage of this latter plan is the exemption of the defensive army from the dangerous agitations of the population, and to make its existence independent of the seditions which sometimes break out in the populace before or during the siege; for if there be three camps the capital is not included in any one of them; whereas if there be but one it occupies the centre of that single camp. Finally, when there is only a girdle of forts, the great dépôts of supplies and arms are exposed to the attacks (*coups de main*) of the enemy as soon as the line is pierced by the capture of two or three forts, and to the enterprises of a populace desirous of hastening the surrender by obstructing the defence. On the hypothesis of three isolated camps this double danger is not to be feared, because the dépôts comprised in the forts of their gorges are secured against such enterprises (*coups de main*).

While the armies are operating in open field the garrison of this great central camp ("pivot central") will be made up of the troops essential to the guard of the forts, and of a reserve of three divisions. These divisions will establish themselves in the intervals of the intrenched camps (*a, b, c*, Fig. 2), so that they can be promptly united to confront and repulse hostile corps which might seek to penetrate the capital to lay contributions or to produce a moral effect by a bold dash. The possibility of invading the city after beating the central reserve seems to afford a powerful argument for a safety-enceinte; but there are so many chances against such an enterprise—which, besides, if successful, is so little decisive—that this possibility need not be dwelt upon. It may, too, be guarded against by throwing up intrenchments in time of war covering the most exposed portions of the perimeter, as a substitute for a safety-enceinte.

[Translated from the French MS. of GEN. BRIALMONT by J. G. BARNAUD.]

**Intro'it**, in sacred music, a composition for voices to be sung or chanted while the officiating minister is entering within the railing of the chancel.

**Intussusception**. See **ILEUS**.

**In'ulin** ( $C_6H_{10}O_5$ ), a substance isomeric with and similar to starch. It is widely distributed in plants, occurring especially in the roots of elecampane, dandelion, chicory, feverfew, meadow saffron; in the tubers of the potato, the dahlia, and the Jerusalem artichoke; in *Serp mauna*, in certain lichens, and probably in the seeds of the sunflower and of mustard, etc. It is prepared by washing the rasped root on a sieve, and allowing the inulin to settle from the liquid, or by boiling the sliced root with water and filtering while hot; the inulin separates on cooling. The juice of dahlia-tubers pressed in the winter becomes semi-solid on standing from the separation of inulin. Inulin is a soft, white, tasteless, odorless powder, resembling starch, which it appears to replace in plants. Unlike starch, it exists in plants in a solution which has the consistence of a thin oil. If a slice of the plant is soaked in alcohol, the inulin separates in spherical granules which can be recognized by the microscope. It is very hygroscopic, and adheres to the teeth and to moist paper. It is but slightly soluble in cold water, freely in boiling water, from which it separates, on cooling, without forming a jelly. It is insoluble in alcohol, which precipitates it from its solution in water. Heated with water, it is changed slowly to levulose (= grape sugar). Dilute acids change it to sugar even in the cold. Inulin is not altered by diastase nor by other ferments. It is colored brown by iodine, is soluble in cuprammonia and in nickelammonia, and it reduces salts of lead, copper, and silver. C. F. CHANDLER.

**Inunda'tions, Mar'itime**. The sea, not content with the sacrifices which it exacts from those who voluntarily throw themselves upon its mercy, often wages battle with man on his own domain. So terrible have been the disasters caused by the unforeseen overflow of the ocean waters that even races of men otherwise most destitute of historical records date their origin from some great flood. The mythic narratives which tell of such show often so curious a conformity to those of the biblical deluge that theologians do not hesitate to receive them as concurrent evidences of the same event. The most noted of these are the floods of XYSYTHUS, OGYGES, and DEUCALION (for which consult those titles). Of the revolutions which have caused the formation of great islands and large seas we know nothing. The evidence adduced in proof of the recurrence of what is called the Cimbric flood (that which is said to have insulated England, and to have considerably changed the condition of the lowlands of Holland) amounts only to a vague statement by Ephorus (B. C. 350) and Clitarchus, that the Cimbrians were driven from their seats by a cataclysm of this kind. As Ar-

istotle mentions that the Celts opposed the floods with arms, and as several ancient historians record the continual encroachments of the sea, this mythic Cimbric flood must be presumed to have been made up of several of greater or lesser magnitude occurring in pre-historic times, by which England was at length severed from France and a communication was opened between the ocean and the North Sea. This channel once established, the tidal currents tended to increase its breadth till natural barriers arrested the process. The Netherlands, presenting no such barriers, would have been totally swallowed up but for the forming of "downs" from the sand cast by the waves upon the shore. These downs, however, furnish only a partial and temporary protection. The sands, chased by the sea-winds, encroach farther and farther upon the fertile plains, forming new lines of downs, and the sea advances in their rear. Two centuries ago foundations of villages and of Roman castles, laid bare at a time of extreme low water, furnished visible evidence of the magnitude of such encroachments even within the historic period.

Since the coasts of the Netherlands are the most exposed of the Northern lowlands to the predominating north-western winds, it is not surprising that they have suffered most from inundations, or that many of these have effected extraordinary changes in the face of this country, while others, more numerous, though less destructive, have plunged the inhabitants for the time being into inexpressible wretchedness. It is to geology, and not to history, that we must look for information as to the earlier and more formidable of these catastrophes. The map of the Netherlands shows the coast to be sheltered by a line of downs, which also extends along the seaward shores of the islands at the entrance of the Zuyder-Zee. This Zuyder-Zee in pre-historic ages was much larger than at present, but its mouth became gradually obstructed. The existing belt of islands are the remnants of what was then continuous coast; the Zuyder-Zee subsided into a lake, of which the area was rapidly reduced by the deposits of the Rhine, which probably discharged into it the greater part of its waters through the Yssel, and perhaps some other branch (of which only dubious vestiges remain). Thus, this lake, then called Flevo, dwindled rapidly, and would have totally disappeared but for the storms of the tenth and twelfth centuries, which battered large breaches in the line of downs, submerged the greater part of the newly-formed land, and, gradually reopening the channels between the islands, caused the Lake of Flevo to expand again into the Zuyder-Zee. For though the inhabitants, now considerably advanced in civilization, did their utmost to restrain the waters, they found their toil and skill alike ineffectual, and many towns, villages, and monasteries were swallowed up for ever.

At what period dikes were invented as a protection against floods is not certainly known; the Romans may possibly have learned their use from Egypt; they certainly employed them as causeways over marshy lands. Tacitus informs us that Nero's lieutenant, Pompeius, constructed a dike to prevent the overflow of the Rhine, and the aborigines of Germany sometimes flooded the country by barring the rivers in order to prevent invasion. It appears that the province of Friesland was diked in the seventh century by King Adgillus; the province of Zeeland was diked by the Danes and Goths in the eighth century; while Oldenburg was enclosed about 984 by Count Otho. Earlier, the natives lived on small hills or elevations called "terpen." Such a "terp" offered a place of security for men and cattle, and such exist still in some parts of this country, where recently a certain number have been erected by order of the government to serve as temporary refuges in case of the failure of the dikes.

Of the storms which have caused notable revolutions, the first recorded in authentic history is that of 860, which carried away a great part of the western coast of the Netherlands, and gave a more southern direction to that branch of the Rhine which formerly discharged its waters near Catwyk. On St. Michael's Day, 1011, a great part of England and of the Netherlands was flooded. In 1134 a part of Flanders was swallowed up. Of the coasts of Friesland (which then consisted of the Dutch provinces of North Holland, the Zuyder-Zee, Groningen, Friesland, part of Hanover, and Oldenburg), a certain part disappeared during the St. Juliana's flood of 1164, and all the lowlands of the Elbe and the Weser were submerged. Still more disastrous was the All Saints' flood of 1170, the first of that name. The formation of the Zuyder-Zee and the separation of Texel and Wieringen are erroneously attributed to this calamity, for the Zuyder-Zee had been already formed by more ancient floods, and the islands were more recently severed.

In continuing this enumeration only the more important

\* Dutch downs, Fr. *dunes*.



of the almost numberless floods mentioned in the annals will receive attention. In 1219 occurred the Marcellus flood, which was only of temporary character; but in 1277 the gulf of the Dollart at the mouth of the Eems was formed, while in 1362 the Mandrankels flood (the "men-drowning" flood) snatched away more than 30 villages on the coasts of Sleswick (Nordstrand). The gulf of Brielvliet in Dutch Flanders, then much wider and deeper than at present, was formed in 1577. But the most disastrous flood by which in later times the Southern Netherlands have been visited was the (second) St. Elizabeth flood, which formed the Biesbosch, submerged 72 villages, changed totally the lower course of the Rhine and Maas, and altered so profoundly the conditions of these rivers that its influence is still felt, though modified, and in a measure controlled, by costly engineering works constructed in later years. This disaster resulted from the combination of a maritime and a fluvial inundation. The branch of the Rhine called Waal previously to that event discharged its waters near the town of Briel, and formed with the other branch, called Lek, the outlet of the Maas. It now took the much shorter direction of the outlets of Brouwershaven and Hellevoetsluis, where, moreover, the tide-range is greater amounting to 20", while at Briel it is only 10-8". The fall per mile of the Waal being thus superior to that of the Lek, the Rhine was drained by the former, while the latter grew shallow. On this account the wide outlet of the Maas gradually filled, and the communication of Rotterdam with the sea became seriously impaired. In 1410 a flood occurred which formed in the Zuyder-Zee a practicable channel for vessels of heavy draught between Enkhuizen and Amsterdam, and thus gave to the latter town its commerce and its importance. Till then, the southern part of that sea had been too shallow to allow more than a limited traffic, which was confined to the then flourishing cities of Hoorn, Medemblik, and Enkhuizen.

From this time onward, though the floods increase in number, their violence diminishes and their effects are less disastrous. Thus, the flood of All Saints' Day, 1570, though only surpassed in magnitude by that which occurred in 1170 on the same day, destroyed no land, though it submerged Bruges, Antwerp, almost all the islands which form the province of Zeeland, Dordrecht, Rotterdam, Amsterdam, part of the provinces of Friesland and Groningen, the coast of Oldenburg, Bremen, and the city of Hamburg, and drowned at the lowest estimate 30,000 inhabitants. Before the breaches of the dikes could be stopped new storms flooded the country, and within the eight years ensuing the unfortunate provinces of Groningen and Friesland were not less than six times partially submerged. These continually recurring disasters must be attributed in great measure to the bad state of repair in which the dikes were kept. Notwithstanding its importance, this matter had never been well regulated. Every village being independent, there existed no authority competent to coerce the delinquent, and so the negligence of some proved the ruin of all. Later, the Dutch republic was impotent to establish proper co-operation, and in such a state of affairs the iron hand of a Napoleon was needed to reduce the petty magistracies into obedience to a common superior. The new regulations established by him produced results so satisfactory as to ensure their permanence; and, though there still arise frequent disputes concerning this vital point of Dutch economy, the state usually succeeds in accomplishing the projects of improvement which it proposes.

The Spanish domination, though generally so disastrous to this country, proved in 1578 of singular benefit to the Frisians; for the Spanish governor of Friesland, the eminent engineer Gaspar de Robbes, lord of Billy, addressed himself with great energy to the repair of the dikes, employing his soldiers in the work, and forcing the Frisians to postpone their differences and ply the spade. Many farmers and landowners pleaded exemption, supporting their claims by ancient titles and patents. Robbes took these deeds and cast them into the crevasse, saying, "There they go: if they stop the gap, 'tis well; if they don't, you shall." Robbes further increased the strength of the dikes by giving them a height of 12 feet, and a breadth at summit of 6 feet, with slopes of 4:1 on the seashore, and of 24:1 on the land-side. As much greater dimensions than these are given at the present day—viz.: a total height of 15 feet, with slopes of 6:1 and 24:1 respectively, the dikes being also strongly protected at the sea-side by palisades and breakwaters—we can easily account for the comparative immunity from disastrous floods enjoyed by these countries in recent years.

In 1607 the county of Somerset (England) was partially flooded, but a much more serious calamity befell the Danish domains in 1631. Part of the coast, called Nordland and its villages, which, though often destroyed, had as often, with undaunted resolution, been again rebuilt, was swept

away, together with the greater part of the population (11,058 people and 66,337 cattle). Hamburg, Bremen, and the coast of Oldenburg were also much injured. More than 10,828 human beings and 90,000 cattle were drowned. In the great Christmas flood of 1717, which covered the whole northern coast, and even some parts of England, 5000 dwellings were totally and 3500 partially ruined. Owing to the prevalent neglect of repairs already mentioned, the years 1718, 1719, and especially 1720, saw these countries flooded again. The most recent inundation of importance was that of 1829, in which the waters reached a height which was not ascertained. This flood in several respects differed from any recently observed before; and on that account it has been ascribed, with a semblance of probability, to a submarine earthquake. Similar particulars had been recorded in ancient chronicles, but as no modern observation had confirmed them, they had passed into discredit. The sea-water was very muddy, and seemed as if boiling; the waves were not high, but short and eddying; the wind, W. N. W., was not violent; and finally the position of the moon was not such as to favor an extraordinary tide. Some days before the event certain springs dried up, and others became muddy, yellow, and brackish. Large fragments of amber were also cast up on the coast of Jutland. Facts corresponding to these had been observed during the floods of 1600 and 1665, during the Christmas flood of 1717, and finally in 1755 during the famous earthquake of Lisbon. The principal effect of this most recent flood was the insulation of the northern part of Jutland.

The floods thus far noticed are such as have been caused by storms and high tides, accompanied usually by wide destruction, in which multitudes perished and other multitudes escaped only with their bare lives, the inundations ordinarily occurring during the night. But, besides these, there are others which, though local, are not unattended with danger, and which deserve a moment's attention. These are the inundations which threaten especially the coasts of the tidal rivers. The powerful streams which separate the islands of Zealand and of part of South Holland, being connected with the Scheldt, the Rhine, and the Maas, form large estuaries, which at flood-tide are filled with the water of the North Sea, and during ebb discharge the flood water along with the drainage, the tide-water varying between 3 and 4 metres. Strong currents, especially during ebb, accordingly prevail in these streams, undermining the southern shores of the islands. By observing the direction of the ebb from N. E. to S. W., while that of the flood is opposite, we are enabled to account for the fact that all the islands are attacked in the same way and exhibit the same form—viz. a concave S. and a convex N. coast, the latter augmenting by the undisturbed deposit of the rivers and the detritus of the southern shores. The W. coast of the province of Holland is attacked in a similar manner, though with less force, the sea-currents not being confined within narrow channels. The system of coast-defence of the Netherlands must therefore embrace two distinct objects—defence against currents, and defence against high seas and storms. The coasts of Friesland, Groningen, and the Zuyder-Zee need only protections of the latter class, while the dikes and downs of the W. coast of Holland and those defending the islands must be considered from both points of view. This portion of our subject is reserved to be treated under the head of LEVES (which see). P. CALAND.

**Inundations and Floods of Rivers.** These two terms are often used as synonymous, but they are conveniently distinguishable, thus: an *inundation* is the state of a river when its waters rise to such a height as to spread beyond its normal channel, overflow its banks, and cover the low grounds along them; a *flood* is the condition of a river when its current, though rising above its mean level and filling the canal which it has excavated for itself, still remains within its banks, or, in other words, is "without overflowing, full." Perhaps the nearest approach we can make to precision of distinction is to say that a flood becomes an inundation when the stream rises sensibly above its mean high-water level, and spreads in considerable volume beyond the limits of its natural channel as bounded by the growth of spontaneous perennial land plants. It is, however, impossible to draw any sharp line of discrimination between floods and inundations as applicable to the whole course of rivers, because a river may be confined by high banks at one point, bordered by low land at another, and these riparian conditions may be altered many times in the same stream; and hence it may be simply at flood in certain parts of its channel, in inundation at others. Using the words in the general sense we have ascribed to them, a flood is ordinarily a beneficial state of a river, because its supply of water for mechanical power, for feeding canals and aqueducts, and for navigation is then ample, and yet not in excess. The augmented volume and



velocity of the water are, especially in new countries, a considerable advantage to navigation, because they particularly favor the downward trade, which is ordinarily the heaviest, if not the most valuable, and they not unfrequently render a further useful service by preventing the closing of the stream by ice. Hence, measures have often been proposed, and sometimes adopted, for keeping rivers permanently at flood by introducing into them additional supplies of water from lakes or artificial reservoirs, or by the diversion of other water-courses into their bed. Thus, the Illinois Canal, when enlarged, will furnish the means of maintaining at all desirable seasons a flood-level in the Illinois, and even perhaps in the Mississippi; and it is believed that a judicious husbandry of the natural sources of supply of the Hudson and of the waters of some of the Adirondack lakes may be made in the same way greatly to improve the navigation of the upper portion of that important river.

Inundations of great rivers, when they are of regular character both in volume and in periodic recurrence, are often not merely highly advantageous to human interests, but even essential to the permanent occupation of their banks by man. Of such rivers the Nile is the type. The seasons and the height of its rise are approximately constant, and therefore readily foreseen; the inundation saturates with moisture the alluvial plains along its banks, and it deposits on them a supply of organic and mineral sediment abundant enough and fertilizing enough to render the artificial application of manures in general superfluous. But even here nature must be aided by human art, and from the earliest ages the Egyptians have employed dikes and canals for retaining and distributing the waters of the inundation. (See NILE.) The more irregular inundations of smaller rivers sometimes render similar service to man, but with few exceptions river inundations are a highly destructive agency; and it is principally in this light that we shall consider them. The river-inundations of modern times, in both America and the Old World, even if not more frequent or more violent than those of earlier ages, have been more disastrous, because in many cases the beds of the streams have been elevated by sedimentary deposits faster than their banks, and because greatly augmented and more diversified moral and material interests are affected by them. Larger towns, vaster mechanical establishments, as well as agricultural and commercial arrangements, great networks of canal, railway, and telegraphic communication, more numerous common roads and bridges, are now exposed to their ravages, and of course the social interests endangered by them are immensely multiplied. While, then, floods are to be promoted, inundations are to be controlled and as far as possible prevented. The best method of effecting this is a very complicated problem, and for various reasons—among which the fact that the sources of considerable streams are often in one State or Territory, their middle and lower courses in another, is the most familiar—the contrivance of systems applicable to the entire flow of rivers has but recently engaged the attention of engineers, and it is not yet even theoretically completely solved.

The means of defence against river-inundations are divisible into two classes—the preventive and the remedial, the former being designed to operate against their causes, the latter to protect valuable interests against their effects. The immediate cause of river-inundations is the discharge of water into river-channels faster than those channels can carry it off. The insufficiency of the channel for this function may be occasioned—(a) by excess of supply; (b) by obstructions in its bed; or (c) by the reduction of its inclination. (a) The excess of supply may be due to abnormal and exceptional causes, such as the bursting of the barriers of natural or artificial accumulations of water, lakes, reservoirs, or mill-ponds, but it is usually derived from rains and melting snows; and as a general rule it may be said that it does not proceed from the down-fall in the great valleys which border the middle course of the stream, but from winter snows or equinoctial rains in the smaller basins of the upland tributaries, whose inclination is more rapid, whose fan-like expansion embraces a wider surface than that of the main valley of the general recipient of them all, and which, moreover, often lie in elevated regions where the precipitation is greater than on the plains. The flow from the uplands is probably in the largest proportion superficial, but it is now known that great quantities of mountain-water sink to a moderate depth into the earth, and then descend, by infiltration or other underground conduction, to lower points in the basins, and are there discharged into the river-channels. High water rarely occurs at the same time in all the tributaries of large rivers, but there are instances, as the Seine and the Po, where the floods of the affluents are usually contemporaneous, not successive, and inundations of rivers are generally destructive in proportion to the degree of coincidence in the floods

of their tributaries. (b) Obstructions which reduce the capacity of delivery of water-courses may be artificial, as the piers of bridges, dams, weirs, riparian spurs or wing-walls, the waste from mines and metallurgical establishments, or they may arise from the natural deposit of terrestrial sediment in the channel, from the caving-in of the banks, from the accumulation of trunks of trees and other floating matter lodged on shoals, from the growth of aquatic vegetation, or from ice, which sometimes forms almost complete though temporary barriers in both European and American rivers. (c) The inclination of the bed of a river may be reduced by geological upheaval of its outlet or its lower course, by the filling-up of its estuary by its own deposits or by sand washed in by the sea, and sometimes by the elevation of parts of its bottom from sand or earth let fall in consequence of the checking of the velocity of its current from changes in the course of the channel, or as a result of artificial processes of improvement.

A preventive system applicable to the whole course of a stream would commence its operations at or near the sources of the tributaries, and its general aim in this division of the work would be first to check the discharge of surface-water into those tributaries by planting the declivities of the valleys with trees or shrubs, terracing their hillsides, running low embankments across sloping grounds, collecting the water in small reservoirs, and in short by any measures which tend to detain the water of precipitation a certain time upon the surface. In agricultural and populous districts the adoption of this part of the system cannot be general, because it would conflict with many indispensable arrangements of improved rural economy and civilized life. Agriculture requires a general grading or smoothing of the ground by filling up small depressions of the soil, and the removal of stumps, clumps of shrubs, rocks, little ridges, and other impediments to the plough, and it must be drained by superficial or underground conduits; railways and common roads must be provided with ditches; streets must be paved or otherwise made impervious to water; and habitations and other buildings must be covered with roofs, which shed all the precipitation that falls upon them. All these artificial contrivances tend powerfully to promote the flow of surface and ground water into the natural channels of discharge; and in the opinion of some able inquirers they are the most active of all causes of inundations in highly improved countries. Hence, in such countries there is great difficulty in reconciling the adoption of the measures we speak of with interests not less important than those they are designed to protect; and in most cases we are reduced to a question of choice of evils. Some of them, nevertheless, such as clothing hillsides too steep for cultivation with trees or shrubs, *circling* or terracing rapid declivities, and the temporary flooding of fields by means of low ridges or embankments, are widely applicable not only without injury, but with positive benefit to agriculture. The next step should be to retard the flow of the current in the lesser affluents by dams, barriers or traverses, heaps of rocks, and impediments of every description. Such measures are of course applicable chiefly to the smaller rivulets in upland districts, and at points where, from the character of the channel and other circumstances, no evil consequences are to be apprehended from their adoption.

Thus far, the immediate aim is to retain the water on the surface or in the beds of small affluents, but when we come to larger tributaries bordered by fields, towns, and industrial establishments, and especially to the main trunk, the direct object is reversed, and increased velocity, and of course delivery, quite down to the point of ultimate discharge, is sought to be promoted. This is effected by the removal of rock, sedimentary deposit, and, so far as practicable, all other obstructions in the bed, by confining the channel to narrower limits at convenient points, and by excavating a deeper canal within it, and especially by cutting off loops and bends in its course, and thus at once diminishing the length and increasing the inclination of its bed. (See RIVERS, REGULATION OF.) Although measures are in progress in France and elsewhere for the application of these and other subsidiary processes to the entire flow of rivers, and though there is no doubt that the violence of inundations might be greatly mitigated, if not wholly prevented by such means, yet thus far we do not know that the system has been applied to the whole course of any great river; and in general, effort is directed, not to the prevention of inundations, but to the confinement of their spread within certain limits. Various plans have been suggested for this purpose, among which the creation of great reservoirs for receiving the overflowing waters is one of the most specious, because it is an imitation of the economy of Nature, who so often hollows out great lakes on the upper courses of rivers, and sometimes accumulates within them flood-water enough to drown the whole country



below, but for the check they oppose to its too rapid discharge.

**Remedial Measures.**—For reasons which cannot be given here, the method of reservoirs is capable of only exceptional application, and in the present state of our knowledge and our means we must, in most cases, content ourselves with such palliatives as are afforded by dikes or embankments high enough and solid enough to protect the grounds they enclose, or rather front, against encroachment by high water. Embankments have been employed from time immemorial in the East, and the recently constructed dikes or levees of the Mississippi are among the grandest modern works of hydraulic improvement. But the *argini*, or embankments of the Po, are perhaps the oldest with which we are thoroughly acquainted, and the theory and practice of embanking as a defence against river-inundations have been more exhaustively considered and more skillfully applied in Lombardy than elsewhere, though in the classic studies of Humphreys and Abbot on the Mississippi we have now a work not surpassed in the whole compass of potamological literature. The embankments of the Po are substantially parallel to each other and to the axis of the river, but they do not follow all its windings, and for the sake of pursuing a shorter course, and at the same time allowing greater space for the swelling waters, they sometimes diverge so far from the channel as to leave a space of three or four miles, often including valuable cultivated land, between them. Their height and thickness are regulated by the varying level of the ground and the force of the current as known by experience; but they are designed to be everywhere sufficiently elevated and sufficiently solid to confine the waters within the limits which they enclose at the highest level to which the river ever rises. They are composed of earth, and with rare exceptions not *revetted* or faced with stone or protected by sheet piling, but simply turfed or planted with willows. In general, they serve as an efficient protection to the land behind them, but there have been numerous cases of breach or crevasse followed by disastrous inundations. (See Po.) This method of defence against inundations is objectionable chiefly on these grounds: The construction and maintenance of embankments involve a great original and annual expenditure; by confining the current they increase its velocity and transporting power, and hence it conveys to the lower course and outlet of the river a larger quantity of sedimentary material, which tends to fill up its estuary and raise the level of its bed; for the same reason, the grounds which skirt the river are deprived of the fertilizing matter which the inundations would spread over it, and which would at the same time raise their surface in proportion to the rise of the river-bed; they interfere with roads and the convenience of navigation; and, in spite of every precaution, they will occasionally burst, and in such case inflict far greater injury on the adjacent country than would be caused by any natural inundation.

Many engineers are now of opinion that the system of high continuous embankments ought to be abandoned, and low dikes, barely sufficient to keep the current from overflowing at every slight elevation of its level, substituted. In great inundations, then, all the lowlands along the banks would be overflowed, and both enriched and gradually raised by the sediment deposited by the water. This plan is recommended by powerful reasons, and where high dikes have not already been constructed and rural arrangements accommodated to them, ought, no doubt, in very many cases to be adopted.

Lombardini, the highest authority on this subject, lays down the following propositions on the subject of river-embankments: The immediate effect of embanking a river is generally an increase in the height of its floods or inundations, but at the same time a depression of its bed; the current, by reason of the increased velocity resulting from its confinement, transports coarse material farther; the embankment of the upper tributaries of a river increases their velocity and delivery, and therefore augments the height of the inundations in the middle and lower course; embankments, before the bed of a river becomes established and constant, ultimately tend to raise its level; the embankment of the lower course of a river causes the elevation of the bed, both as a direct effect of increased deposit and because the deposit at and near the point of discharge into the sea prolongs the course, and consequently diminishes the inclination of the bed and the transporting power of the current.

The literature of this subject is very voluminous. Especially deserving of notice are the many hydrological essays of the eminent Milanese engineer Elia Lombardini, among which we particularize—*Impugnazione degli Studi sulla Statistica dei Fiumi; Dei Congiungimenti e soprattutto l'antichissima condizione del Po; Sulla Inondazione avvenuta nella Francia; Dell'Origine del Progetto della Scienza Idraulica in Italia;*

*Guida allo Studio dell'Idrologia; Champion, Les Inondations en France* (Paris, 1858-64, 6 vols. 8vo); the very valuable *Report of Humphreys and Abbot On the Physics and Hydraulics of the Mississippi River* (1861, folio); and *The Earth as Modified by Human Action*, by the present writer (New York, 1874, 8vo); in enumerating which works we refer also to the numerous authorities cited in them. (On the whole subject see RIVERS, REGULATION OF; for historical notices of memorable river-inundations, the articles on the rivers where they have occurred; and on inundations by the sea, and defences against them, see INUNDATIONS, MARITIME.)

GEORGE P. MARSH.

**Invalides', Hôtel des**, at Paris, was founded in 1671 by Louis XIV., and served until 1775 both as an asylum for maimed and wounded officers and soldiers, and as a refuge for the old servants of the courtiers. At present it affords quarters for some thousands of disabled soldiers. It is a stately building and contains the tomb of Napoleon I., whose remains were placed here in 1810.

**Inv'a'riable Plane, The**, a term of theoretical dynamics, used pre-eminently in regard to the solar system. There is in mathematical relation with every system of material particles, subject only to their mutual actions and to forces directed towards a fixed point, or a point in uniform rectilinear motion, a certain plane passing through the point which preserves a fixed direction in space, remaining absolutely fixed if the point remain fixed, and moving parallel to itself if the point move; and which Laplace, who made it the subject of a memoir, named the *invariable plane* of the system. To obtain an idea of the characteristic property of this plane by which it is determined, suppose lines (called *radii vectores*) drawn from the point in question to each of the different particles of the system, and then projected orthogonally upon any plane passing through the point. These several projections will vary in length as the direction of the plane on which they are made varies, and the areas described by them on the plane during any given time, in virtue of the motions of the particles about the point, will therefore also vary. Now, attributing proper signs to these areas, according to the directions in which the lines describing them move about the point, there is, among the infinite number of planes passing through the point, one for which the algebraic sum of the products formed by multiplying the area described by the projection of the radius vector of each particle by its mass, is greater than for any other, or a *maximum*. This is the *invariable plane* of the system. On account of the property just stated it is often called the *plane of maximum areas*. Knowing the masses and motions of the particles, the position of the invariable plane relative to assumed planes of reference passing through the origin of radii vectores can be determined at any time by the appropriate mathematical formulæ. If there are no extraneous forces acting on the system, any point in space may be assumed as an origin, and an invariable plane be determined for the system relative to it, in the same manner. The different planes which may thus be determined for the same system with reference to different assumed points are all parallel. The existence of the invariable plane, it will be observed, is independent of the law of action between the particles and of the law of the extraneous forces, and it preserves its constancy of direction whatever changes take place in the system under the action of the specified forces. Theoretically, the particles of the system may be isolated or aggregated, and, if aggregated, in any manner. In a system of natural bodies the rigorous determination of the invariable plane depends upon the figures of the bodies, and the laws according to which their density varies in their interior, as well as upon their masses.

*The Invariable Plane of the Solar System.* The theory of the invariable plane derives its chief interest from the application Laplace made of it to the solar system. The fundamental planes to which astronomers refer the positions and motions of the heavenly bodies are subject to slow secular changes; and even the stars, which we ordinarily call fixed, and which would seem to furnish us with natural points to which to refer these changes, have themselves been found to have small "proper motions." Considering these circumstances, and the embarrassment he anticipated astronomers would one day experience in consequence of them in comparing observations made in widely separated ages, Laplace suggested that the invariable plane of the solar system, determined relative to the centre of the sun, might be used as one of reference in ascertaining these changes, and calculated its position with reference to the ecliptic at different epochs. It is implied, in speaking of this invariable plane, that Laplace considered the solar system in his calculation an independent one, subject only to the mutual action of its members; or, in other words, that the action of the stars upon it is in-



sensible. He also neglected the comets, whose masses are unknown, but which he had good reason to believe very small. Lastly, he supposed the masses of the sun and the planets concentrated at their respective centres of gravity—the satellites, with their primaries. This last supposition, though not in strict accordance with the rigorous theory of the invariable plane given above, obviated an insuperable difficulty in applying immediately the latter to the case in question, arising from our ignorance of the laws according to which the densities of the bodies of the system change from their surfaces inward, and was regarded by Laplace as furnishing an adequate approximation. The result of his calculation upon these suppositions places the invariable plane with reference to the ecliptic at the beginning of 1750 as follows:

Inclination of the invariable plane to the ecliptic at this epoch.....	1° 35' 31"
Longitude of its ascending node.....	102° 57' 15"

The results of his calculation for the epoch of 1950 agree very closely with the foregoing.

Since the time of Laplace the planet Neptune has been discovered, and a multitude of asteroids. Different masses have also been assigned to the planets from those he used. Stockwell in his memoir on the secular variations of the orbits of the eight principal planets, recently published by the Smithsonian Institution, adopting masses received at present, including that of Neptune, and using the formulæ of Laplace, makes the position of the invariable plane with reference to the ecliptic at the beginning of 1850 to be as follows:

Inclination.....	1° 37' 19".4
Longitude of ascending node.....	106° 14' 06"

Stockwell's calculation, it may be added, does not include the asteroids, whose masses are unknown, but believed to be in the aggregate small.

The eminent geometer Poinsoot made the formulæ of Laplace the subject of considerable criticism, maintaining that in treating the sun and planets as massive points, and in thus neglecting the areas proceeding from the rotations of these bodies upon their axes, and from the revolution of the satellites about their primaries, he had not only failed to determine a truly invariable plane, but one even whose variations could be neglected in comparison with those which it should make known. Poisson and Pontécoulant, on the other hand, hold that the analysis of Laplace nevertheless determines a plane practically invariable, which was all he had in mind to do. It would require some space to give a just view of this difference of opinion; here, we can only refer to it.

Poinsoot gives a rigorous rule for determining the truly invariable plane, if there be one, which he proposes to call the equator of the solar system. But the unknown laws of density previously referred to entering it in the form of the moments of inertia of the bodies of the system, it does not furnish the means of an immediate determination. Poinsoot suggests, however, that by forming, at different epochs sufficiently separated, certain equations in which the masses and moments of inertia of the bodies considered appear as unknown quantities with coefficients furnished by observation, these unknown quantities may ultimately be found, and thus the data obtained for the determination desired. This method, if actually applied successfully, would, as Poinsoot observes, furnish us the masses of the bodies of our system independently of the Newtonian law of gravitation, from which we derive our present knowledge regarding them. Repeated determinations of the invariable plane made in this way with precision would show by the accordance or discordance of their results whether we were right in our original assumptions regarding the system, or whether we had neglected actions which for long periods ought not to be disregarded.

But if a truly invariable plane were exactly found for our system, in the present state of our knowledge it would after all be of limited utility for the purpose for which it was proposed. For, supposing it actually located in the heavens, it could of itself only serve to verify and determine motions perpendicular to it, or, as we may say, changes of *latitude*. To determine motions parallel to it, or, as we may again say, changes of *longitude*, we should further need to know a right line of invariable direction in the invariable plane whence to estimate the angular value of such motions. To make it truly useful, we should also be able to determine precisely the position at any time with reference to it of the present natural planes of reference, such as the equator and the ecliptic, so that positions referred to these might be reduced to it when desirable. Now, to do this we should equally need the direction of the fixed line named. To determine, for instance, the position of the ecliptic with reference to the invariable plane, we should not only require its inclination—which we may suppose found by the methods previously spoken of—but also

the line of intersection of the two planes; and to locate this we should again need the fixed line on the invariable plane to measure from. Poisson has suggested that if it were sufficiently well determined, we might use the projection on the invariable plane of the line which the centre of gravity of the solar system describes in space, which, upon the supposition implied in speaking of the invariable plane, that the system is uninfluenced by the action of the stars, is straight. But while we have an approximate knowledge of the points in the heavens towards which this line appears to be directed, they are by no means determined with sufficient certainty and precision for so delicate a use as the one in question, and it may be doubted if they ever will be. There is no other line in the invariable plane which we can imagine it possible to determine for this purpose. This plane, then, is likely to remain in the future, as it has hitherto been, chiefly a matter of theoretical interest, rather than one of much practical utility. Fortunately, the means of astronomical observation are now so excellent, and the heavens are so faithfully, skillfully, and widely observed, and the resources of astronomical theory already so highly developed, that in all probability the astronomer of the remote future will be able to compare the places of the heavenly bodies with those they occupy now, despite the changes of his fundamental planes, with a precision fully commensurate with all the needs of his time, unless, indeed, these shall augment beyond our present power to conceive.

*References.*—Laplace, in the *Journal de l'Ecole Polytechnique*, tome ii.; Laplace, *Mécanique Céleste*, liv. i. ch. 5; liv. ii. ch. 7; liv. vi. ch. 17; Poisson, *Mécanique*, ed. 1833, liv. iv. ch. 9; Poinsoot, *Mémoire sur la Théorie et la Détermination de l'Equateur du Système Solaire*, appended to the later editions of the author's *Éléments de Statique*; Pontécoulant, *Théorie Analytique du Système du Monde*, 2d ed., liv. i. ch. 4; liv. ii. ch. 8, and note vi. at end of tome i.

JOHN E. CLARK.

**Invariant.** A rational algebraic expression of any degree in two or more variables is said to be linearly transformed when for each variable,  $x, y, z$ , linear functions of new variables, such as  $\lambda_1 X + \mu_1 Y + \nu_1 Z$  for  $x$ ;  $\lambda_2 X + \mu_2 Y + \nu_2 Z$ , for  $y$ , etc., are substituted. If the expression be homogeneous in the variables, any function of its coefficients is called an *invariant*, if, after such transformation, the same function of the new coefficients is equal to the old function multiplied by some power of the modulus of transformation (which is a function of the coefficients of transformation, only,  $\lambda_1 \mu_1 \nu_1$ ;  $\lambda_2 \mu_2 \nu_2$ , etc.). It is an *absolute invariant* when, the value of this power being unity, the function is absolutely unaltered by transformation. The invariance of discriminants\* was first pointed out by Dr. Boole (*Cambridge Math. Jour.*, Nov., 1841); and "modern algebra" may be said to have had its origin in this discovery. Mr. Cayley took up the more general problem, *what functions possessed this property of invariance*, and brought to light many others (some of which involving the variables) which are unaffected by linear transformation. Those containing the variables are called *co-variants*, or *contra-variants*, according as the substitution is direct (as above) or *inverse* (a distinction which cannot here be explained). The important uses of these functions can only be briefly illustrated. If, for example, the equations of two conic sections are, by transformation, brought to their simplest (or "canonical") forms, and their invariants (which for these forms are comparatively simple) calculated, any homogeneous relation found to exist between them may be predicted for them, no matter to what axes the equations are referred. By this means we can with facility obtain *general solutions* for—e. g. the condition that two conics shall touch each other; that a triangle inscribed in one shall circumscribe the other; the equations of tangents to a conic at its intersection with any right line; the equations of the four common tangents to any two conics, etc., etc. The first-named condition—or, more generally, the condition that any two curves should *touch*—is expressed by the vanishing of an invariant function of the coefficients of the curve-equations, called the *tact-invariant*.

J. G. BARNARD.

In'ver Grove, tp. of Dakota co., Minn. Pop. 971.

**Inverness**, town of Scotland, the capital of Inverness-shire, on the Ness, near its entrance into the Moray Frith. It has considerable manufactures of linen and hemp stuffs and extensive shipbuilding docks. Pop. 14,463.

\*If a homogeneous function in  $k$  variables be differentiated with respect to each, the resultant expression arising from the elimination of the variables from the  $k$  differentials is called the *discriminant* of the function; as it is also the *determinant* of the  $k$  expressions, arising from the differentiation. It may be written as a DETERMINANT (which *see*), of which each row is formed of the coefficients of one of the  $k$  differentials.



**Inverness**, the westernmost co. of Cape Breton Island, belonging to Nova Scotia. It has a fertile soil and beds of good coal. Cattle, produce, and fish are exported. Cap. Port Hood. Pop. 23,415.

**Inverness**, post-v., cap. of Megantic co., Quebec, Canada. It has a large trade, a tannery, and a weekly newspaper. Pop. of sub-district, 2741.

**Inverness**, tp. of Cheboygan co., Mich., on the S. side of Mackinaw Straits. Pop. 1293.

**Inverness-shire**, county of Scotland, bounded N. and W. by Ross-shire and the Atlantic, and S. and E. by the counties of Perth, Aberdeen, and Nairn. Some of the Western Islands, among which are Skye and Harris, belong to it. Area, 4256 square miles. Pop. 87,480. The western part is wild, rugged, but well wooded mountain-land: Ben Nevis, the highest peak in Great Britain, is 4406 feet high. In the eastern part are extensive tracts of heath, yet about 13,000 acres are under a regular rotation of crops, wheat, barley, and oats, and the county contains excellent pastures, especially for sheep, of which it possessed 452,795 in 1859. Wool and oats are its chief exports. The Gaelic language predominates in this county.

**Inverse'** [Lat. *inverso*]. If two mathematical operations are exactly contrary to each other, either is said to be the inverse of the other. Thus, addition and subtraction, multiplication and division, differentiation and integration, are inverse operations. If two varying quantities are so connected that either is a function of the other, and if one is called the *direct* function, the other is called the *inverse* function. Thus, if we regard a *sine* as a direct function of the corresponding arc, the arc is an inverse function of the sine; this relation is symbolized by the expressions  $y = \sin x$ , and  $x = \sin^{-1} y$ . If we denote the form of any direct function by the symbol  $\phi$ , and the form of the corresponding inverse function by  $\phi^{-1}$ , there may be two cases: (1) when both of the equations,  $\phi[\phi^{-1}(x)] = x$ , and  $\phi^{-1}[\phi(x)] = x$ , are satisfied; and (2) when both these equations are not satisfied. In the former case the direct and inverse are said to be *convertible*; in the latter case they are said to be *inconvertible*. Every direct function has one convertible inverse, and in addition may have one or more that are inconvertible. Thus, if we have the relation

$$y = x^2 - 2x, \quad (1)$$

and regard  $y$  as the direct function, we have, by solution,

$$x = 1 + 1 + y \text{ and } x = 1 - 1 + y. \quad (2)$$

Both these values of  $x$ , when substituted in equation (1) verify it, but the value of  $y$  taken from (1) does not verify both of equations (2); hence, both values of  $x$  are inverse functions of  $x^2 - 2x$ , but both are not convertible. Let us replace  $y$  in the second member of equations (2); we have

$$1 + 1 + (x^2 - 2x) = 1 + (x - 1) = x, \text{ and}$$

$$1 - 1 + (x^2 - 2x) = 1 - (x - 1) = 2 - x.$$

The first result shows that the first value of  $x$  is convertible, and the second result shows that the second value of  $x$  is inconvertible. There is a class of functions each of which is its own inverse, as  $1 - x$ ,  $\frac{1}{x}$ ,  $\frac{1}{1-x}$ . W. G. PECK.

**Inversion**, in music, a term of frequent use to denote certain changes in melodies, chords, or harmonies, by which (1) the motion of an air is reversed, or (2) an interchange is made between the upper and lower terms of single chords, or of voices in a composition consisting of two or more parts. A *melody* is said to be inverted when its motion upward or downward is reversed, as if it were turned upside down. This is also called *reversion*. A *chord* is inverted when the lower note is not the root or fundamental bass, but is the original third, fifth, or seventh, etc.; just as, in an arrangement of the figures 1, 3, 5, we might "invert" them thus, 3, 1, 5, or 5, 3, 1. A *harmonized theme* or *subject* is inverted when any two or more of its parts change places, the higher becoming the lower, and the lower the higher.

1. The inversion of a *melody* affects nothing but the upward or downward motion in its progress. Each upward step is answered in the inversion by a downward step corresponding to it, interval for interval. Of such inversions (or reversions) of melody there are two kinds—viz. the *simple* and the *strict*. In "simple" inversion it is sufficient that the same motion from degree to degree on the scale should be preserved, even though a step of a whole tone in the theme may often become a semitone in the reply, and *vice versa*. In "strict" inversion the reply is the exact contrary of the theme. The whole tones are answered by whole tones, and semitones by semitones, so that the intervals made from note to note in the progress of the inversion are precisely like those of the original theme or subject.

2. **Inversion of Chords**.—The normal or natural position of a chord is that in which the lowest note is its fundamental bass, prime, or root, the other several elements (third, fifth, etc.) being built upon this, and deriving from

it their names, uses, and relations. So long as the *actual* bass of a chord is the prime or root, such chord retains its fundamental form, whatever may be the "changes of position" assumed by the upper parts. But when a new form is given to the chord by placing its original third, fifth, etc. in the bass, and putting the fundamental note among the higher parts, the chord is said to be *inverted*.

3. The inversion of a *harmonized subject* consisting of two or more parts or voices is when a higher and a lower part change places—e. g. when the bass is so elevated as to become the treble, and the treble so lowered as to become the bass. Inversions of this nature constitute what is called "double counterpoint," and the simplest kind is that in which one of the parts is removed an octave towards the other. Of course, in this process all the intervals are reversed, a third becoming a sixth, a fourth a third, and so on. By such inversions major intervals become minor, and minor become major; diminished intervals are changed into augmented, and *vice versa*.

Another species of inversion is that called *retrograde*, in which a composition is so ingeniously constructed as to be read, first, in the usual manner, and second, in a backward direction. *Reverse retrograde* is that in which the parts are not only to be read backward, but are also *inverted*.

There is also a *double reverse retrograde*, in which the construction is such that the copy may be turned upside down, and then played with good effect. Under such a process it is evident that not only are the notes read backward, but the upper and the lower parts change places, the order of letters on the staff is changed, the clefs are altered, and the rhythmical movement of the notes exactly reversed.

WILLIAM STATIONER.

**Invertebra'ta**, a term in zoology applied collectively to the various subdivisions of the animal kingdom that differ from the *Vertebrata* in wanting all trace of an osseous (or cartilaginous) spinal column, or back-bone, made up of numerous distinct bones termed *vertebræ*. Aristotle, 340 years before our era, recognized this distinction in the animal kingdom where he says: "All sanguineous animals have either a bony or a spinous column;" but it was not until the time of Cuvier that the terms *vertebrate* and *invertebrate* came into use amongst naturalists. Cuvier and Lamarck, after introducing these terms, speedily apprehended that the divisions thus designated were by no means of equal value, and that the *Invertebrata*, as a group, contained animals constructed on several widely different types, any one of which presented distinctive characters equal in importance to those of the *Vertebrata*. Linnaeus had constructed four of his six great classes out of what Cuvier now unified as the vertebrates, the remaining two, *Insecta* and *Vermes*, including the heterogeneous invertebrates. Cuvier, regarding the former as a single sub-kingdom, subdivided the latter into three other sub-kingdoms, which he respectively termed from the arrangements of their parts *Radiata*, *Articulata*, and *Mollusca*. This triple division of the invertebrates was for a time universally accepted, and is even now, with one modification, very generally received. It was soon noticed that Cuvier's *Radiata* contained forms that could not be naturally associated together by structural characters; in fact, in many cases the organization was so undefined that the creatures could not reasonably be assigned to any of the sub-kingdoms; a new sub-kingdom was therefore established, to which these lowest of animals were relegated. This fifth sub-kingdom was named *Protozoa*.

But the rapid increase of zoological knowledge, and the desire to arrive at a natural classification, have from time to time suggested the necessity of further essential modifications of the Cuvierian groups. Classes, or groups of classes, have been elevated to the rank of sub-kingdoms (or *branches*, as they are now termed by some authors); and in the course of these changes the *Radiata* have been broken up and the name expunged altogether from the list of primary divisions. As yet, no one of the new classifications has been found altogether satisfactory, but, being founded on elaborate investigations on the embryology and life history of the various forms, they are each and all steps in the right direction, since it is only by applying our knowledge of the laws of development that we can hope to attain to classifications that shall express the true relationships of living beings. To enable the inquirer to realize the changes that have been proposed in the classification of the *Invertebrata*, and to correlate the different arrangements, we append the classification propounded by Prof. Huxley in his *Introduction to the Classification of Animals*, and that given by Prof. Rolleston in his *Form of Animal*

\*Some authors, as known have substituted the term *Amphipoda* for *Protozoa*, *Actinoptera* for *Radiata*, *Mollusca* for *Mollusca*, *Echinodermata* for *Articulata*, and *Spongiophora* for *Vertebrata*.



*Life*, founded upon the sub-kingdoms of Gegenbaur. The former will serve to show the differences between the modern and the Cuvierian systems, whilst the latter will indicate by means of the connecting lines the affinities that may be supposed to exist between the various sub-kingdoms:

*Table of the Primary Groups of the Invertebrata, after Huxley.*

II. Mollusca.	IV. Annulosa.
III. Molluscoidea.	V. Annuloida.
VI. Cœlenterata.	VII. Infusoria.
VIII. Protozoa.	

*Table of the Classes of the Invertebrata, after Huxley.*

(The limits of the Cuvierian sub-kingdoms are indicated by dotted lines; of Huxley's primary groups by brackets with numbers.)

[II. Mollusca, Cuv.	Articulata, Cuv.
[Cephalopoda.	[IV. Insecta.
Pteropoda.	Myriapoda.
Pulmonogasteropoda.	Arachnida.
Branchiogasteropoda.	Crustacea.
Lamellibranchiata.]	Annelida.
	Chaetognatha.]
[III. Ascidioida.	
Brachiopoda.	[V. Scœlecidæ.
	Echinodermata.]
[Polyzoa.]	
[VI. Actinozoa.	Radiata, Cuv. [VII. Infusoria.]
Hydrozoa.]	
	[VIII. Gregarinidæ.
	Rhizopoda.
	Radiolaria.
	Spongiidæ.]

*Tabular View of the Classification of the Invertebrata (as adopted by Prof. Rolleston; the arrangement of sub-kingdoms after Gegenbaur):*

Insecta.	
Arachnida. Myriapoda.	
ARTHROPODA.	
Crustacea.	
	Holothuroidea. Echinoidea.
	ECHINODERMATA.
	Crinoidea. Asteroidea.
	Cephalopoda
	Pteropoda.
	Gasteropoda.
	MOLLUSCA. Lam. libbranchiata.
	Tunicata.
	Brachiopoda.
	Polyzoa.
Gephyrea. Annulata.	
Rotifera.	
VERMES.	
Nematelminthes.	
Platyelminthes.	
	Ctenophoræ.
	CELENTERATA.
	Anthozoa.
	Hydrozoa.
Infusoria. Spongiadæ.	
PROTOZOA.	
Rhizopoda.	
Gregarina.	

EDWARD C. H. DAY.

**Investiture** [Lat. *investio*, to "clothe"], as a feudal custom, was the open delivery of possession ("the livery of seisin") of a fief by the lord to his vassal. This, in an age when writing was rare, was effected by means of some visible ceremonial and symbol, such as giving the branch of a tree or some material object that would evidence the conveyance to public knowledge and permanent remembrance. In the Church, after the analogy of feudal custom, investiture was an open confirmation in ecclesiastical office by some symbolical act or emblem, such as the bestowment of the pallium or crosier and ring, as ensigns of official honor or of pastoral charge and spiritual espousals. The claim of the prerogative of such investiture of an ecclesiastic by the political ruler was for centuries matter of controversy between the hierarchy and the monarchy—a controversy which interests not only as an important factor in the history of mediæval Europe, but as a reflex of its condition and ideas as respects the relations between the secular and spiritual powers. This right of investiture was claimed in behalf of secular power as an appanage of the monarchy inherited from the old Roman empire, and also on the ground that the episcopal office, with the temporalities attaching in the feudal ages of manorial estates, privileges, honors, and emoluments, was to be regarded in the nature of a fief, and to be bestowed with a like ceremonial by the lord paramount. The claim was resisted on the allegation that laymen could not bestow the authority for priestly functions, as was tokened by the ring and the crosier, and that the degradation and corruption of the Church sprang from this usurpation and the simoniacal practices

and oppressive exactions inevitably attendant on lay investiture.

In the early Church, Constantine and the Christian emperors, as inheritors of the pontifical rights of their pagan predecessors, undoubtedly exercised the prerogative of confirmation after episcopal elections. After the fall of the empire of the West the Gothic and Lombard kings claimed the same power as successors to the prerogatives of the Roman empire. After them this claim was exercised by the Frank monarchy—by the Merovingians, the prerogative of even direct episcopal nomination; by the Carolingians, that of the investiture of the pope himself. It was the aim of Charlemagne to establish a theocratic monarchy, in which the emperor was to be supreme lord so far as earthly organization or administration was required. The successors of Charlemagne claimed, and often exercised, the same rights of suzerainty over the Church. This claim, however, was contested, resisted, or eluded on every opportunity; and such opportunity constantly offered during the dissensions of the descendants of Charlemagne, which often led them to seek the aid of the clergy and to appeal to the Church and the pope as arbiters in their controversies with each other. So for centuries the prerogative of investiture was asserted and exercised, denied and resisted, according to the character and position of individual monarchs and popes. In 875, Charles the Bald formally renounced his claims as superior of the states of the Church and all control of elections to the papacy, and accepted a papal vicar as primate for all Germany. In 983, Otto I. made the Romans swear on the relics of St. Peter they would never afterwards elect or consecrate a pope without the permission and approbation of the emperor. Sylvester II. (999–1003), on the other hand, directly assailed lay investiture as the source of simony and the cancer of the Church, and himself sent the crosier and the ring directly to Arnulf, elected as archbishop of Rheims. Again, Henry III. in 1047 received of the Romans the admission of his perpetual right of choosing the pope, and their oath that they would never consecrate a pope without the emperor's consent. This controversy was brought to a crisis when Hildebrand, as prime-mover of the papacy, or as pope (Gregory VII., 1073–85), developed his policy of making the Church independent of all secular power, and ultimately supreme amid the governments of the world. Under his instigation, Alexander II. (1061–72) issued a decree against all lay investiture. In the Lateran Council, held by himself as Gregory VII. (1075), it was again denounced, and every bishop or abbot accepting it was deposed and those bestowing it were excommunicated. These decrees brought the papal and imperial power at direct issue, and the factions that arose therefrom, the Guelphs and the Ghibellines—the former the party of the pope, the latter that of the emperor—distracted Germany and convulsed and wasted Italy for a long period with civil discord and war. The fortunes of this controversy were various. In its course Henry IV. was reduced (1077) to the humiliation of standing in a cold winter from the 25th to the 27th of January, barefoot and in the garb of a penitent, fasting the whole day, in the open court of the castle of Canossa, before the pope would accept his repentance and submission and give him absolution. Presently, the strife was renewed still more fiercely, and the pope died in exile. The dispute was continued under his successors, until, under Henry V. and Calixtus II., it was settled by the concordat of Worms (1123) that henceforth all episcopal elections should be conducted by the laws of the Church, but in the presence of the emperor, and that spiritual investiture by the crosier and the ring should be bestowed by the pope, but for temporalities, enfeoffment should be by the emperor with the sceptre. In other countries of Europe the controversy respecting lay investiture had like fortunes and results. In France investiture by the ring and crosier was relinquished by the monarchs, and episcopal benefices were bestowed through written instruments or orally. In England, Gregory VII., during the controversy with Germany on his hands, forebore to press the question to an open breach with the iron will of William the Conqueror. It came to open quarrel between William Rufus and Anselm, archbishop of Canterbury, and Pope Paschal II., but was finally adjusted by an agreement that for investiture with the crosier and ring should be substituted the simple oath of fealty. Thus everywhere, in the issue, the symbols of strictly priestly investiture were relinquished by the secular authority, but the feudal obligation was asserted for temporalities attached to ecclesiastical benefices.

T. M. POST.

**Involute** [Lat. *involutio*]. If we wrap a string around a given curve, and then unwrap it, keeping the string stretched, each point of the string will generate a curve called an *involute* of the given curve. This mode of gene-



ration implies that the given curve is represented by a pattern cut out of some rigid material, as wood or metal. Thus, to draw an involute of a circle, we cut out a circular pattern, around which we wrap a string; we then lay the pattern on a plane surface, attach a pencil or tracing point at some point of the string, and unwrap the string; the pencil or point will trace out the required involute. It is obvious that the same curve may have an infinite number of involutes; hence, to find any particular involute we must know one of its points. To find the equation of an involute, let the equation of the given evolute be

$$y = f(a, \beta), \quad (1)$$

and assume the second and third equations of condition for an osculatory circle, which are

$$y - \beta = -\frac{dx^2 + dy^2}{d^2y}, \quad (2)$$

$$x - a = -\frac{dy}{dx}(y - \beta), \quad (3)$$

in which  $a$  and  $\beta$  are the co-ordinates of the centre of any circle that is osculatory to the required involute. Combining (1), (2), and (3), so as to eliminate  $a$  and  $\beta$ , we have a differential equation of the second order, which is common to the whole class of involutes. Integrating this equation twice, and determining the values of the constants, so as to conform to the given conditions, we find the equation of the required involute.

W. G. PECK.

**In'yo**, county of California, lying mostly E. of the Sierra Nevada. It is bounded on the N. E. by Nevada. Area, 4725 square miles. It is a great basin whose waters do not flow into the sea. Owen's Lake is the largest body of water. The valleys contain much fertile land. Gold-bearing quartz is mined and milled. Salt is found in some parts. Wool, grain, and pork are staple products. Cap. Independence. Pop. 1956.

**Io**, in Grecian mythology, was a daughter of Inachus, but was transformed into a beautiful white cow by Zeus, who was enamored of her, and wished to conceal the affair from his jealous wife. Here, however, became suspicious, and set Argos with the hundred eyes to watch her; and when Hermes slew Argos, she sent a gad-fly, which pursued Io from place to place all over the earth, until at last she found rest in Egypt. She appears in *Prometheus and The Suppliants* by Æschylus. By the symbolical school of modern mythologists she is identified with the moon, as Argos with the starry sky and Hermes with the morning.

**Iodine** [*Gr.* *ιώδης*, "violet like," from *iov*, "a violet," and *idos*, "form"] (atomic weight, 127; symbol I), an element discovered by M. Courtois of Paris in 1812 in the mother liquor from the kelp or ash of seaweed which had been burned in order to obtain sodium carbonate. It has since been found in many mineral waters, in sea-water, in seaweeds, especially Laminaria and Fucoids—in sponges, oysters, and other forms of marine life. Cod-liver oil contains from 0.03 to 0.04 per cent. of iodine. It is found also in many land-plants, as tobacco and water-cresses, and even in potatoes, beans, barley, and oats. Certain minerals also contain it, though those containing it as an essential constituent are comparatively rare. Such are iodyrite, or silver iodide, found among silver deposits in Mexico, Chili, and Spain, and coccinite, or mercury iodide, found in Mexico. Iodine also occurs as an accidental constituent in some dolomites, where it is combined with calcium and magnesium; in several deposits of alkaline salts, as Chili saltpetre and rock-salt. In some cases it has been found in the products from gasworks, as the ammonia-liquor. Chatin claimed to have found it in the waters of several rivers, and in the rain water, and even the atmosphere, of certain localities. It has been claimed, however, that the reagents used by him themselves contained minute traces of iodine.

**Preparation of Iodine.**—The sources from which the iodine of commerce is derived are kelp and Chili saltpetre. The former contains 0.162 to 0.175 per cent. The carbonization of the seaweed is usually conducted in closed vessels, in order to prevent loss by volatilization. The kelp is lixiviated, and the liquors are concentrated and cooled, in order to crystallize out the sulphates, chlorides, and carbonates of potassium and sodium; and from the mother liquor the iodine is extracted either by heating with concentrated sulphuric acid, with or without manganese dioxide, or by precipitation as copper subiodide by iron and a salt of copper; from which product the iodine is expelled by treatment with sulphuric acid and manganese dioxide. The use of sulphuric acid without the manganese compound is not advantageous, as sulphurous acid forms, which reacts upon the iodine and causes a loss of iodine. Chlorine is also sometimes used to precipitate the iodine from the mother-liquors. An excess of chlorine must be carefully avoided, since that would cause the iodine to go into solu-

tion again as iodine chloride. Washing and a second sublimation of the iodine is usually resorted to in order to purify the product for market. Glasgow is the chief port for the manufacture and export of iodine from kelp. The process of extraction of iodine from the Chili saltpetre is essentially the same as that pursued with the kelp.

**Properties.**—Commercial iodine, especially when obtained from kelp, often contains cyanogen iodide, sometimes to the extent of 1 per cent; it also may contain up to 15 or 20 per cent. of water. It is sometimes adulterated with coal, charcoal, plumbago, or manganese dioxide. Iodine is a dark crystalline solid, with a color and lustre resembling plumbago. Its odor is like that of chlorine. It fuses at 107° C. (= 224.6° F.), and boils between 175° and 180° C. (347–356° F.). It is volatile at ordinary temperatures, the vapor having a fine violet color, whence the name is derived (*Gr.* *ιώδης*, "violet colored"). In a state of vapor it is one of the heaviest vapors known, its gravity referred to air being 8.716. It dissolves in alcohol, ether, and carbon disulphide, also in water containing soluble iodides or ammonium chloride or nitrate. In pure water it dissolves only in the proportion of 1 part in 1000. With starch it forms an intensely blue compound, and this is one of the most delicate tests used for the detection of its presence, as the color is apparent when but 1 part of iodine is present in 450,000 of water. It is displaced from its compounds by chlorine and bromine. It destroys vegetable colors but slowly; its action on organized tissue is more rapid. Taken into the stomach in large quantity, it produces ulceration of the mucous membrane, and death. Starch or starchy substances are the usual antidotes.

**Compounds.**—Iodine combines with hydrogen, forming hydriodic acid, which has very similar properties to hydrochloric (muriatic) acid. It also combines directly with metals, forming iodides. The principal compounds with oxygen and the metals are the iodates and periodates. The oxides corresponding to these salts are  $I_2O_5$  and  $I_2O_7$ . These compounds decompose readily, giving up their oxygen, and some explode violently on being struck or heated. With ammonia, iodine forms a compound,  $NI_3$ , which when dry explodes violently with the slightest friction. Cadmium iodide is used in photography, usually in conjunction with iodide of potassium, for sensitizing collodion. (See PHOTOGRAPHY.) One of the most important applications of iodine is in the manufacture of some of the aniline colors. (See ANILINE COLORS.)

E. WALLER.

**Iodine, Medicinal Uses of.** Iodine is used in medicine in simple solution in alcohol or dissolved in water by the aid of potassium iodide (Lugol's solution). Locally, iodine is a powerful irritant, and its solutions stain the skin yellowish brown. Inhaled, its vapor is irritant to the mouth, throat, and air-passages, causing coryza, cough, watering of the eyes, and headache. Internally, in single dose, the effects vary according to the quantity swallowed, from mere uneasiness in the stomach to severe gastric pain, with vomiting and purging, headache, giddiness, and, though rarely, even general prostration and death. In continued administration of considerable doses a form of chronic poisoning called *iodism* occurs. In mild cases the effects are more or less gastric disturbance with increase of the secretions, irritation of the mucous membrane of the eyes, nose, and throat, with frontal headache, and sometimes an eruption on the face around the eyes and about the nose and chin. In severe types there may be also a general febrile condition, vomiting and purging with abdominal pain, various nervous disturbances, and, according to some of the continental observers, a tendency to absorption of some of the tissues of the body, shown by emaciation and wasting of certain glands. This latter effect, however, must be very exceptional, as it is seldom seen. Iodine is rapidly eliminated from the body, and the poisonous effects just described speedily cease on discontinuance of the drug. Preparations of iodine are used locally as counter irritants, and internally they have some unknown influence over nutrition, proving useful in goitre, certain forms of serofulous disease, affections of the fibrous and muscular tissues, etc. For internal administration, however, the alkaline iodides, especially potassium iodide, are now far more frequently used than solutions of iodine. These salts are free from the irritant local effect of iodine, but in continued dose may cause some of the milder symptoms of iodism described above. Medicinally, they are used in the conditions just mentioned under iodine and in tertiary syphilis, chronic mercury and lead poisoning, and indeed in a great variety of diseases. They are often given in very large quantities and with perfect safety.

EDWARD CURTIS.

**Iod'oforn**, a methylether,  $CHI_3$ , formed by the mixing of alcoholic solutions of potash and iodine. It is in the form of small glittering, sandy, yellow crystals of a sweet taste, and strong, peculiar, very persistent saffron



like odor. It is slowly volatile, nearly insoluble in water, but soluble in alcohol, ether, and oils. It is decomposed by alkalis and by a heat of 200°. Iodoform is a valuable medicine, being anæsthetic like chloroform. Unlike the latter, however, it is totally unirritating, even to mucous membranes or abraded surfaces. On account of its solid form it cannot be employed as a general anæsthetic by inhalation, but it is exceedingly useful as a local application to relieve pain, as in painful ulcers, sores, irritated or inflamed mucous membranes. It seems also in many such cases to directly promote healing. EDWARD CURTIS.

**Io'la**, post-v., cap. of Allen co., Kan., on the Leavenworth Lawrence and Galveston R. R., 78 miles by rail S. of Lawrence. It is in a fine agricultural region; has a bank, 3 churches, and manufactures of furniture and other goods. The Neosho furnishes water-power, and there is an unfailing artesian well which affords a mineral water useful in a wide range of disease, and which also supplies inflammable gas enough to afford light and fuel for a large town. It has 1 weekly newspaper. Pop. of tp. 1759.

L. WALKER, Ed. "NEOSHO VALLEY REGISTER."

**Iola**, post-tp. of Waupaca co., Wis. Pop. 729.

**Iola'us** [Gr. *Ἰόλαος*], in Grecian mythology, the charioteer and companion of Hercules, to whom he was the first to pay divine honors after his death. He was said to have been the first victor at the Olympian chariot-races, and to have conquered and civilized the island of Sardinia, where he died and was worshipped as a hero.

**I'olite**, a mineral crystallizing in the trimetric system, and being essentially a silicate of alumina, magnesia, and protoxide of iron. Its hardness is from 7.0 to 7.5; specific gravity, 2.6; in color it occurs of various shades of blue, and exhibits in a marked manner the property of dichroism, or of presenting, when viewed in different directions, different colors. Hence, one of its synonyms is *dichroite*. It is sometimes used as a gem, being the *sapphire d'eau* of jewellers, obtained from Ceylon.

**I'on**, in Grecian mythology, was a son of Apollo and Creusa, the daughter of King Erechtheus of Athens, and was brought by Hermes to his father's temple at Delphi, where he was educated. When Creusa married Xuthos, but bore him no children, a false oracle made Xuthos believe that Ion was his son, and he took the youth into his house. Creusa, not recognizing him, tried to poison him, and fled to Delphi, where a priestess told her that Ion was her own son. This myth has been treated by Euripides in his tragedy *Ion*.

**Ion**, a native of the island of Chios, ranked as one of the five principal tragic poets of the Athenian canon, and was also a composer of other kinds of poetry. He was contemporary with Æschylus, Sophocles, and Pericles, was an intimate friend of Cimon, and on one occasion carried off both the dithyrambic and the tragic prizes. The number of his tragedies is variously stated at twelve, thirty, and forty. A few fragments of eleven remain, also some passages of other poems and prose-writings, preserved chiefly in Athenæus. Nieberding (1836) and Köpke (1836) have edited the fragments of Ion, with notices of his life.

**Io'na**, or **Icolmkill**, the most famous island of the Hebrides, 3 miles long by  $\frac{1}{2}$  broad, was colonized in 563 by St. Columba of Ireland with twelve disciples, it having been granted him by the kings both of the Scots and of the Picts. He built there the celebrated monastery, which was regarded by the Picts as their mother-church, and from which Christianity was introduced into Scotland and the N. of England. Iona was ravaged by the Norsemen in 795, 802, 806, 825, and 896, on three of which occasions most of the monks were martyred. In the eleventh century the monastery was repaired by Queen Margaret the Saint, and in 1097 a pilgrimage was made to it by King Magnus of Norway. For two centuries thereafter the jurisdiction was disputed between the bishoprics of Scotland, Ireland, and the Isle of Man. At the end of the fifteenth century it became the seat of the bishopric of the Scottish isles, and was repopulated with monks from Cluny. Many kings of the isles, some of Northumbria, and even of Norway, were buried on this sacred island, which has been long nearly deserted, the present population being less than 300. Of late it has become a resort of tourists. The oldest buildings of which ruins exist appear to be of the eleventh and twelfth centuries. (See Dr. Johnson's interesting account of his pilgrimage to Iona in the *Tour to the Hebrides*.)

**Iona Island**, in the Hudson River, 47 miles N. of New York. It belongs to Cornwall tp., Orange co., N. Y., has extensive vineyards, and is a favorite point for picnics and excursions from New York.

**Io'ne**, tp. of Amador co., Cal. Pop. 1779.

**Ione**, tp. of Nye co., Nev. Pop. 52.

**Ione Valley**, post-v. of Amador co., Cal., 40 miles S. E. of Sacramento, on Sutter Creek. It has copper-mines.

**Io'nia**, the ancient name of a portion of the western sea-coast of Asia Minor, upon the Ægean Sea. It derived its name from its inhabitants, the supposed descendants of a mythic hero, Ion, son of Apollo. Ionia extended from the river Hermus to the Mæander, and was the seat of the Ionian league of twelve cities, chief of which were Ephesus, Smyrna, Clazomenæ, Erythræ, Colophon, and Miletus. According to tradition, Ionia was colonized about 1050 B. C. by settlers from Attica; but Dr. E. Curtius in his *History of Greece* has shown reasons for believing that the Ionians had resided there from time immemorial.

**Ionia**, county of W. Central Michigan. Area, 576 square miles. It is a well-timbered, fertile, undulating region. Cattle, grain, and wool are staple products. Lumber, castings, carriages, and farming implements are leading articles of manufacture. The county is traversed by the Detroit and Milwaukee and the Detroit Lansing and Lake Michigan R. Rs. Cap. Ionia. Pop. 27,681.

**Ionia**, post-v. of Chickasaw co., Ia., on the Iowa and Dakota division of the Milwaukee and St. Paul R. R.

**Ionia**, post-v., cap. of Ionia co., Mich., on Grand River and on the Detroit and Milwaukee and the Detroit Lansing and Lake Michigan R. Rs., and on the Stanton branch of the last-named road; has 2 national banks, railroad repair-shops, over 15 other manufactories and mills, 8 churches, 2 newspapers, a public park, free reading-room, good schools, etc. Agriculture and the lumber business are leading interests. Pop. 2500; of tp. 4158.

CLARK TAYLOR, Ed. "SENTINEL."

**Ionia**, post-tp. of Dixon co., Neb. Pop. 334.

**Io'nian**, in music, the name of one of the ancient ecclesiastical modes. The Ionian scale is usually understood to be that which resembles in form the modern scale of C major.

**Ionian Islands**, a chain of islands extending along the western and southern coast of Greece, of which the largest are Corfu, Paxo, Santa Maura, Theaki, Cephalonia, Zante, and Cerigo. Area, 1041 square miles. Pop. 251,712. From the commencement of the fifteenth century to 1797 they belonged to Venetia. From 1797 to 1815 they changed masters five times, but were then formed into a republic under English protection. In 1864 they were annexed to Greece, the inhabitants being Greeks. They are fertile and well adapted to the cultivation of vines and olive trees. Currants and olive oil are their main exports.

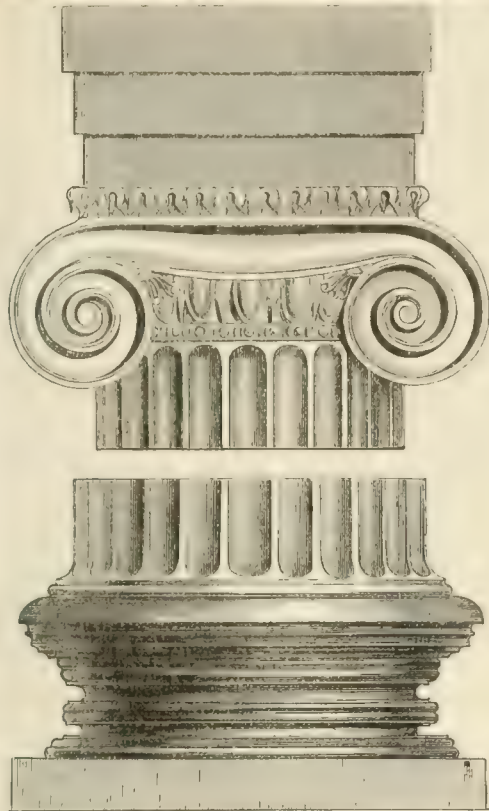
**Io'nians** [Gr. *Ἴωνες*, sometimes lengthened into *Ἰάωνες*], a race of Greek descent who resided chiefly in Asia Minor and the adjacent islands, but spread themselves to all parts of the Eastern Mediterranean, to the delta of the Nile, and to India as far as Orissa. According to the prevailing legend, their ancestor was Ion [*Ἴων*], the son of Apollo and Creusa, who may perhaps be identified with the Javan of the Mosaic table of the founders of nations. The Greek legends speak of the Ionians as migrating from Attica about the eleventh century B. C., and settling in Asia Minor, incorporating with themselves some of the original inhabitants and driving out the others. The Ionians were always a maritime race, and some recent writers urge with much plausibility that they came to Attica from the East, and that their migration to the shores of Asia Minor was a remigration to their original abode; and indeed the Egyptian monuments of the fifteenth century B. C. contain the same group of hieroglyphics by which the Greeks were designated in the time of the Ptolemies. The ancient Sanskrit books speak of the Yavanas, who are supposed to be Ionians who penetrated India from the region of the Euphrates, by way of Cashmere. The Greeks who were left behind by Alexander the Great to hold his fortress on the banks of the Indus were also called Yavanas; and in Northern India all Mohammedans are thus designated. It would thus seem that the Sanskrit term came to be applied in time to all foreign races, of whom the Ionians were the earliest, who reached India from the West, just as throughout the Orient all Europeans are designated as Franks.

**Ionian Sea** is the name of that part of the Mediterranean which lies between Italy and Sicily to the W. and European Turkey and Greece to the E. It forms the gulfs of Taranto and Patras, and communicates with the Adriatic by the Strait of Otranto.

**Ion'ic Order**, in Greek architecture, is regarded as of Asiatic origin. It is now conceded that its use was as old as (or even older than) that of the Doric. Its principal seat was in Asia Minor. The temple of Diana at Ephesus, that of Apollo at Miletus, the temple of Wingless Victory and the Erechtheum at Athens, and the temples at Teos, Priene, and Sardis, were among the most famous examples of this style. Its rude beginnings are discernible in As-



syrian and Persian ruins still existing. In its perfect form the Ionic column has a height of nine diameters, a base of



very varied form, twenty-four flutes on the shaft, separated by fillets, and a capital formed by volutes.

**Io'nie In'dians**, a tribe of the Texas confederation, allied by race with the Caddoes. They removed early from the Hot Spring region of Arkansas to Texas, and their descendants (85 in number in 1872) reside on the Washita River, Indian Territory. They are self-supporting, and have always been a peaceable and friendly race.

**I'os** [*Ios, Nio*], an island of the Aegean, now, but not anciently, reckoned as one of the Cyclades. It lies N. of Thera and S. W. of Naxos, and is 11 miles long and 5 broad. Area, 20 square miles. It is rough, but quite productive, and has a fine harbor and some 4000 inhabitants.

**Ios'co**, county of Michigan, bounded on the E. by Lake Huron. Area, 500 square miles. It has large forests of pine, and is generally level. Agriculture is not much carried on. Lumbering is the principal industry. It is becoming a resort of anglers, on account of the presence of the grayling in its streams. Cap. Tawas City. Pop. 3163.

**Iosco**, tp. of Livingston co., Mich. Pop. 904.

**Iosco**, tp. of Waseca co., Minn. Pop. 913.

**I'owa**, a central State of the upper Mississippi Valley,

the parallels of 40° 36' and 42° 30' N. lat., and between the meridians of 89° 57' and 96° 31' W. lon. It is bounded on the N. by Minnesota; on the E. by the Mississippi River, which separates it from Wisconsin and Illinois; on the S. by Missouri, the Des Moines River being the boundary line for a short distance; on the W. the Missouri River is its boundary, dividing it from Nebraska as far as Sioux City and the mouth of the Big Sioux River, which then becomes its western limit, and separates it from Dakota Territory as far N. as the line of 43° 30' N. lat. The form of the State is irregularly trapezoidal. Its area is stated at 35,015 square miles, or 35,228,800 acres. Its greatest length from N. to S. is 208 miles; its greatest width from E. to W. a little more than 300 miles.

*Face of the Country.*—Iowa may be described in general as very level; there are no mountains and no considerable hills in the State. Its average elevation above the level of the sea is between 800 and 900 feet. Yet within the State is the great watershed dividing the streams flowing into the Mississippi from those discharging their waters into the Missouri. This watershed passes through the N. W. portion of the State in a direction nearly S. by E., through Dickinson, Clay, Buena Vista, Sac, Carroll, Audubon, Guthrie, and Adair cos., turning in the latter county sharply to the S. E. through Madison, Union, Clarke, Lucas, and Appanoose cos. to the Missouri line. A secondary watershed, somewhat higher at points than this, continues S. from Adair co. through Union and Ringgold cos. There is therefore not only a gradual slope of the whole State from the N. to the S., but eastern and western diametrical slopes from this great watershed toward the Mississippi and Missouri rivers. The rivers have worn valleys sometimes through the earthy material, and sometimes through some of the underlying rocky strata beneath; these valleys have in many places abrupt and rocky bluffs along the river-banks, thus giving an appearance of hills, which, strictly speaking, do not exist, as these steep banks are rather valley-sides than hillsides; being in all cases depressions below the general level. The plain or plateau of which Iowa forms a large portion is at all points considerably elevated above the level of the sea. The surface of the Mississippi at low water at the S. E. corner of the State is 114 feet above the sea, at the N. E. corner of the State it is 660 feet, showing a descent in the river of 216 feet, or about one foot to a mile. The surface of the Missouri at low water at the S. W. corner of the State is 954 feet; of the Big Sioux at low water at the N. W. corner of the State, 1344 feet; the surface of the great watershed at the northern State boundary, near Spirit Lake in Dickinson co., is 1691 feet, and at the southern State boundary, in Ringgold co., about 1220 feet. The descent from the highest point in the State (near Spirit Lake) to the lowest point in the S. E. corner of the State does not exceed 5 feet 7 inches per mile, and in most directions it is not more than from 2 to 4 feet per mile. The whole country is therefore eminently adapted for the construction of good roads and railroads, and, as we shall see, the State, young as it is, is traversed in all directions by railways. Most of the State was originally what the settlers call "rolling prairie"—i. e. it had long wave-like depressions and elevations, resulting from the drainage of the surface-water into the upper branches of the rivers. It is now losing much of its prairie character, the prevention of the annual fires having caused the forest trees to encroach upon the prairies, and the settlers also having planted many trees.

*Rivers, Lakes, etc.*—All the rivers and streams of the State are affluents of either the Mississippi or the Missouri; the former, draining the widest territory in the State, has tributaries of greater length and larger volume than the latter. Among the streams flowing into the Mississippi within the State are the Upper Iowa, a stream of considerable rapidity, and having a deep valley which has eroded the rocky strata to a considerable depth throughout its entire course; Turkey River, which has also high and rocky bluffs along its banks; Maquoketa and Wapsipinicon rivers; the Iowa River, a large and navigable stream; the Cedar River, which has rapids and falls in a part of its course; the Chequamegon or Slunk River, a broad but not very deep river; and the Des Moines, a large and navigable river which enters the Mississippi at the S. E. corner of the State. The rivers of the western drainage-slope, falling into the Missouri, are generally small. Save about them, as the Chariton, Grand, Platte, the Nodaway forks, and Nishnabotona rivers, rise in Iowa, but flow southward into Missouri, and enter the Missouri River in that State; the Little Sioux and Floyd are streams of moderate size and with broad fertile valleys, with few or no rocks or boulders in their course. The Big Sioux, which rises in Dakota and forms a considerable portion of the western boundary of Iowa, is a large stream, with high and steep bluffs along a portion of its course, but without rocks. It is navigable to



Seal of Iowa

lying between the Mississippi and Missouri rivers, between  
Vol. II.—81



a point a little above the N. line of Iowa, where there is a series of rapids by which it descends 60 feet in the course of half a mile. The Mississippi has two stretches of rapids opposite Iowa—the lower, called the Des Moines Rapids, from Keokuk to Montrose, 12 miles in length and with a total descent of 25 feet; and the upper, from Davenport to Le Claire, about 15 miles in length, and having a total descent of 26 feet. The lakes are mostly small, and in the Eastern States would be called ponds; the principal are Spirit Lake, in Dickinson co., about 4 miles long, and of the same width. It contains between 10 and 12 square miles. It was the place of a terrible massacre of whites by Indians in 1857. Okoboji Lake in the same county is of horseshoe form, and drains Spirit Lake. It is narrow, but the outside of the horseshoe is about 15 miles in length. Clear Lake in Cerro Gordo co. is 4 miles long and 2 wide. Storm Lake in Buena Vista co. is still smaller, having only 5 square miles, but of great beauty. There are also two or three yet smaller lakes in Wright and Sac cos., which have barriers of boulders, sand, and peat which have given them the name of Walled Lakes.

**Geology.**—With the exception of the river-valleys and some small tracts, the surface of the State is covered to a greater or less depth with diluvial or drift deposits, and these again in some sections, as in the river-bottoms of the great rivers, with alluvium or loam. But an examination of the bluffs and rocky strata of the river-channels indicates that there are accessible at least twenty different geological formations, all of them, except a small outcrop of Azoic rocks—Sioux quartzite (in the extreme N. W. corner of the State)—occurring in regular succession from the N. E. to the S. W. portion of the State, and being inclined at such an angle or dip that each formation laps over the one next below it in very regular order. In the N. E. there is a tract extending from the sources of the Turkey River to the mouth of the Maquoketa which belongs wholly to the Lower Silurian system; all the formations of this system dip toward the S. W. at such an angle that the Upper Silurian laps over them just S. of the Turkey River. The groups of Lower Silurian here developed are the Primordial, represented successively by the Potsdam sandstone, Lower Magnesian limestone, and St. Peter's sandstone; the Trenton group, represented by the Trenton limestone and the Galena limestone; and the Cincinnati group, of which only the Maquoketa shales are recognizable here. The Upper Silurian system, which follows immediately and overlaps the Lower Silurian, extends on the Mississippi from just above the mouth of the Maquoketa River to Davenport, but, though covering a breadth of two or three counties near the river, narrows as it approaches the upper line of the State into a strip of not more than 6 or 8 miles in breadth. But one group and one formation of this system is represented—viz. the Niagara limestone. A broader band, and one of pretty uniform width, extending on the Mississippi from Davenport to Muscatine, and running diagonally to the northern boundary of the State, consists of the Hamilton limestone and shales, the representative rocks of the Hamilton group of the Devonian system. This, in turn, is overlapped by the Sub-carboniferous group, represented here successively by the Kinderhook beds, the Burlington, the Keokuk, and the St. Louis limestone. This extends from Muscatine to the Des Moines River, and, following the Skunk River valley to the source of that stream, stretches westward from Clear Lake in Cerro Gordo co. through Butler, Franklin, Wright, and Humboldt cos. The Lower and Middle Coal-measures, which come next, occupy a broad belt in the middle of the State, being divided into two nearly equal portions by the Des Moines River. They yield large quantities of bituminous coal of good quality. The Upper Coal-measures occupy the whole S. W. portion of the State except a tract in Montgomery and Cass cos., where there is an outcrop of the Nishnabotona sandstone, the lowest member of the Earlier Cretaceous group. In Woodbury and Plymouth cos. there is also an outcrop of Cretaceous rocks, consisting of the Woodbury sandstone and shales; and in Guthrie and Greene cos. there are two others, in which the chalky beds are very prominent. The remainder of the State, comprising the whole N. W., and including the greater part of twenty-six counties, is covered so deeply with the overlying drift to a thickness of from 150 to 200 feet that it may fairly be considered as belonging to the Post-tertiary group. The Sioux quartzite, a very hard brick-red rock belonging to the Azoic system, is found only in ledges on the banks of the Big Sioux, just before it crosses the boundary. In Dakota and Minnesota this rock is abundant, and some strata of it are used by the Indians for making redstone pipes.

**Mineralogy.**—The Iowa coal-field contains at least 7000 square miles, and on its S. W. border dips down at a very small angle under the upper or unproductive Coal-measures,

and may be mined in the section covered by these. A very large number of coal-mines have been opened, mostly by drifting from the valley-side, though in some instances shafts are sunk. The coal is bituminous; cannel coal has occasionally been found, but is too impure to be of any value. Lead, the argentiferous galena ore, found in the galena limestone, is mined in great quantities at Dubuque and its vicinity, and smelted at the mines. There is lead also in the Lower Magnesian limestone on the Upper Iowa River, but not in sufficient quantity to make mining profitable. There are few other metals in Iowa. The iron ore met with in various parts of the State is of good quality, but the quantity is small and the mining unprofitable. Gypsum is found in very great quantities at Fort Dodge and its vicinity in the condition of stratified rock, and quarried like ordinary limestone. It is largely exported. Building-stone of fair quality is found E. of the Des Moines River. The Hamilton limestone, the sandstone of the Kinderhook beds at Burlington, the Keokuk limestone, and the gray St. Louis limestone, all furnish very good building-material. Gypsum is also used for this purpose as it comes from the quarries. Lime is manufactured largely from the limestones and from the chalky beds. Brick-clay, potters' clay, and good building-sand are plentiful.

**Vegetation.**—The State contains a greater proportion of tillable and fertile soil than almost any other in the Union. With the exception of the small portion occupied by rivers, lakes, ponds, and rocky bluffs, the whole surface is arable and yields everywhere liberal crops. The surface is so nearly level that agricultural machinery can be used everywhere, and the labor of planting and gathering crops is thereby much facilitated. There are three descriptions of soil in the State, yet differing somewhat in their characteristics: (1) The drift soil, formed of the surface portion of the drift or diluvial deposit, consists of a dark loam from one to three feet deep, and is found mostly on the prairies. There are no stumps and very seldom any stones in it, and it is very easily ploughed and cultivated by machinery. It is so fertile that in many places, after twenty years' cultivation without manure, it still yields abundant crops; it contains considerable clay, and is therefore classed as a moderately stiff soil. (2) The bluff soil is the surface portion of the bluff deposit; it is very fine, contains less clay than the drift soil, and no stones or boulders. It can be ploughed earlier than the drift, being drier, and is fully as fertile, while it is deeper. (3) The alluvial soil, found in the river-bottoms, consisting of the soil and decomposed vegetable and animal matters brought down by the floods, is the richest and most productive and durable soil in the world. The area occupied by forests and woodland in Iowa is stated by the agricultural department to be 4,985,668 acres, or about one-eighth of the entire surface of the State. The breadth of the State being but about 200 miles from N. to S., and the variations in its elevation so trifling, there is very little climatic difference in the vegetation of the State. The persimmon and pawpaw do not ripen their fruit N. of the parallel of Burlington, but there are few other instances in which trees or plants do not flourish equally well in all parts of the State. The most common forest trees are four or five kinds of oak, the common elm, cottonwood, black walnut, hickory, sugar-maple, soft maple, and linden. The buckeye, aspen, water-birch, wild-cherry, ash, box-elder, white walnut or butternut, sycamore, and slippery elm, though occasionally found, are less abundant. There are a few pine trees in Eastern Iowa on the sandstone bluffs, and some red cedar in similar situations. The chestnut, beech, and tulip tree are not natives of Iowa. The principal native fruits are wild grapes, plums, crab-apples, cherries, blackberries, raspberries, gooseberries, and strawberries, and among the nuts are hickory and hazel nuts, black walnuts, butternuts, and a few pecan nuts in the S. E. counties. The prairie-grass, which is of fair quality, is used not only for pasturage, but to a large extent for hay, and is distinguished from that obtained from the cultivated grasses by the name of *wild hay*. There is also a wild rice, of some value for nutriment, and which is in great demand by aquatic and other birds, which grows in the shallow ponds of Northern Iowa. The cultivated crops are, among the grains, corn, wheat, oats, barley, rye, and buckwheat. Of the first four the State exports very large quantities annually. Hay, principally timothy and red clover, is extensively made and exported, and blue grass and white clover are cultivated for lawns and pasturage. Flax, hemp, and hops are crops of considerable importance. Sorghum is not so largely cultivated as formerly. Potatoes are raised in great quantities both for home consumption and export. Sweet potatoes are grown successfully in the southern part of the State. Garden vegetables of all kinds grow well in all parts. Among cultivated fruits, apples are very abundant and of excellent quality. Three dozen varieties are recommended by the



agricultural society, and largely raised throughout the State. Pears grow well, and are becoming plentiful, but peach trees are liable to be killed by the severe winters. Grapes are grown successfully in all parts of the State, the Catawba and Concord being the most common varieties. Plums succeed well where the curculio does not destroy the fruit. The small fruits, gooseberries, raspberries, currants, and strawberries, are cultivated with great success. Much attention is paid to tree culture, and many foreign trees have been introduced with excellent result. The Osage orange is much used for hedges in Southern Iowa, but does not succeed so well in the northern counties.

**Zoology.**—The rapid settlement of the State has driven out most of the larger wild animals; the buffalo and elk, both formerly abundant in Iowa, have now disappeared, though at long intervals a stray elk from Dakota appears in the N. W. of the State. Deer are occasionally found in the wooded districts, but they are not plentiful. The black bear was never very abundant in the State, and both he and the panther have long since disappeared. The large gray wolf and the wild-cat are very rare, and the mischievous coyote or prairie wolf is fast disappearing. There are a very few beavers and otters in some of the rivers, and muskrats, minks, raccoons, foxes, and opossums are not very rare. The birds common in all the Northern States are plentiful in Iowa, and there are a few which are rare in other States. Ravens are occasionally seen in the northern counties, the yellow-headed blackbird in the north-western part of the State, and paroquets in the southern tier of counties; among the game birds, wild-turkeys and partridges or ruffed grouse are often found in the wooded districts, and prairie-hens in great number in the prairies which are as yet unreclaimed. Quails, snipe, and woodcock are plentiful in their season, and some curlews are found. Geese, swans, and ducks visit the ponds and rivers of the State in spring and autumn in great numbers. The rivers of the State yield great quantities of excellent fish, among which are found the salmon, the lake-trout, white-fish, brook-trout, troutlet, brown and common catfish, perch, roach, etc.

**Climate.**—The very slight difference of elevation in the surface of the State causes the climate to be very uniform, the variety being only that of the difference in latitude and the small variation in altitude. The growing season of vegetation commences about ten days earlier on the southern than on the northern boundary. The average amount of rainfall does not vary so much as has been supposed from that on the Atlantic coast. Observations continued for thirty-two years make the mean annual rainfall (including the reduction of the snow to water) 42 inches for Iowa, while that of the same latitude on the Atlantic coast is about 45 inches. Less snow falls in Iowa than upon the Atlantic coast, but there is sufficient for several weeks' sleighing every winter. Both the Mississippi and Missouri generally freeze over opposite Iowa, and remain closed for two or three months in the winter. There have been but two winters in the past thirty-two in which they did not freeze over entirely, and in both these they remained open only below Davenport. All the small rivers freeze over solidly every winter. Observations of temperature continued from 1838 to 1870 at Muscatine and Iowa City, both on nearly the same parallel, give the following results: The maximum of summer heat occurred in July, 1870, when it reached 100° F., and the greatest winter cold in Jan., 1857, when the mercury in the thermometer stood at -30° F. The mean average temperature for each month of the year for the whole thirty-two years was as follows: Jan., 20° F.; Feb., 20°; Mar., 35°; Apr., 49°; May, 59°; June, 68°; July, 73°; Aug., 71°; Sept., 63°; Oct., 50°; Nov., 26°; Dec., 24°. The average annual temperature for the whole thirty-two years was 47° 57' F. The mean temperature of the spring was 47° 44'; of the summer, 70° 37'; of autumn, 49° 52'; and of winter 23° 37'. The following items in regard to the temperature of Keokuk, in the extreme S. E. corner of the State, are for the year from Oct., 1872, to Oct., 1873, and are from the chief signal-officer's report: Monthly range of the thermometer, Oct., 58°; Nov., 63°; Dec., 71°; Jan., 73°; Feb., 60°; Mar., 74°; Apr., 51°; May, 43°; June, 47°; July, 40°; Aug., 46°; Sept., 49°. Mean monthly temperature, Oct., 55.5°; Nov., 54.6°; Dec., 20.5°; Jan., 17.6°; Feb., 26.1°; Mar., 38.7°; Apr., 48.5°; May, 61.5°; June, 77.9°; July, 76.3°; Aug., 78.7°; Sept., 63.0°. Monthly rainfall, Oct., 0.42; Nov., 0.71; Dec., 0.50; Jan., 3.31; Feb., 0.53; Mar., 0.51; Apr., 5.65; May, 3.42; June, 1.21; July, 8.77; Aug., 0.54; Sept., 3.37—annual rainfall, 28.97. Iowa is within the zone of variable winds. In the thirty-two years referred to the wind blew on an average 70 days from the N. E.; 76 from the E. S. E.; 105 from the S. S. W.; 114 from the W. and N. W., making 219 days of westerly winds and 146 of easterly winds. The average time of the first flowering of apple trees at Muscatine is May 6;

at Dubuque, about a degree N., May 12. Iowa ranks high among the healthiest States of the Union.

**Agricultural Products.**—The amount of land in farms in 1870, according to the census, was 15,541,793 acres. Of this, 9,396,467, or a little more than one-fourth of the area of the State, were improved, and 6,145,326 acres unimproved land. The average size of farms was 134 acres. The value of farms was \$392,662,441, and of farming implements and machinery, \$20,509,582. The value of all farm productions was \$114,386,441; of animals slaughtered and sold for slaughter, \$20,781,223; of home manufactures, \$521,101; of forest products, \$1,200,468; of market-garden products, \$244,963; of orchard products, \$1,075,169; amount of wages paid during the year, \$9,377,878. Iowa was in 1870 the largest wheat-growing State in the Union except Illinois, her wheat crop that year amounting to 28,708,312 bushels of spring wheat and 727,380 bushels of winter wheat. The rye crop amounted to 505,807 bushels; that of Indian corn to 68,935,065 bushels, being second only to Illinois in this crop; the oat crop was 21,005,142 bushels; the barley crop, 1,960,779 bushels; and the buckwheat, 109,432 bushels. In 1872 the production of wheat had fallen off somewhat, and Iowa occupied the fifth place, her wheat product being in round numbers 22,080,000 bushels. Her Indian corn product had increased, but that of other States had increased in a still greater ratio, and she ranked third in that crop, producing 101,989,000 bushels. Of rye the crop of 1872 was 533,000 bushels; of oats, 19,934,000 bushels, a falling off of over 1,000,000 bushels; of barley, 2,194,000 bushels; of buckwheat, 162,000 bushels; the potato crop, which in 1870 was 5,914,620 bushels, had increased in 1872 to 6,631,000 bushels, aside from about 50,000 bushels of sweet potatoes raised in Southern Iowa. The hay crop, which in 1870 was 1,777,339 tons, in 1872 had fallen off to 1,664,000 tons. The value of these products in 1872 was estimated (probably an underestimate) at \$53,158,530. Of other agricultural products we have no statistics later than those of the census of 1870, when the State produced 695,518 pounds of flax, 2,967,043 pounds of wool, 171,113 pounds of hops, 71,792 pounds of tobacco, 15 hogsheads of sorghum-sugar, 146,490 pounds of maple-sugar, 1,218,636 gallons of sorghum-molasses (the crop of sorghum-molasses in 1872 was reported at 3,500,500 gallons), 9315 gallons of maple-molasses, 42,313 bushels of peas and beans, 2225 pounds of beeswax, 853,213 pounds of honey, 37,518 gallons of domestic wine, 2475 bushels of clover-seed, 88,621 bushels of flaxseed, 53,432 bushels of grass-seed. The value of all live-stock in the State in 1870 was reported as \$82,987,133; the number of horses as 433,642; of mules and asses, 25,485; of milch cows as 369,811; of working oxen, 22,058; of other cattle, 614,366; of sheep, 855,493; of swine, 1,353,908. In 1873, according to the report of the Iowa State Agricultural Society, the following were the numbers and aggregate value of the live-stock: horses, 634,400, valued at \$40,506,440; mules and asses, 36,400, valued at \$2,654,652; oxen and other cattle, 820,000, worth \$19,196,200; milch cows, 537,300, valued at \$15,130,368; sheep, 1,768,000, worth \$4,278,560; swine, 3,847,700, valued at \$17,199,219; making the entire valuation of live-stock in Jan., 1873, of \$98,984,439. The dairy products of Iowa in 1870 were 27,512,179 pounds of butter, 1,087,741 pounds of cheese, 688,800 gallons of milk sold. These have been very largely increased within the past four years.

**Manufacturing Industry.**—The increase in manufactures in Iowa has been very rapid. The very imperfect returns of manufactures in the census of 1870 give the State 6566 manufacturing establishments, driven by 899 steam-engines of 25,298 horse-power, and 726 water-wheels of 14,249 horse-power, employing in all 25,032 operatives, of whom 23,395 were men, 951 women, and 686 children, using capital estimated (very much below the truth) at \$22,420,183, paying for wages \$6,893,292, using raw material to the value of \$27,682,096, and producing goods worth \$46,534,322. The probability is that the annual product of the manufactures of the State is now not less than \$100,000,000. Of these products, the first in rank are flour and flouring-mill products; in 1870 there were 306 flouring mills, employing 1298 hands and \$433,123 capital, using \$9,385,363 of raw material, and producing \$12,298,882 of flour and meal. Next in importance was the manufacture of lumber, which was conducted in 339 mills, employing 3128 hands, and a capital estimated at \$4,711,001, using raw material valued at \$3,803,465, and producing lumber valued at \$6,237,110. Carriages and wagons were reported made in 449 establishments, by 1662 employes, of the annual value of \$1,932,143; wood in goods, in 68 mills, by 1038 hands, to the value of \$1,561,341. Cut meats were packed in 10 establishments, by 208 hands, to the value of \$1,190,100; snaddlery and harness in 25 establishments, by 879 hands, to the value of \$1,110,802; clothing, 196 estab-



lishments, to the value of \$1,003,732; agricultural implements and machinery in 55 establishments, by 552 hands, to the value of \$829,967; malt liquors in 101 breweries, to the value of \$992,848; furniture in 225 establishments, by 959 hands, to the amount of \$981,691; tin, copper, and sheet-iron ware, in 231 shops, employing 609 hands, to the amount of \$758,011; printing and publishing in 67 offices, to the amount of \$648,752; 20 machine-shops, employing 506 hands, produced steam-engines, etc. to the value of \$647,413; iron castings, to the amount of \$532,780; sash, doors, and blinds, 31 factories, producing \$467,586; cooperage, 136 shops, producing \$452,388; brick, 116 kilns, making bricks to the value of \$425,919; and 53 boot and shoe shops, producing goods to the value of \$423,283. The only other considerable industries were the bakeries, 58 in number, which produced goods to the value of \$315,530, and tobacco and cigar factories, of which there were 71, producing cigars, etc. to the amount of \$377,773.

**Mining Industry.**—Iowa has a considerable mining and quarrying interest, confined almost exclusively to coal, lead, and gypsum. In 1870 there were 131 of these mining establishments, employing 1628 hands and an estimated capital of \$756,224, paying wages to the amount of \$656,714, and producing the articles mined or quarried to the value of \$1,063,184.

**Railroads.**—At the close of the year 1873 there were 3800 miles of completed railroad in the State, 469 miles having been added since Jan., 1872. The principal rail-

roads are summarized in the following—the Chicago Rock Island and Pacific, connecting Davenport with Council Bluffs, 300 miles; the Burlington Cedar Rapids and Minnesota, connecting Burlington with Plymouth, 229 miles, and Plymouth with Austin, 32 miles; the Burlington and Missouri River, 349 miles; the Cedar Falls and Minnesota, running from Waterloo to the Minnesota State line, 75.5 miles; the Cedar Rapids and Missouri, connecting Cedar Rapids with Omaha, Neb., 271.5 miles, and Clinton with Lyons, 2.5 miles; the Central Iowa, running from the northern to the southern State line, and forming a portion of the line connecting St. Paul, Minn., with St. Louis, 203 miles; the Chicago Iowa and Nebraska, connecting Clinton with Cedar Rapids, 81.5 miles; the Chicago and South-western, from Washington to Leavenworth, Kan., 271 miles; the Des Moines Valley, from Keokuk to Des Moines, 248.5 miles; the Dubuque and Sioux City, 143 miles; the Dubuque and South-western, from Farley to Cedar Rapids, 54.75 miles; the Iowa Falls and Sioux City, 184 miles; and the Sioux City and Pacific, from Sioux City to Fremont, Neb., 107 miles. Besides these there are numerous short connecting lines. With these great highways traversing every part of the State, and her eastern and western boundaries washed by two great rivers, Iowa has excellent commercial facilities. The following table, compiled from *Poor's Rail and Manual for 1874-75*, gives the condition of the railroads of Iowa about the beginning of Jan., 1874.\*

NAMES OF RAILROADS.	LENGTH.		GENERAL LIABILITIES.			Cost of railroad, equipment, etc.	TRAFFIC.		GROSS EARNINGS.				Earnings less operating expenses.
	Main and branch.	All other tracks.	Capital stock.	Funded debt.	Total stock, bonds, and debt.		Passengers carried.	Freight moved.	From passengers.	From freight.	All other.	Total amount.	
	Miles.	Miles.	\$	\$	\$	\$	No.	Tons.	\$	\$	\$	\$	\$
Burlington Cedar Rapids and Minnesota.....	389.75	14.00	.....	7,600,000	7,600,000	7,600,000	.....	.....	300,000	700,000	59,809	1,059,809	411,115
Burlington and South-western.....	118.60	40.00	2,000,000	1,900,000	3,900,000	3,900,000	.....	.....	40,000	69,135	.....	109,135	.....
Cedar Falls and Minnesota.....	75.60	3.00	1,587,000	1,587,000	3,174,000	3,174,000	.....	.....	44,675	85,074	.....	129,750	112,000
Cedar Rapids and Missouri River.....	274.00	10.00	7,620,000	3,614,000	11,234,000	11,234,000	.....	.....	400,000	1,250,000	51,771	1,701,771	529,555
Central Iowa.....	159.00	15.00	.....	5,000,000	5,000,000	5,000,000	87,941	184,148	153,000	441,000	41,053	615,053	.....
Chicago Clinton and Dubuque.....	60.00	2.50	960,000	1,500,000	2,460,000	2,460,000	33,315	51,061	39,013	65,103	4,168	108,172	31,312
Chicago Dubuque and Minnesota.....	134.00	11.00	2,500,000	4,425,000	6,925,000	6,925,000	61,560	114,942	97,020	193,938	22,901	313,839	153,862
Chicago Iowa and Nebraska.....	81.00	17.90	3,916,200	779,700	4,695,900	4,695,900	.....	.....	300,000	700,000	56,292	1,056,292	396,110
Davenport and St. Paul.....	136.00	10.00	.....	3,120,000	3,120,000	3,120,000	.....	.....	50,000	120,000	9,369	189,369	.....
Des Moines and Fort Dodge.....	88.00	20.00	4,000,000	2,400,000	6,400,000	6,400,000	.....	.....	200,000	551,000	.....	751,000	149,413
Des Moines Valley.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Dubuque and Sioux City.....	142.90	14.80	5,000,000	882,000	5,882,000	5,882,000	.....	.....	271,189	890,287	.....	1,071,466	318,893
Dubuque South-western.....	55.00	3.70	1,150,000	528,500	1,700,300	1,711,676	40,813	45,559	41,312	73,120	8,529	122,961	28,990
Iowa Falls and Sioux City.....	184.00	6.60	4,625,000	2,960,000	7,585,000	7,585,000	.....	.....	146,318	262,250	.....	408,568	142,999
Iowa Midland.....	71.40	.....	.....	1,314,000	1,314,000	1,467,147	.....	.....	30,000	50,000	4,781	84,781	1,980
Keokuk and Des Moines.....	161.50	14.00	3,924,600	2,153,720	6,078,320	6,078,320	.....	.....	.....	.....	.....	.....	.....
Missouri Iowa and Nebraska.....	85.00	4.00	1,500,000	2,000,000	3,500,000	2,000,000	.....	.....	.....	.....	.....	.....	.....
Sioux City and Pacific.....	107.00	15.00	2,000,000	1,628,000	3,628,000	3,696,500	.....	.....	73,461	169,507	8,962	261,930	60,766
Total.....	2,373.55	201.50	40,882,105	43,292,010	84,174,115	82,891,533	.....	.....	1,145,998	2,790,279	145,422	7,983,988	2,570,235

**Finances.**—In 1870 the assessed valuation of real and personal estate was \$302,515,418, and the estimated true valuation, \$717,644,750. The taxation for all purposes, State, county, city, town, etc., was \$9,055,614, of which the State received only \$832,918, the counties, \$3,052,931, and the towns, cities, etc., \$5,169,765. The State had no debt, but the debts of the counties were \$3,732,929, and of the towns, cities, etc., \$3,775,706. The fiscal reports of the treasurer and auditor are made up biennially. The latest is that of Nov. 15, 1873. The treasurer had received during the two years ending with that date, including a balance of \$81,740.84 on hand at the beginning of the biennial period, \$2,211,318.35, and had disbursed in the same time \$2,180,100.69, leaving at the close of the fiscal year a balance of \$31,217.66. The estimated receipts for the next two years were \$1,973,800, and the expenditures provided for by law amounted to \$1,474,000, leaving \$499,800 to be applied for special purposes. The amount of taxation for all purposes under the levy of 1872 was \$10,711,925.49, or 2.94 per cent. of the valuation. This valuation amounted to \$369,849,503.91, which would make the true valuation about \$863,000,000. The amount of the permanent school fund is \$3,294,742.83, an increase of \$133,249.82 since 1871. There were patented in 1871-73, 48,817.08 acres of school lands, 2320 acres of university lands, and 11,643.43 acres of swamp-lands. The selection of swamp-lands made in the several counties under the act of Congress of 1872 amounted to 865,770.46 acres. The entire grants made within the State for railroads and other internal improvements now amount to 4,898,668.88 acres.

**Commerce.**—The State has a port of entry at Dubuque, with a fine custom-house built by the U. S. government. Its internal and inter-State commerce has been estimated on good authority to exceed \$500,000,000 annually.

**Banks, Savings Banks, Insurance Companies, etc.**—There

are 80 national banks in operation in Iowa. They had, Nov. 1, 1874, \$6,261,480 capital paid in, \$6,095,000 bonds on deposit, \$7,984,805 circulation issued, of which \$5,602,869 was outstanding. There were also 20 State banks, having an aggregate capital of \$1,200,000, and deposits amounting to \$2,898,954.58. There were 18 savings banks, with capital and deposits of \$1,247,600. There were also 163 private banking-houses. There were 8 fire insurance companies in the State in July, 1873, 2 of them mutual; and the capital of the 6 stock companies was \$335,025, and the assets of all about \$908,000. During the year ending May 15, 1873, the amount of premiums received by these companies was \$362,026.15, the amount of losses paid, \$90,016.95. The aggregate expenditures were \$273,978.69, the aggregate income from all sources, \$425,943.74. Fifty companies from other States received during the same year \$1,029,102.94 in premiums, and paid for losses \$386,378.14. There is but one life insurance company in the State, organized in 1867 with \$100,000 capital, which had \$180,650 assets in July, 1873. In the year preceding it had issued 282 new policies and received \$45,813.29 in premiums, covering insurances to the amount of \$425,021. Forty-one life insurance companies of other States did business in Iowa, receiving \$1,037,622.34 in premiums and paying \$231,531.09 in losses.

**Population.**—Iowa has but a brief history, and its record of population dates back but about forty years. The whites were first permitted to settle within the present limits of the State in June, 1833, and very few actual settlements were made before 1834. In 1840 there were 43,112

\* In the year 1874 the railroads had increased till their mileage in Jan., 1875, was 4314.43, and the cost of roads, equipment, etc., \$142,319,729.

† Operated by the Burlington and South-western R. R.



inhabitants; in 1846, when it was admitted as a State, 97,588; in 1850 the number of inhabitants was 192,214; in 1860, 674,913; in 1870, 1,191,020; in 1873, by State census, 1,251,333. The immigration, except in the new counties, is very nearly balanced by the emigration to Missouri and the States and Territories farther W. The density of the population to the square mile was in 1850, 3.49; in 1860, 12.26; in 1870, 21.69; in 1873, 22.73. The number of families in 1850 was 33,047, averaging 5.73 persons to a family; in 1860, 124,028 families, averaging 5.44 to a family; in 1870, 222,430 families, averaging 5.37 to a family. Of the 1,191,020 inhabitants of the State in 1870, 989,328 were natives of the U. S., and 201,692 of foreign birth. Of those born in the U. S., 416,139 were partially or wholly of foreign parentage, and 369,971 had both father and mother of foreign birth. Of those who were natives of the U. S., 128,620 were born in the State, 126,285 in Ohio, 79,143 in New York, 73,435 in Pennsylvania, 65,391 in Illinois, 64,083 in Indiana, 24,309 in Wisconsin, 19,563 in Virginia, 14,186 in Kentucky, 13,831 in Missouri, 12,204 in Vermont, 8929 in Massachusetts, 8918 in Michigan, 5185 in Connecticut, 5688 in New Jersey, 5090 in North Carolina, 5066 in New Hampshire, 5943 in Maine, 5972 in Maryland, and less than 1000 in any other State. Of the 204,692 persons of foreign birth in the State, 66,162 were from the different German states, 65,442 from Great Britain and Ireland (of whom 40,124 were from Ireland, 17,907 from British America, mostly from Canada), 17,556 from Norway, 10,796 from Sweden, 2827 from Denmark, 6766 from Bohemia, 4513 from Holland, 3937 from Switzerland, 3130 from France, 2691 from Austria, 1344 from Luxemburg, 650 from Belgium, and 598 from all other countries. There were 5762 colored persons (3099 males and 2663 females) in the State. Of the white population, which numbered 1,188,207, 622,786 were males and 565,421 females. Of the native population, 510,864 were males and 478,464 females; of the foreign-born, 115,053 were males and 89,630 females. There were but 48 Indians in the State, of whom 29 were males and 19 females. Of the 625,917 males in Iowa, 240,769 were of military age (between 18 and 45 years); of these, 173,060 were of native and 67,709 of foreign birth; 1425 were colored; 290,717 were of the age of citizenship (21 years old and upward), and of these, 255,802 were citizens. There were 394,696 persons of school age (5 to 18 years), of whom 201,531 were males and 193,165 females. According to the State census of 1873, there were at that time 491,344 persons of school age in the State, but the school age prescribed by the State is between 5 and 21 years.

*Education.*—In 1870 there were, according to the census, 306,353 persons who attended the schools of the State, public and private, during some portion of the year. Of these, 13,000 were of foreign birth. There were 160,269 white male and 145,421 white female scholars; and 661 colored, of whom 346 were males and 315 females; there were also 2 Indian pupils. The number of inhabitants of all races, 10 years old and over, unable to read and write was 45,671, of whom 20,692 were of foreign birth and 44,145 were whites; of these, 5858 (3401 males and 2457 females) were from 10 to 15 years of age; 3680 (2044 males and 1636 females) were from 15 to 21 years of age; and 34,607 (11,782 males and 19,825 females) were over 21 years of age. Of the 1,244 colored illiterates, 70 (32 males and 38 females) were from 10 to 15 years of age; 146 (71 males and 75 females) were from 15 to 21 years of age, and 1308 (635 males and 673 females) were over 21 years. The whole number of educational institutions in 1870 was 7496, having 9349 teachers (3666 males and 5683 females) and 217,654 pupils (105,665 males and 111,989 females). The total income of these was \$3,470,693, of which \$65,150 was derived from endowment, \$3,317,629 from taxation and public funds, and \$159,314 from tuition and other sources. There were 7322 public schools, with 8866 teachers (of whom 2381 were males and 5485 females), and 205,923 pupils (100,308 males and 105,615 females). The total income of these public schools was \$3,245,352, of which \$3100 was derived from endowment, \$3,241,752 from taxation and public funds, and \$900 from tuition and other sources. According to the census, there were 21 colleges, with 139 teachers (109 males and 30 females) and 1,061 students (1468 males and 1376 females). The total income of these colleges was \$101,950, of which \$4,000 was derived from endowment, \$10,000 from taxation and public funds, and \$87,950 from tuition and other sources. There were 34 academies, with 103 teachers (46 males and 57 females) and 2533 pupils (1019 males and 1514 females), and an income of \$1,889, derived from tuition and other sources. There were also 100 boarding and day schools, private schools, having 136 teachers (64 males and 72 females) and 44872 pupils (1741 males and 3131 females), and an income of \$38,550, derived from tuition and other sources. The pub-

lic school statistics to the beginning of the year 1873 were: number of ungraded schools, 8163; of graded schools, 460; of persons between 5 and 21 years of age, 474,350 (males 243,522, females 230,828); scholars enrolled in the schools, 349,633; average attendance, 218,131; average time schools are taught, 6 months and 14 days; number of teachers, 15,193 (males 5888, females 9305); average compensation of male teachers, \$36 per month; of female teachers, \$29.32 per month; average cost of tuition per week for each pupil, \$0.42; number of school houses, 8255; total value of school-houses, \$7,460,381.19. By the State census of 1873 the number of persons of school age in the State was reported as 491,344, and there was an increase of 932 school districts. The total amount expended in 1873-74 for school purposes was \$4,229,455. There is a State university at Iowa City, which has 32 professors, 263 students, besides the normal class, and 4 departments—collegiate, normal, law, and medical. Its assets are \$232,221.50, and its income for the two years ending June 3, 1873, \$122,041.29. Its expenses from June 21, 1871, to Oct. 1, 1873, were \$103,415.93. There is to be a department of dental medicine established in connection with it. It still holds 7840 acres of its land-grant, which are valued at nearly \$30,000. The agricultural college at Ames was organized in 1869. It has 12 professors, 220 students, and has good buildings and the avails of 240,000 acres of government lands, of which, however, 22,765 are not yet leased or sold. It has received considerable appropriations from the State. There are 16 universities and colleges (only 3 of them, however, having post-graduate or professional schools—viz. Iowa Wesleyan University, Cornell College, and Griswold College) which are not State institutions. Of these, 4 are under the patronage of the Methodist Episcopal Church, 3 under that of the Baptists, 3 Lutheran, 2 Congregational, 1 Friends, 1 Episcopal, 1 Christian, and 1 un denominational. Iowa College, the oldest, dates back to 1848; the others range between 1854 and 1870. These colleges have about 130 professors, and about 1850 students, and libraries containing over 40,000 volumes. There is a scientific department to Cornell College; theological departments to Griswold College and Iowa Wesleyan University, the Wartburg Lutheran Theological Seminary at Casstown, and the German Reformed Theological Seminary of the North-west at Dubuque; law departments to Iowa State and to Iowa Wesleyan universities; a medical department of Iowa State University at Iowa City; a college of physicians and surgeons at Keokuk; and a department of pharmacy of the Iowa Wesleyan University at Mount Pleasant. There are 5 or 6 academies of high grade at Davenport, Dubuque, Denmark, and Irving. Of training or normal schools, there are departments attached to the State University, to Iowa College at Grinnell, and to Whittier College at Salem. In these in 1872 there were 225 students. Of special schools of education, there is the Iowa college for the blind at Vinton, with 112 students and 32 teachers and employes, property of the estimated value of \$250,000, and an annual income from the State of \$24,000; the institution for the deaf and dumb at Council Bluffs, with 6 instructors and 119 pupils, property valued at \$179,000, and an income of \$25,000 from the State; the soldiers' orphan homes, three in number, at Davenport, Cedar Falls, and Glenwood, with 508 children in their care and an annual expense of \$146,050; a State reform school for boys at Eldora, on a farm of 440 acres, the buildings costing \$80,000, and having 145 boys in charge; a girls' reform school near Salem in Lee co., on a small farm, with 11 inmates. The State prison at Fort Madison has 276 prisoners; a new one has been established at Anamosa, where there are 25 prisoners. There are 2 insane hospitals in the State; that at Mt. Pleasant had in Nov., 1873, 495 patients; and its expenses for the two years preceding had been \$229,441.25. The new hospital at Independence is not yet completed, but at the close of 1873 had 152 patients.

*Statistics of Crime.* The whole number of convicts in prison during the year ending June 1, 1870, is stated to have been 615, of whom 397—287 natives (273 white and 14 colored) and 110 persons of foreign birth—remained in prison June 1, 1870. This can only refer to the State penitentiaries, for in these, as we have seen, there were in 1872 over 300 prisoners, or if the reform schools are included, 457 prisoners. The 99 county jails and the several city penitentiaries and police prisons can hardly have been without inmates.

*Libraries.* In 1870 there were 240 libraries, public and private, containing 653,600 volumes, of which 1143 were public libraries, containing 377,851 volumes. Of these, the State library at Des Moines has 11,000 volumes, 23 town and city libraries, 22,808 volumes; 41 court and law libraries, 944 volumes; 14 school and college libraries, 18,747 volumes; 1084 church and Sunday school libraries, with 203,855 volumes; 1 literary society, with 140 volumes; 18



circulating libraries, with 20,367 volumes. The 2387 private libraries had an aggregate of 295,749 volumes.

**Newspapers.** In 1870 there were 235 newspapers of all classes in the State, issuing annually 16,403,380 copies, and having an aggregate circulation of 219,090. The number in 1874 exceeds 300, and the circulation has increased correspondingly. Of those published in 1870, 22 were dailies, with an aggregate circulation of 19,800; 3 tri-weeklies, with a circulation of 1650; 1 semi-weekly, with a circulation of 1000; 196 weeklies, with a circulation of 187,840; 3 semi-monthlies, with 3400 circulation; 5 monthlies, with 3950 circulation; 2 bi-monthlies, with 750 circulation; and 1 quarterly, with 700 circulation.

**Churches.**—In 1870 there were reported by the census 2763 churches, with 1416 church edifices, 431,709 sittings, and \$8,730,362 of church property. Of these, the Baptists had 352 churches, 165 church edifices, 50,690 sittings, \$668,900 of church property. In 1873, according to the *Baptist Year Book* for 1875, the regular Baptists had 379 churches, 252 ordained ministers, 20,734 members, 254 Sunday schools, 20,541 teachers and scholars, 26,546 volumes in Sunday school libraries, and \$126,025 of benevolent contributions, aside from church expenses. There are a considerable number of churches of the minor Baptist denominations, as Mennonites, Tunkers, "Church of God," etc., in the State, enumerated with Baptists in the census, but not in the *Year Book* statistics. The Christian Connection had, including also the "Disciples," in 1870, according to the census, 113 churches, 48 church edifices, 15,750 sittings, and \$124,450 of church property. The Congregationalists had 187 churches, 125 church edifices, 33,925 sittings, and \$529,570 of church property. In 1874 they had, according to the *Congregational Quarterly*, 224 churches, 198 ministers, and 12,803 communicants. The Protestant Episcopal Church in 1870 had 58 parishes, 36 church edifices, 9584 sittings, and \$192,862 of church property. In 1874, according to the *Church Almanac*, there were 57 parishes, 45 clergymen, 2991 communicants, 3220 Sunday school teachers and scholars, and \$75,643 of benevolent contributions, aside from church and parish expenses. The Evangelical Association (Albright's) had in 1870, 32 churches, 11 church edifices, 2400 sittings, and \$22,800 of church property; in 1873 they had 51 itinerant and 53 local preachers, 70 churches, and 4717 communicants. In 1870 the Friends had 82 meetings, 60 meeting-houses, 17,075 sittings, and \$125,800 of meeting-house property. The Lutherans in 1870 had 79 churches, 45 church edifices, 12,285 sittings, and \$113,950 of church property. As nearly as can be ascertained, in 1873 they had 122 churches, 79 ministers, and about 15,000 communicants. The Methodist Church, in 1870, had 982 churches, 492 church edifices, 142,655 sittings, and \$1,490,220 of church property. In 1873 the Methodist Episcopal Church had 4 conferences within the State, 627 church edifices, 534 itinerant and 868 local preachers, 52,026 members, besides probationers, \$1,839,892 of church property, 1035 Sunday schools, and 73,433 Sunday school teachers and scholars. There were also a large number of churches adhering to the Methodist Episcopal Church, South, and many belonging to the different minor Methodist denominations. The Presbyterian Church (including the Northern and Southern and United Presbyterian Churches) in 1870 had 375 churches, 222 church edifices, 64,890 sittings, and \$962,325 of church property. In 1873 the Presbyterian Church, North, had 2 synods, 10 presbyteries, 222 ordained ministers, 348 churches, and 16,991 members. The United Presbyterian Church in 1873 had 5 presbyteries, 58 ministers, 91 churches, and 5396 members. The Cumberland Presbyterian Church in 1872 had 4 presbyteries, 20 ministers, about 30 churches, and nearly 4000 members. The Reformed Church (late Dutch) in 1870, had 4 churches, 4 church edifices, 1500 sittings, and \$25,000 of church property. The Reformed Church (late German) had 13 churches, 13 church edifices, 3950 sittings, and \$46,000 of church property. Owing to the arrangement of synods and classes, the statistics of neither of these churches for the State can be separated. The Roman Catholic Church in 1870 had 216 congregations, 165 church edifices, 57,280 sittings, and \$1,216,150 of church property. According to the *Catholic Directory*, in 1874 they had 135 priests, 250 churches, chapels, and stations, but only 108 church edifices, and an adherent population of about 70,000. In 1870 there were 28 Second Advent churches, with 10 church edifices, 2950 sittings, and \$13,050 of church property. There were 3 Unitarian congregations, 2 church edifices, 715 sittings, and \$19,000 of church property. The United Brethren in Christ (German Methodists) in 1870 had 188 churches, 28 church edifices, 10,445 sittings, and \$69,250 of church property. In 1874 they had 4 conferences, 327 churches, 171 ministers, and 7449 members. The Universalists in 1870 had 35 congregations or parishes, 15 church edifices, 4465 sittings,

and \$99,525 of church property. In 1873 they had 59 parishes, 24 organized churches, 1100 adherent families, and 782 members. There are a considerable number of churches of the minor denominations, such as Christian Union, Christadelphians, New Jerusalem Church, etc., and a body of 4000 or more Mormons, not included in the above statement, but there are not sufficient data for giving any accurate statistics concerning them.

**Constitution, Courts, Representatives in Congress, etc.**—When Iowa was admitted into the Union as a State, her people had adopted a constitution which remained the supreme law of the State until 1857, when a new constitution was prepared by a convention called for the purpose, and adopted by the people. This constitution remains in force to the present time, except that in the 2d article, on the right of suffrage, the word "white" was stricken out, by vote of the people in 1868, thus giving to colored persons the same privileges and responsibilities as were before granted to whites only. That section now provides that "every male citizen of the U. S., of the age of twenty-one years, who shall have been a resident of this State six months next preceding the election, and of the county in which he claims his vote sixty days, shall be entitled to vote at all elections which are now or hereafter may be authorized by law. All elections by the people shall be by ballot." The legislature consists of a senate of fifty members elected for four years in senatorial districts, and a house of representatives of 100 members elected for two years in representative districts. Senators must be citizens and at least twenty-five years of age; representatives must be citizens and not under twenty-one years of age. The sessions of the legislature are biennial. The executive officers of the State—the governor, lieutenant-governor, secretary of state, auditor, treasurer, superintendent of public instruction, and register of the state land-office—are elected by the people of the State at the general election for the term of two years. The judicial department comprises a supreme court, district court, and circuit court. The supreme court consists of four judges, who are elected by the people and serve for six years, but are so classified that their terms of office close at different dates. Each judge in succession becomes chief-justice before his term expires. The supreme court is both a court of errors and a court of appeal. The attorney-general is elected for two years, and the reporter and clerk of the supreme court for four years each. The State is divided into fourteen judicial districts, and every four years the people of each district elect one judge of the district court, one judge of the circuit court, and one district attorney, who serve for four years each. There are no county courts, but both the district and circuit courts are held successively, but at different times, in each county of the district. Under the apportionment of 1872 Iowa has nine members of Congress.

**Counties.**—There are 99 counties in the State, and the following table gives their population by sexes in 1870, and total population in 1860 and 1850:

COUNTIES.	Males, 1870.	Females, 1870.	Total pop. 1870	Total pop. 1860	Total pop. 1850.
Adair.....	2,178	1,804	3,982	984	
Adams.....	2,470	2,144	4,614	1,533	
Allamakee.....	9,310	8,549	17,868	12,237	777
Appanoose.....	8,498	7,958	16,456	11,931	3,131
Audubon.....	659	553	1,212	454	
Benton.....	11,846	10,608	22,454	8,496	672
Black Hawk.....	11,381	10,325	21,706	8,244	135
Boone.....	7,577	7,007	14,584	4,232	735
Bremer.....	6,647	5,881	12,528	4,915	
Buchanan.....	8,869	8,165	17,034	7,906	517
Buena Vista.....	907	678	1,585	57	
Butler.....	5,268	4,683	9,951	3,724	
Calhoun.....	834	768	1,602	147	
Carroll.....	1,332	1,119	2,451	281	
Cass.....	2,923	2,541	5,464	1,612	
Cedar.....	10,297	9,434	19,731	12,949	3,941
Cerro Gordo.....	2,634	2,088	4,722	940	
Cherokee.....	1,156	811	1,967	58	
Chickasaw.....	5,228	4,952	10,180	4,336	
Clarke.....	4,473	4,262	8,735	5,427	79
Clay.....	868	635	1,503	52	
Clayton.....	14,455	13,316	27,771	20,728	3,873
Clinton.....	18,694	16,663	35,357	18,938	2,822
Crawford.....	1,387	1,143	2,530	383	
Dallas.....	6,392	5,627	12,019	5,244	854
Davis.....	7,898	7,667	15,565	13,764	7,264
Decatur.....	6,197	5,821	12,018	8,677	965
Delaware.....	8,998	8,434	17,432	11,024	1,759
Des Moines.....	14,191	13,065	27,256	19,611	12,988
Dickinson.....	745	644	1,389	180	
Dubuque.....	20,013	18,956	38,969	31,164	10,841
Emmet.....	757	635	1,392	105	
Fayette.....	8,744	8,229	16,973	12,073	825
Floyd.....	5,705	5,063	10,768	3,744	
Franklin.....	2,360	2,178	4,538	1,309	
Fremont.....	5,980	5,194	11,174	5,074	1,244
Greene.....	2,462	2,165	4,627	1,374	
Grundy.....	3,472	2,927	6,399	793	
Guthrie.....	3,758	3,303	7,061	3,058	



COUNTIES.	Male, 1870.	Females, 1870.	Total pop. 1870.	Total pop. 1860.	Total pop. 1850.
Hamilton.....	3,203	2,852	6,055	1,699	
Hancock.....	524	475	999	179	
Hardin.....	7,360	6,624	13,984	5,440	
Harrison.....	4,750	4,172	8,922	3,621	
Henry.....	10,064	10,499	21,463	18,701	8,707
Humboldt.....	3,300	2,883	6,282	3,168	
Iowa.....	1,408	1,188	2,596	332	
Iowa.....	124	102	226	43	
Jackson.....	8,671	7,973	16,644	8,029	822
Jasper.....	11,688	10,931	22,619	18,493	7,210
Jessie.....	11,601	10,515	22,116	9,883	1,280
Jefferson.....	9,248	8,591	17,839	15,038	9,904
Johnson.....	12,889	11,999	24,888	17,573	4,472
Jones.....	10,273	9,458	19,731	13,306	3,007
Keokuk.....	10,079	9,355	19,434	13,271	4,822
Kossuth.....	1,824	1,527	3,351	416	
Lee.....	19,265	17,585	36,850	29,232	18,861
Linn.....	16,233	14,847	31,080	18,947	5,444
Louis.....	6,743	6,134	12,877	10,370	4,939
Lucas.....	5,368	5,020	10,388	5,766	471
Lyons.....	131	90	221		
Madison.....	7,325	6,559	13,884	7,339	1,179
Mahaska.....	11,490	11,018	22,508	14,816	5,989
Marion.....	12,579	11,857	24,436	16,843	5,482
Marshall.....	9,387	8,195	17,582	6,015	338
Mills.....	4,808	3,910	8,718	4,481	
Mitchell.....	5,068	4,514	9,582	3,409	
Monona.....	1,995	1,659	3,654	832	
Monroe.....	6,671	6,053	12,724	8,612	2,884
Montgomery.....	3,356	2,578	5,934	1,256	
Muscatine.....	11,175	10,513	21,688	16,444	5,731
O'Brien.....	404	311	715	8	
Oceola (new co.)					
Pace.....	5,292	4,683	9,975	4,419	551
Palo Alto.....	756	580	1,336	132	
Plymouth.....	1,245	954	2,199	148	
Pocahontas.....	785	661	1,446	103	
Polk.....	14,527	13,330	27,857	11,623	4,513
Pottawattamie.....	9,189	7,704	16,893	4,968	7,828
Poweshiek.....	8,456	7,125	15,581	5,668	615
Ringgold.....	2,047	2,744	4,791	2,923	
Sac.....	775	636	1,411	246	
Scott.....	20,157	18,442	38,599	25,959	5,986
Shelby.....	1,358	1,182	2,540	818	
Sioux.....	320	256	576	10	
Story.....	6,088	5,563	11,651	4,051	
Tama.....	8,595	7,536	16,131	5,285	8
Taylor.....	3,635	3,354	6,989	3,590	204
Union.....	3,199	2,787	5,986	2,012	
Van Buren.....	9,059	8,613	17,672	17,081	12,270
Wapello.....	11,669	10,677	22,346	14,518	8,471
Warren.....	9,286	8,694	17,980	10,281	901
Washington.....	9,766	9,186	18,952	14,235	4,957
Wayne.....	5,853	5,434	11,287	6,409	340
Webster.....	5,598	4,886	10,484	2,504	
Winneshiek.....	820	742	1,562	168	
Woodbury.....	12,424	11,146	23,570	13,942	516
Woodworth.....	3,477	2,695	6,172	1,119	
Worth.....	1,518	1,374	2,892	756	
Wright.....	1,275	1,117	2,392	653	
Total.....	625,917	568,103	1,194,020	674,913	192,214

**Principal Towns.**—Davenport and Dubuque are the only cities of from 20,000 to 25,000 inhabitants; Burlington, Keokuk, and Des Moines (the capital) have from 15,000 to 20,000; Council Bluffs is the only city having between 10,000 and 15,000 inhabitants; Muscatine, Clinton, Iowa City, Cedar Rapids, and Ottumwa have from 6,000 to 8,000; Lyons, Waterloo, Fort Madison, Fort Dodge, Mount Ver-

non, Cedar Falls, Sioux City, Oskaloosa, and Marshalltown have from 4,000 to 6,000 each.

**History.**—The whole region lying between the Mississippi and Missouri rivers in the North-west, as well as much of the country S. of the Missouri, was claimed by the French on the ground of Marquette's discoveries in 1673, and was transferred to Spain by treaty in 1763. In 1800, Spain ceded it back to France, and it was sold as part of the Louisiana purchase to the U. S. in 1803. In 1804 the Louisiana district, which included what is now the State of Iowa, was placed under the jurisdiction of Indiana Territory, but the next year it was organized as a distinct Territory with a government of its own. In 1812 the name was changed to Missouri Territory. In 1834 all that part of Missouri Territory N. of the State of Missouri and W. of the Mississippi was placed under the jurisdiction of Michigan Territory. In 1836, Wisconsin Territory was organized, and Iowa made a district of it, with the seat of government for the whole Territory fixed at Burlington. In 1838, Iowa Territory was organized, and in 1839 the capital of the Territory removed from Burlington to Iowa City. The Territory was admitted into the Union as a State, with the boundaries described at the beginning of this article, Dec. 28, 1846. In 1857, at the time of the adoption of the new constitution, the capital was removed from Iowa City to Des Moines, where it now remains. The present Territory of the State was for many years in possession of the Sioux, Sac, Fox, and Iowa tribes of Indians, but by repeated treaties with the Indians their title to the land was extinguished, and they all removed westward, until in 1870 there were but 48 Indians in the State. A few Frenchmen had settled at Montrose and Dubuque before the close of the last century, and some French pioneers and American hunters had long lived among the Indians, but the first settlements of whites permitted by the U. S. government within the present limits of Iowa were made in 1833-34 at Fort Madison, Burlington, and Dubuque. The first counties organized were Des Moines and Dubuque. The first train of cars run in Iowa started from Davenport in 1855 over the Mississippi and Missouri road. Since its admission to the Union the growth of Iowa has been rapid and uninterrupted, and its prosperity steady. At the commencement of the late civil war the State, under the management of the patriotic governor, Kirkwood, made great exertions, and during the war sent 83,000 men, its full quota, into the field. During that period the wives, sisters, and daughters of its soldiers, by the aid of agricultural machinery, planted, gathered, and harvested its crops, and kept the State up to its full measure of productiveness, and when peace returned its prosperity and resources were found to be very slightly impaired.

#### Governors of the State.

Territory.		James W. Grimes....	1854-58
Robert Lucas.....	1838-41	Ralph P. Lowe.....	1848-50
John Chambers.....	1841-46	Samuel J. Kirkwood....	1860-64
James Clark.....	1846-46	William M. Stone.....	1864-68
State.		Samuel Merrill.....	1868-72
Ansel Briggs.....	1846-50	Cyrus C. Carpenter....	1872-76
Stephen Hempstead..	1850-54	Samuel J. Kirkwood....	1876-

#### Electoral and Popular Vote at Presidential Elections.

Iowa was not admitted into the Union as a State until 1846, and her first Presidential vote was at the election of 1818.

Elect. year.	Candidates who received the electoral vote.	Elect. vote.	Pop. vote.	Candidates.	Pop. vote.	Candidates.	Pop. vote.
1818	Lewis Cass P.....	4	12,093	Zach. Taylor P.....	11,084	Martin Van Buren P.....	1,126
	W. O. Butler V. P.....			M. Fillmore V. P.....		C. F. Adams V. P.....	
1852	Franklin Pierce P.....	4	17,763	Winfield Scott P.....	15,856	J. P. Hale P.....	1,604
	William R. King V. P.....			W. A. Graham V. P.....		G. W. Julian V. P.....	
1856	John C. Fremont P.....	4	43,951	James Buchanan P.....	36,170	M. Fillmore V. P.....	9,180
	W. L. Dayton V. P.....			J. C. Breckenridge V. P.....		A. J. Donelson V. P.....	
1860	Abraham Lincoln P.....	4	70,400	S. A. Douglas P.....	55,111	J. Bell P.....	1,763
	H. Hamlin V. P.....			H. V. Johnson V. P.....		E. Everett V. P.....	
1864	Abraham Lincoln P.....	8	89,075	G. B. McClellan P.....	49,596	J. C. Breckenridge P.....	1,048
	A. Johnson V. P.....			G. H. Pendleton V. P.....		Joseph Lane V. P.....	
1868	U. S. Grant P.....	8	129,399	Horatio Seymour P.....	74,040		
	Schuyler Colfax V. P.....			F. P. Blair V. P.....			
1872	U. S. Grant P.....	11	131,566	Horace Greeley P.....	71,196	C. O'Connor P.....	2,221
	Henry Wilson V. P.....			R. Gratz Brown V. P.....			

We acknowledge our obligations for many facts relative to the physical and political geography and history of Iowa, to Prof. C. A. White's *Manual of the Physical Geography and Institutions of Iowa*, published in 1874.

L. P. BROCKETT.

**Iowa**, a river in the State of the same name, rises in Hancock co., near the Minnesota line, flows S. E. for 300 miles, passing by Iowa City, the former capital of the State, and enters the Mississippi 35 miles N. of Burlington. It is navigable for small steamers to Iowa City, 80 miles from the mouth.

**Iowa**, county of S. E. Central Iowa. It is rolling and fertile; cattle, grain, and wool are staple products. Area, 576 square miles. It is on the Iowa River and the Chicago Rock Island and Pacific R. R. Cap. Marquette. Pop. 16,544.

**Iowa**, county of the S. W. of Wisconsin. Area, about 750 square miles. It is bounded on the N. by Wisconsin River. The surface is somewhat broken. Timber is not abundant. The soil is very fertile. Cattle, grain, and wool are staple products. Lead is extensively mined, and copper and zinc are found. Carriages and wagons are leading manufactures. Cap. Dodgeville. Pop. 24,544.



**Iowa**, tp. of Allamakee co., Ia. Pop. 347.

**Iowa**, tp. of Benton co., Ia. Pop. 2639.

**Iowa**, tp. of Cedar co., Ia. Pop. 1168.

**Iowa**, tp. of Dubuque co., Ia. Pop. 878.

**Iowa**, tp. of Franklin co., Ia. Pop. 125.

**Iowa**, tp. of Iowa co., Ia. Pop. 962.

**Iowa**, tp. of Jackson co., Ia. Pop. 1209.

**Iowa**, tp. of Marshall co., Ia. Pop. 1123.

**Iowa**, tp. of Washington co., Ia. Pop. 1062.

**Iowa**, tp. of Winnebago co., Ia. Pop. 436.

**Iowa**, tp. of Wright co., Ia. Pop. 204.

**Iowa**, tp. of Doniphan co., Kan. Pop. 3531.

**Iowa Agricultural College.** See APPENDIX.

**Iowa Centre**, post-v. of Indian Creek tp., Story co., Ia. 8 miles from Nevada, a station on the Chicago and North-western R. R. Pop. 248.

**Iowa City**, city, cap. of Johnson co., Ia., at the head of navigation of the Iowa River, and on the Chicago Rock Island and Pacific R. R., 130 miles E. of Des Moines. It was (1839-55) the capital of Iowa Territory and State, and the buildings and grounds of what was formerly the capitol are now occupied by the State University. There are 4 flouring-mills, and manufactures of woollens, flax, oil, etc., 1 monthly, 1 semi-monthly, 1 daily, and 4 weekly newspapers, 15 churches, 2 national banks, good schools, public and private, fine county and other public buildings, hospital, etc. The city has a large local trade. Pop. of tp. outside of city, 2180; of city, 5914, increased since census.

N. H. BRAINERD, Ed. "IOWA CITY REPUBLICAN."

**Iowa College**, the oldest college in Iowa, was founded in 1847 by an association of Congregationalists and Presbyterians, and established at Davenport. The latter withdrew in 1852. Like early New England colleges, it is under no ecclesiastical control, and no sectarian influence is exerted. A freshman class was formed in 1850; ladies admitted 1857; a four years' scientific course established 1867. It has graduated 58 young men and 61 young ladies; of the latter, 56 graduated from the ladies' course (three years), and 5 from the college classical course. The scientific course contains some studies usually deemed post-graduate. Preparation for it includes the same Latin and Greek as preparation for the classical course. Civil engineering and surveying are taught with practice; also chemistry and physics in both courses, recitations and laboratory-work occupying alternate weeks. English is taught from the Anglo-Saxon sources on the thorough plan of Prof. F. A. March, LL.D., in Lafayette College, Pa. Normal instruction, a year's course, is contemplated, the special training in methods being open to students in all the courses, and the English department becoming a model or practice school; normal students to teach in its classes one hour a day. Classes in the ladies' course recite with college classes to the college professors. There is a classical academy preparing for both courses. The aim of the founders has been not to compete in mere numbers, but to surpass in standard of scholarship, thoroughness, and discipline ordinary Western institutions. The professors are eagerly sought for their superior qualifications by older Eastern institutions, and the progress of the college has been crippled thereby, as well as by losses by fire. It is supplied with chemical and philosophical apparatus. The new Central College, erected 1872, is the most beautiful and convenient college building in Iowa. The annual number of students is 200.

In 1860 the college was removed from Davenport to Poweshiek co., in the centre of the State, where Hon. J. B. Grinnell had founded a colony-town bearing his name, composed of Eastern people entirely, in which no intoxicating liquor is sold, and there are no lager-beer saloons, billiard-rooms, or other places of lounging and dissipation. The largest Protestant church W. of Chicago is here—a Congregational church of over 530 members. The religious influences of the college have always been very strong, though unsectarian. Nearly half of its male graduates have chosen the Christian ministry; some are foreign missionaries. Its endowment is less than \$100,000, and its two largest benefactions have been—\$30,000, for the endowment of the presidency, by Hon. Samuel Williston of Easthampton, Mass., and \$20,000, for the Latin professorship, by the late Aaron Benedict, Esq., of Waterbury, Conn. It holds the most central position in the State, at the crossing of the Chicago Rock Island and Pacific R. R. and Central R. R. of Iowa, connecting every section of the State.

GEO. F. MAGGON.

**Iowa Falls**, city of Hardin co., Ia., on the Illinois Central R. R., and 143 miles W. of Dubuque, on the Iowa River, which here has a succession of rapids which give

name to the town. The scenery here is remarkably fine, and the city itself is one of the most attractive in the State. It was founded in 1850, and incorporated as a city in 1870. It has a weekly newspaper, a fine graded school, and several churches.

O. W. GARRISON, Ed. "SENTINEL."

**Iowa Indians**, a tribe of aborigines of the Dakota stock, formerly inhabiting Iowa and Northern Missouri. They were closely allied, not by race, but by association, to the Sac (Sauk) and Fox Indians. They at present number 225 souls. They occupy 16,000 acres of the Great Nemaha reservation; the rest belong to a band of Sacs and Foxes. The Iowas are superior in industry and intelligence to most Indians. They receive a handsome annuity from the government, and sustain an orphan asylum.

**Iowa Point**, post-v. of Iowa tp., Doniphan co., Kan., on the Missouri River and the Atchison and Nebraska R. R. Pop. 242.

**Ipa'va**, post-v. of Fulton co., Ill., in Pleasant tp., on the Chicago Burlington and Quincy R. R. (Buda and Rushville division). It has 1 weekly newspaper. Pop. 488.

**Ip'ecac**, an important drug, the dried root of *Cephaelis Ipecacuanha*, a small shrubby perennial plant, natural order Rubiaceæ, growing in damp, shady forests in Brazil. The root is slender, from four to six inches long, and marked with annular ridges. The stem is also slender, and rises but a few inches from the ground. The plant bears seldom more than six leaves; the flowers are white and very small, and collected into a closely packed group surmounting a round axillary footstalk. The root is gathered by the natives, cleaned, dried, and exported in large bags or bales. It yields a fawn-colored powder of peculiar smell and acrid bitter taste. Its active principle is an alkaloid, *emetin*, which, when pure, is a white uncrystallizable powder, difficultly soluble in water, but soluble in alcohol. The common impure article of the shops is in transparent brownish-red scales, deliquescent, and very soluble in water and alcohol. Ipecac, locally, is mildly irritant, but some persons are so susceptible that merely opening a bottle of the powder will cause sneezing, and even an asthmatic seizure. Taken internally in minute doses, as one-sixth to one-fourth of a grain, ipecac, like other irritants, tends to increase the appetite and promote digestive vigor. In somewhat larger quantities it disturbs the stomach, and causes relaxation of the mucous membrane of the alimentary canal and air-passages, with accompanying increase of their secretions. In large dose it causes speedy vomiting and nausea, and a still greater effect on the mucous membranes just mentioned. Ipecac is accordingly used in small dose as a stomachic tonic, in somewhat larger as a relaxer of the dry and stiffened condition of the respiratory mucous membrane in the first stage of a catarrh, and in still larger doses as an emetic. With certain precautions the emetic effect even of a large dose may be avoided, and thus given ipecac is a valuable remedy in dysentery. Powdered ipecac and opium, 1 part each, and potassium sulphate, 8 parts, form the well-known "compound ipecac powder" or "Dover's powder."

EDWARD CURTIS.

**Iphic'rates**, b. about 419 B. C., was an Athenian general, and distinguished himself greatly in the Corinthian war (395-387 B. C.) by organizing a force of light troops, *pel-tastes*, with which he routed the Lacedæmonian army near Corinth in 392 B. C. After the peace of Antalcidas he went to Thrace, where he fought in the service of Cotys, whose daughter he married, and where he founded the city of Drys. In 377 he commanded the Greek auxiliaries who followed Pharnabazus, the Persian satrap, on his campaign against Egypt. A disagreement arose between the Greek and the Persian commanders, and Iphicrates fled to Athens, where Pharnabazus tried to arraign him for treachery, but failed. In the social war Iphicrates once more commanded the Athenians, but though successful, was again accused and acquitted. D. about 350 B. C. Cornelius Nepos has given a short sketch of his life.

**Ip'higeni'a**, the daughter of Agamemnon and Clytemnestra. When the Greek fleet lay bound by a dead calm in the port of Aulis, the seer Calchas declared that the wrath of Diana was the cause of the calamity. Agamemnon had offended the goddess in former days by killing a stag in her grove, and in order to propitiate her he had vowed to sacrifice the most beautiful born to him within a year, but as this happened to be Iphigenia, he had not fulfilled the vow. Iphigenia was now brought to Aulis, but when carried to the altar to be sacrificed, Diana herself took her away and brought her to Tauris, where she officiated as priestess to the heaven-fallen image of the goddess. In after years Orestes, her brother, came to Tauris with the purpose of carrying away this image, but was captured and brought to the priestess to suffer death in atonement for his intended crime. The brother and sister recognized



each other, and fled with the divine image. This subject has been used by Euripides, Racine, and Goethe for tragedies, and by Gluck for an opera.

**Ipomœa.** See JALAP.

**Ipsambul.** See ABU SAMBU.

**Ip'sara, or Psara,** a small island in the Grecian Archipelago, W. of Sam, belongs to Turkey. It is rocky and barren, but was densely peopled and very prosperous before the Greek revolution; but having been taken by the Turks in 1821, its commerce was destroyed, its agriculture fell into decay, and its population decreased very much. At present its inhabitants live mostly by fishing.

**Ip'sus** [Gr. *Ἰππὸς* or *Ἰππός*], small town of Phrygia, Asia Minor, celebrated for the great battle fought there, B. C. 301, between King Antigonus and his son, Demetrius Poliorcetes, and the combined forces of CASSANDER, LYSIMACHUS, PROTEUS, and SELEUCUS (see these names), in which Antigonus was slain and his dominions conquered. In the seventh and eighth centuries A. D. Ipus was the seat of a Christian bishopric. It has been identified with the modern *İpsözü Hisar*.

**Ipswich,** town of England, the capital of Suffolk, on the Orwell, which is navigable here for vessels of 200 tons burden. It has many good educational institutions, among which are a grammar school, founded by Cardinal Wolsey, who was born here, a mechanics' institution, and a workmen's college; large iron and soap factories and extensive shipbuilding docks. Pop. 43,136.

**Ipswich,** town of Queensland, Australia, on the Bremer, was incorporated into a municipality in 1840, and is a growing and prosperous place. Pop. 5092.

**Ipswich, tp. and post-v.** of Essex co., Mass., 27 miles N. E. of Boston, on the Eastern R. R. and on Ipswich River, 3 miles from the sea, has manufactures of shoes, soap, boxes, hosiery, isinglass, 2 woollen, 2 planing, 3 saw, and 2 grist mills, a weekly newspaper, a public library, a ladies' seminary, savings bank, 6 churches, an insane asylum, and a house of correction. The taking of clams employs some 200 men. Pop. 3720.

E. L. DAVENPORT, Ed. "CHRONICLE."

**Ira,** tp. of St. Clair co., Mich. Pop. 1580.

**Ira,** post tp. of Cayuga co., N. Y. It contains 3 villages and 4 churches. Pop. 2014.

**Ira,** post tp. of Rutland co., Vt., 5 miles S. W. of West Rutland. It has manufactures of lime. Pop. 413.

**Irak'-Aj'mee,** the central province of Persia, traversed by ranges of naked and barren mountains, which from the high Elboorz in the W. by degrees lower down into a desert table-land in the E. The valleys along the rivers, some of which lose themselves in the desert, are fertile, and the province contains several of the largest cities of the empire, such as Teheran, Isfahan, and Koom.

**Irak'-Ar'abee,** province of Asiatic Turkey, between the Tigris and Euphrates, and westward from the Euphrates to the desert. It contains the ruins of Babylon, Seleucia, and Ctesiphon, and is inhabited by nomadic Arabs. Cap. Bassora or Basra.

**Iran.** See PERSIA.

**Iranians** [from *Iran*, the native name of Persia], a branch of the Aryan or Indo-European family, now comprising the Persians, Armenians, Afghans, Kurds, and several isolated tribes in Beloochistan and India, the river Indus properly forming their eastern boundary, although the Parsees so called from their Persian origin are numerous in Bombay. Their original seat appears to have been near the sources of the Oxus, whence they spread in various directions, especially occupying the great plateau of Persia and the mountainous region of Armenia; they also penetrated Asia Minor, and during the flourishing period of the Persian empire dwelt as far N. as the Caucasus and established colonies in the Crimea. They intermingled with kindred tribes, and the modern Persians have a large infusion of Georgian and Caucasian blood, so that their complexion is fairer and their features more regular than are found among the Afghans, who are probably the best type of the purely Iranian race, of which in ancient times the Medes and Persians were the most notable representatives. The Medes are the first Iranian race specially mentioned in history. According to Herodotus, they were a powerful people as early as 2400 B. C., when a Median dynasty ruled in Babylonia; but at a later period this was expelled, and the Medes became, at least nominally, subject to the great Assyrian empire, from which they were the first of the subject tribes to revolt; and with this revolt Herodotus begins his history of the Median empire, whose limits do not appear to have been very exactly defined. In general, it may be said to have extended on the N. to

the mountains near Atropatene, on the S. to Susiana, on the E. to the Caspian, and on the W. to the river Zagros, which separated it from Assyria and Babylonia. The ancient Persians were essentially identical with the Medes, though somewhat ruder; both were divided into various tribes and clans, the names of which, and little more, have been preserved by Herodotus. For the partial recovery of the ancient Iranian language we are mainly indebted to our knowledge of the Sanskrit. Its oldest phases lie buried in the sacred books of the Parsees and in cuneiform inscriptions of the time of Cyrus, Darius, and Xerxes. The name *Zend* has been improperly applied to this language; this properly belongs to a translation into the Pehlevi of the sacred book of the *Zend-Avesta*; recent German philologists style the language the Old Bactrian. The first attempt at a grammar of this language was made by Haug in his *Essays on the Sacred Language, Writing, and Religion of the Parsees*, Bombay, 1862; in 1864, Justi published a *Handbuch der Zendsprache*, in which he gave a lexicon of the Old Bactrian, to which valuable additions were made by Lagarde in his *Beiträge zur baktrischen Lexicographie* (1868); in 1867 appeared Spiegel's *Grammatik der Alt-baktrischen Sprache*. The Pehlevi is Iranian, and was probably used as a literary language from about the third century; it is known through inscriptions, coins, and gems, and the translation of the *Avesta* and a few other religious books; it maintained itself until the development of the modern Persian, which is Iranian in its grammatical structure, but contains a large number of Arabic words. E. of the territory of modern Persia are the more purely Iranian dialects of the Afghans and Beloochees, and W. of these those of Ossetes, Kurds, and Armenians. The Iranians may be considered as the connecting link between the Indo-Europeans of Asia and Europe. A few of them are nomadic, but the majority are agriculturists, craftsmen, and traders. (See Spiegel's *Iranische Alterthumskunde*, Leipzig, 1871-73.)

**Irassburg,** tp. and post-v., county-seat of Orleans co., Vt. It has a national bank, manufactures of lumber, and the county buildings. It is 42 miles N. N. E. of Montpelier. Pop. 1083.

**Irbit',** town of Russia, in the government of Perm, at the confluence of the Irbit and the Nisa. It is famous for its annual fair, held in the months of February and March, and attended by a great number of European and Asiatic merchants. It is the largest fair in Russia, next to that of Nishni-Novgorod, and goods from China, India, Persia, and Europe to the value of \$25,000,000 are brought together and disposed of. Pop. 5400.

**Iredell,** county in the W. of North Carolina. Area, 600 square miles. It is hilly, fertile, and well watered and timbered. Gold is found in some parts. Cattle, grain, tobacco, and wool are staple products. The county is traversed by the Western R. R. of North Carolina. Cap. Statesville. Pop. 16,951.

**Iredell** (JAMES), b. at Lewes, Sussex co., England, Oct. 5, 1751, and settled in North Carolina in 1768; was admitted to the bar in 1770, took an active part in the cause of independence, was elevated to the judicial bench in North Carolina in 1777, and in 1790 was appointed one of the associate justices of the Supreme Court of the U. S. He was a man of extensive learning and great ability. He published in 1790 the *Laws of North Carolina 1745-90*. D. at Edenton, N. C., Oct. 20, 1799.

A. H. STEPHENS.

**Iredell** (JAMES, JR.), son of James Iredell, b. in North Carolina Nov. 2, 1788, at Edenton; graduated at Princeton; was a member of the State legislature for a number of years, and Speaker of the House part of the time. In the war of 1812 he commanded a company of volunteers who went to repel a threatened British invasion at Norfolk, Va. In 1819 he was appointed to the circuit court bench of his State. In 1827 he was elected governor of North Carolina, and was U. S. Senator from that State 1828-31. After this he was a reporter of the decisions of the State supreme court, publishing thirteen volumes of law and eight of equity reports. D. at Raleigh, N. C., Apr. 13, 1835.

A. H. STEPHENS.

**Ireland** [Gr. *Ἰουερνία*; Lat. *Hibernia*, *Éire*, *Ériu*, *Érinna*, *Yoland*, *Yoland*; Celtic or Irish, *Éire*, *Éir*, *Éirinn*], the largest of the British Isles (see GREAT BRITAIN). Lies between lat. 51° 28' and 55° 25' N., and long. 10° 20' and 10° 26' W. of Greenwich. It is washed on three sides by the open Atlantic, and separated from Great Britain by the Irish Channel or Sea. Its greatest length is 177, and its greatest breadth 177, and it contains an area of 32,000 square miles, exclusive of that of the smaller islands belonging to it, whose area is 246 square miles.

**Relief.** By far the greater portion of the island consists of a level or undulating plain, filling up nearly the whole



centre from sea to sea, and consisting to a great extent of bogs, which are incapable of cultivation and impart a dreary aspect to the country. The most extensive of these bogs is that of Allen. The hills generally rise in isolated groups near the sea. If we assume the waters of the ocean to rise to the extent of only 500 feet, they would cover 77 per cent. of the entire surface, and the hills would rise above them in the shape of more than 100 islands, encircling a shallow central sea. The most elevated of these mountains are in South-western Ireland, where the Carn Tual rises to a height of 3404 feet. The Wicklow Mountains near the E. coast culminate in the Lugnaquilla (3039 feet). In Mayo the mountains attain a height of 2638 feet; in the N. of Ireland they rise to 2228 feet (Mount Savel), and in the county of Antrim to 1802 feet (Mount Trostan).

**Hydrography.**—The rivers of Ireland flow for the greater part through plains, enlarging sometimes into lakes, and navigable in several instances almost to their source. The Shannon is the most important amongst them. It rises in the county of Cavan at an elevation of 345 feet above the sea, and enters the sea below the city of Limerick. It forms several lakes, amongst which Loughs Allen, Ree, and Derg are the most important, and is navigable as high up as the former, a small portion above Limerick excepted, where navigation is obstructed by the rapids of Doonass. It frequently inundates the surrounding country, in spite of expensive engineering works erected to regulate its course. The Lee is only a small river, but forms the important harbor of Cork. The Barrow enters the sea at Waterford, and is navigable as far as Athy, whence there is a canal to Dublin. The Liffey is remarkable solely because it enters Dublin Bay. The Boyne is the most important river on the E. coast of Ireland. It is celebrated on account of the battle of the Boyne (1690), but navigable only for 20 miles above its mouth. The Bann rises in the Mourne Mountains, and after a course of 40 miles it enters Lough Neagh. It leaves that lake at the north-western corner, and enters the sea below Coleraine. Owing to its rapid course it is navigable only in parts. The Foyle flows into a bay on the N. coast of Ireland, 6 miles below Londonderry. The Erne forms several important lakes, and is navigable almost throughout its entire length. The Corrib forms the discharge of Lough Corrib, and enters the sea at Galway, on the W. coast of Ireland. A subterranean river, 5 miles in length, connects Lough Corrib with Lough Mask. Ireland abounds in lakes. The most important amongst them are Lough Neagh (158 square miles), in the north-eastern part of the country; the lower Lough Erne (43 square miles); Lough Mask (34 square miles); and Lough Corrib (68 square miles); Loughs Derg (36 square miles) and Ree (50 square miles).

**Climate.**—The temperature of the central part of the country has been estimated at 50° F., that of the S. at 51.5°, and of the extreme N. at 48.5°, the difference between N. and S. thus only amounting to 3°. The mean temperature in winter is 41.5°, in spring 47°, in summer 60°, and in autumn 51° F. The temperature is thus even more equable than that of the British Isle, a feature to be traced to the influence of the Atlantic, which is likewise answerable for the greater amount of rain which falls throughout Ireland, and for the greater moisture of the air. These circumstances are most conducive to a luxuriant vegetation, and the name "Emerald Isle" is perfectly appropriate; but they interfere to some extent with agricultural operations. The average rainfall throughout Ireland may be estimated at 40 inches annually; in the W. and S., and particularly in the hills of Kerry, it is greatly in excess of this, but on a portion of the eastern coast it hardly exceeds 25 inches.

**Geology.**—Ireland may be divided geologically into three regions—viz. the great central plain, Northern Ireland, and Southern Ireland. The whole of the former is occupied by Carboniferous limestone, except where older rocks lie on the surface. It is covered with drip, peat-moss, and fresh-water marl, in which the fossils of animals not long extinct have been discovered. In Northern Ireland the Silurian formation is the most prominent. It may be looked upon as a continuation of the same formation in Scotland, and is intruded by granite and basalt, the latter forming the Giant's Causeway on the N. coast. Permian, Cretaceous, and Triassic rocks likewise occur in that part of the country, the latter near Belfast containing beds of gypsum and rock-salt. South-eastern Ireland consists mainly of Cambrian rocks, equivalent to those of South Wales, upon which the lower Silurian strata (flags and slates) rest unconformably. In Kerry and Cork the sandstones and slates of the Devonian age are most prominently represented.

**Population.**—In no country of Europe has there been exhibited within a recent epoch so vast an increase in the population, succeeded by an even vaster decrease, than in Ireland. In 1750, Ireland had a population of 2,372,634

inhabitants. In 1811 this population had increased to 5,937,856, and it continued to increase until 1841, when it numbered 8,175,124 souls. But then came a potato famine; thousands died of starvation, and an immense impulse was given to emigration. In 1851 there were only 6,552,385 inhabitants; in 1861, 5,792,055; in 1871, 5,412,377. The decrease is still going on at the present time, though at a less rapid rate than formerly. It was due, in the first instance, to famine, but is now brought about entirely by emigration. Irish emigrants not only cross the ocean in search of a new home, but they have likewise invaded Great Britain, much to the annoyance of the native working population, upon whose wages this immense influx of unskilled labor has exercised a considerable influence. (See GREAT BRITAIN.) Between 1851 and 1861, 1,149,118 persons emigrated from Ireland; between 1861 and 1871, 768,859 persons, exclusive of those who merely crossed over to the sister island. The population of the counties of Ireland in 1871 was as follows:

County.	Area. In acres.	Population.
Carlow.....	221,343	51,650
Dublin.....	226,895	405,262
Kildare.....	418,497	83,614
Kilkenny.....	509,732	109,379
King's county.....	493,985	75,900
Longford.....	269,409	64,501
Louth.....	202,124	84,021
Meath.....	579,861	95,558
Queen's county.....	424,854	79,771
Westmeath.....	453,468	78,432
Wexford.....	574,588	132,668
Wicklow.....	500,178	78,509
Leinster.....	4,876,934	1,339,448
Clare.....	827,994	147,864
Cork.....	1,849,685	517,076
Kerry.....	1,185,918	196,586
Limerick.....	680,842	191,936
Tipperary.....	1,061,731	216,713
Waterford.....	461,552	123,310
Munster.....	6,067,722	1,393,485
Antrim.....	763,749	420,170
Armagh.....	328,086	179,260
Cavan.....	477,394	140,738
Donegal.....	1,197,154	218,334
Down.....	610,740	277,294
Fermanagh.....	457,369	92,794
Londonderry.....	522,345	175,906
Monaghan.....	319,742	114,969
Tyrone.....	806,657	215,766
Ulster.....	5,483,206	1,833,231
Galway.....	1,566,352	248,458
Leitrim.....	392,363	95,562
Mayo.....	1,367,618	246,030
Roscommon.....	603,935	140,670
Sligo.....	461,753	115,193
Connaught.....	4,392,041	846,213
All Ireland.....	20,819,903	5,412,377

The following were the towns having more than 10,000 inhabitants—In Leinster: Dublin, 254,808; Drogheda, 14,740; Kilkenny, 12,174; Wexford, 11,734; Dundalk, 10,428. In Munster: Cork, 78,642; Limerick, 39,353; Waterford, 23,349; Clonmel, 10,112; Queenstown, 10,334. In Ulster: Belfast, 174,412; Londonderry, 25,242; Newry, 13,364; Lurgan, 10,632. In Connaught: Sligo, 10,670; Galway, 15,597. The majority of the inhabitants of Ireland are of Celtic race, and the earlier English immigrants have completely amalgamated themselves with them. In the N. E. of Ireland, however, there are numerous English and Scotch settlers, who, being Protestant, exhibit a certain amount of antagonism to the remainder of the population. It is amongst these Irish Protestants that Orange lodges recruit their members, though of late years, and much to the credit of the people, religious animosities appear to be dying out. The English language is spoken throughout the country, but Irish (in 1871) is still spoken by 817,875 persons (330,211 in Connaught, 386,494 in Munster, 84,923 in Ulster, and 16,247 in Leinster). No less than 103,562 persons speak Irish only.

**Agriculture.**—The climate of Ireland is more favorable to cattle-breeding than to the cultivation of cereals. The system of cultivation leaves much to be desired, though agricultural schools have been established since 1838 in all parts of the country. The Irish generally refer their inferiority in these respects to absentee landlords and the uncertainty of tenure; and although due weight should be given to these causes, there is no doubt that local causes, such as the excess of small buildings as well as difference of race, have had some effect. In these respects the Irish land act, one of the measures for the relief of Ireland passed recently by the British Parliament, should be productive of much good. It places the Irish cultivator in a far better position than the Scotch and English farmers, secures fixity of tenure, provides compensation for exhausted



improvements, and even facilitates the conversion of leaseholds into freeholds. The following are the agricultural statistics for 1860 and 1873:

	1860. Acres.	1873. Acres.
Wheat.....	469,642	168,165
Oats.....	1,361,581	1,519,089
Barley.....	180,964	230,188
Bere and rye.....	12,822	9,210
Beans and peas.....	12,745	12,872
Potatoes.....	1,171,837	903,282
Turnips.....	318,091	347,904
Beet and mangold.....	32,060	38,182
Cabbage, etc.....	44,332	59,677
Vetches and rape.....	40,534	24,355
Flax.....	128,144	129,432
Meadow and clover.....	1,594,186	1,837,183
Total under crops.....	6,967,970	5,270,159
Fallow.....	36,295	13,174
Woods and plantations.....	319,060	323,783
Permanent pasture.....	9,160,693	10,120,695
Reef and waste.....	3,712,128	4,297,582
Water.....	494,199	494,199
Total area.....	20,819,892	20,819,892

There can be no doubt that the cultivated land has decreased since 1860, but not in the same rate as the population, whilst not much weight can be placed upon the different areas given for pastures and waste lands, as these are elastic terms. The live-stock of Ireland (in thousands) was as follows:

	1860.	1865.	1870.	1874.
Horses.....	621	548	533	526
Cattle.....	3,599	3,198	3,800	4,118
Sheep.....	3,538	3,694	4,337	4,438
Pigs.....	1,269	1,305	1,461	1,606

These figures sufficiently attest the general and increasing prosperity of the country.

**Fisheries.**—The Irish fisheries were far more important formerly than they are now. In 1861 they employed 12,035 boats, manned by 48,000 men and boys; in 1873 only 8450 boats. The decrease is due to emigration and the great demand for seamen. The Irish rivers swarm with salmon, and the surrounding coasts with cod, ling, hake, herrings, pilchards, etc., yet Irish markets are being supplied with cured fish from Scotland and the Isle of Man.

**Mining.**—The mining industry of Ireland is of very subordinate importance. In 1871 there were only 2852 miners, engaged in coal, iron, lead, and copper mines, and in the salt-works near Belfast. Other metals, including gold and silver, occur.

**Manufactures.** Ireland is not a manufacturing country, as may clearly be perceived on referring to the statements given under Great Britain. The only manufacture of any extent is that of linen, of which Belfast is the centre. The whole of the textile industry of the country is carried on in 243 factories, having 1,052,705 spindles and 18,630 power-looms, and employing 61,842 hands (according to the census the textile industries employ 171,526 hands).

**Commerce.** Ireland in 1874 had a mercantile marine of 1761 sea-going vessels, of a capacity of 214,392 tons. The direct trade with foreign countries is comparatively trifling, as the greater part of the trade is carried on through English and Scotch ports. The direct imports of foreign and colonial merchandise have a value of about £12,000,000; the direct exports of Irish produce do not exceed £180,000. The principal seaports are Dublin, Cork, Belfast, Waterford, and Limerick. There is no satisfactory record of the trade with England, but the principal exports consist of cattle, sheep, horses, butter, bacon, and other agricultural produce, porter, whisky, and linen goods.

**Religion and Provision for its Support.**—According to the census of 1871, there were 4,150,867 Catholics (76.7 per cent.), 667,998 Protestant Episcopalians (12.1 per cent.), 497,648 Presbyterians (11.2 per cent.), 13,141 Methodists, 48,218 other dissenters, 3814 Quakers, 285 Jews, and 106 deists, etc. The bulk of the population is therefore Catholic, and the existence of an established Protestant Church in connection with that of England has always been looked upon as a grievance. In 1869 this Church was disestablished and disendowed, but annuities and compensations have been granted on so liberal a scale that only a comparatively trifling sum will remain after all liabilities have been met. After a payment of £300,000 to the disestablished Church in lieu of its private endowment, £372,332 to the Catholic Maynooth College, and £90,000 to nonconformist bodies, there remained, on Jan. 1, 1875, property valued at £16,750,000 and producing £622,622 a year. Liabilities (annuities, etc.) are estimated to swallow up £11,560,000 of this amount, and there will thus remain £5,190,000, which are to be devoted to educational and other purposes.

**Education.** A system of national education was inaugurated in 1845, but as these national schools are not denominational, they have never been supported as heartily by the

ministers of different religious bodies as they ought to have been, and the education of the people has suffered accordingly. In 1873 no less than 976,696 children attended these schools, but only 350,882 did so more than 30 times during the year. The Roman Catholic pupils constituted 79.5 per cent. of the whole number. There were 9802 teachers and 381 work-mistresses, whose united salaries amounted to £501,054. According to the census of 1871, there were 9495 primary schools, attended by 615,785 pupils, and 587 superior schools, attended by 23,053. Amongst the superior schools Trinity College at Dublin and the Queen's Colleges at Cork, Galway, and Belfast are the most important. These institutions are open to all alike, without reference to religious creed. There is likewise a Roman Catholic university. Maynooth College is the principal institution for the training of priests.

**History.**—According to tradition, Ireland was inhabited originally by Firbolgs and Danauns, who were eventually subdued by Milesians or Gaels. We know next to nothing respecting Ireland for any period antecedent to the fourth century. At that time the inhabitants of the island were known as Scotti, and they made descents upon the Roman province of Britannia and Scotland, and even upon Gaul. Christianity was introduced in the course of the fifth century, when St. Patrick was the chief apostle of the new faith, and in the sixth century missionaries went forth from the Irish monasteries to convert Great Britain and the nations of Northern Europe. At this early period Ireland appears to have been divided among numerous clans, who owed allegiance to four kings, and to an arduous, or monarch, to whom the central district called Meath was allotted. The incursions of the Scandinavians, which began in the eighth century and continued for 300 years, checked the progress of civilization of Ireland. They established themselves on the eastern coast, whence they made predatory incursions into the interior of the country, until they were overthrown at the battle of Clontarf, near Dublin (1014), by Brian Borumha, the "monarch" of Ireland. From the eighth to the twelfth century Irish scholars enjoyed a high reputation for learning, the arts were cultivated, and the round towers are believed to be remains of the architecture of that period. In 1155, Pope Adrian IV. authorized Henry II. of England to take possession of Ireland on condition of paying an annual tribute. In 1172, Henry made his first descent upon Ireland. He received the homage of a number of chiefs, and authorized certain Norman adventurers to take possession of the entire island in his behalf. In the course of the thirteenth century these Norman barons, favored by dissensions amongst the natives, had succeeded in firmly establishing their power, but in the course of time their descendants identified themselves with the natives, even to the extent of adopting their language. At length, the power of England became limited to a few coast-towns and to the districts around Dublin and Drogheda, known as the "Pale." In 1541, Henry received the title of "king of Ireland" from the Anglo-Irish Parliament, then sitting at Dublin, and several of the native princes acknowledged him as their sovereign. The attempt to introduce the Reformed faith led to repeated revolts, which were suppressed, and the lands of the rebellious chiefs parcelled out amongst Protestant Scotch and English settlers. The so-called "Plantation of Ulster" took place in this manner under James I. In 1611 the Irish rose in rebellion and massacred the Protestants, but they were most severely punished by Cromwell, who overran the country in 1649. At the Revolution the native Irish generally sided with James II., the English and Scotch "colonists" with William and Mary, and the war was not terminated until 1692. Penal statutes were then passed against the Catholics, and the general dissatisfaction gave rise to numerous secret societies and to a rebellion in 1798, which was not suppressed till 1800. On the 1st of January of the following year the Irish Parliament was suppressed and incorporated with that of Great Britain. From that year dates the existence of a United Kingdom of Great Britain and Ireland. E. G. RAVENSTEIN.

**Ireland (WILLIAM HENRY),** b. in London in 1777, son of Samuel Ireland, an engraver and author, who published several works of travel and *Graphic Engravings of Hogarth* (1794-99). He was apprenticed to a conveyancer, and having accompanied his father upon a visit to Stratford-upon-Avon, he forged a lease containing the pretended signature of Shakespeare, which he said he had discovered among some old law papers. He afterwards executed other similar forgeries, and produced *Macbeth*, a tragedy purporting to have been written by Shakespeare, which was acted at Drury Lane Theatre, Kemble playing the principal part; this, with *Henry VIII.*, another forgery, was published in 1799. The fraud was soon exposed, and he abandoned his profession, devoting himself to literary pursuits, writing several novels and *The Neglected Genius*,



a poem (1812). His *Confessions* (1805) contain a full account of his various forgeries: a new edition, with an introduction by Richard Grant White, was published in New York in 1874. D. Apr. 17, 1835.

**Irenæus**, one of the most distinguished of the early Church Fathers, b. in Asia Minor or Syria in the first half of the second century, probably between 120 and 140 A. D., and enjoyed as a young man the instruction of Polycarp, the disciple of John and bishop of Smyrna. He went afterward to Gaul, and was a presbyter at Lyons in 176, in which year he visited Rome. In 177, Photinus, bishop of Lyons, suffered martyrdom, and Irenæus succeeded him in the episcopal office. His energy and zeal in building up the Christian Church in Gaul are highly praised by his contemporaries, but more particular events of his life are not recorded. Some have supposed that he suffered martyrdom in the persecutions under Septimius Severus, but as neither Tertullian nor Eusebius mentions any such event, it must be considered very doubtful. His position in the Church Schaff defines as "the leading representative of the Asiatic Johannine school in the second half of the second century, the champion of Catholic orthodoxy against Gnostic heresy, and the mediator between the Eastern and Western churches. He united a learned Greek education and philosophical penetration with practical wisdom and moderation, and a just sense of the simple essentials in Christianity." Of his writings only the *Adversus Hæreses* has come down to us, and this only in a rather uncouth Latin translation, but, such as it is, it is of great importance for the understanding of the movements in the early Christian Church. The best editions of the book are that by Stieren (Leipsic, 1833) and that by Harvey (Cambridge, 1857).

**Irene** (Gr. Εἰρήνη, "peace"), an empress of Constantinople, b. at Athens about 752, at seventeen became wife of Leo, son and heir of Constantine V., and upon his death in 780 was named in his testament as ruler during the minority of their son, Constantine VI., then nine years of age. In 786 she called a council at Constantinople to restore the images which had been banished from the churches; but this being interrupted by the soldiery, she in the following year summoned another at Nicaea in Bithynia, at which the veneration of images was declared to be consonant with Scripture, reason, and the Fathers and councils. Her son was induced by his favorites to throw off the maternal yoke and proclaim himself emperor. Irene was secluded in one of her palaces, but conspiracies were formed for her restoration. In 797 an attempt was made to assassinate Constantine, but he escaped to Phrygia, where he was rejoined by his mother, who persuaded him to return to Constantinople, where he was seized by the emissaries of Irene and his eyes put out. She then ruled rigorously for five years, but the eunuch Neophorus, her grand treasurer, having been secretly invested with the purple, arrested Irene, seized all her treasures, and banished her to the island of Lesbos (802), where she gained a scanty livelihood by spinning. D. Aug. 10, 803.

**Ireton** (HENRY), b. at Attenton, Nottinghamshire, England, in 1610; studied law at Oxford, and took a conspicuous part in the great civil war, becoming one of Cromwell's generals. In 1646 he married Bridget, daughter of the future Protector. Ireton was taken prisoner at Naseby by Prince Rupert, but rescued the same day; he signed the death-warrant of Charles I., and accompanied Cromwell to Ireland in 1649. On the latter's return to England in 1650 the prosecution of the conquest of Ireland was entrusted to Ireton, and prosecuted with vigor, not unmingled with cruelty. D. of the plague before Limerick Nov. 15, 1651, and was buried in Westminster Abbey, whence his remains were exhumed at the Restoration and burned at Tyburn. He left one son and four daughters.

**Iridacææ** [so named from the typical genus, *Iris*], an order of the petaloideous division of monocotyledonous or endogenous plants, distinguished by having only three stamens, alternate with the inner divisions of the adnate perianth and extrorse anthers; and the leaves are almost always equitant. Some have tuberous root-stalks, others solid bulbs or corms. The juice in all is acrid. The principal economical products of the order are orris-root, from one or more species of *Iris*, and SAFFRON (which see), the deep orange-colored stigmas of *Crocus sativus*. The order is mainly notable for the ornamental flowers it furnishes, such as those of *Iris*, *Gladiolus*, *Tigridis* (or tiger flower), and *Crocus*. Irises are dispersed over the northern temperate zone, crocuses belong to the Old World, but far the greater part of the order, especially those with solid bulbs, belongs to the Cape of Good Hope. ASA GRAY.

**Iridium** [Lat. *iris*, *iridis*, the "rainbow"], one of the rare metals of the platinum group, was recognized as a distinct element by Tennant in 1804. It takes its name from the iridescence of its solutions. It has not been found in a

pure state, but is usually combined with osmium, forming the mineral species known as iridosmine, and with platinum giving the species platiniiridium, also in small quantity with palladium and with native platinum. It occurs with these metals in varying, apparently indefinite, proportions. It is regarded as isomorphous with osmium, the percentage varying from 43 to 77, and in the platinum alloy to range from 20 to 77 per cent. It is difficult of separation in a pure state from these metals, and processes for its extraction, especially from osmium, have engaged the attention of many of the most distinguished chemists. Persoz (*Ann. de Chimie et de Physique*, lv. 210) converts the metals into sulphide by ignition in an earthen crucible with carbonate of soda and sulphur. Wöhler recommends (*Pogg. Annalen*, xxi. 161) the ignition to redness of the powdered alloy with common salt in a porcelain or glass tube through which a current of dry chlorine gas is passed as long as it is absorbed. The resulting chlorides are dissolved in boiling water; the solution is concentrated and distilled with nitric acid, by which the osmium is removed as osmic acid, leaving the iridium in solution. It is precipitated by chloride of ammonium, and the ignition of this precipitate yields metallic iridium. Frey roasts the ore in a current of oxygen at a red heat, by which the osmium is partly removed as osmic acid, and the remainder, after fusion with nitre, is distilled with nitric acid. (*Comptes Rendus*, xxxviii. 1008.) Claus (*Beiträge zur Chemie der Platinmetalle*, Dorpat, 1854) fuses 1 part of the ore with 1 part of caustic potash and 2 parts of saltpetre. After pouring out and cooling, the fused mass is digested for twenty-four hours in cold water. Osmate and ruthenate of potash are dissolved, and are drawn off by a syphon. The portions of undecomposed ore are subjected to a second fusion after separation by washing from the insoluble black powder, which consists chiefly of the oxides of iridium, rhodium, and platinum. Prof. Wolcott Gibbs, who has made extended investigations of the chemistry of the platinum metals (*Smithsonian Contributions*, xii., and *Am. Jour. Sci.*, xxix., May, 1860; xxxi. 63; xxxiv. 342; xxxvii. 57), employed this method with several essential modifications. He first fuses the ore with three times its weight of dry carbonate of soda, in order to remove the silica and other impurities. He reduces the osmate of potash obtained by the fusion with nitre and potash to osmito by boiling it in a mixture of alcohol and water. The ruthenate of potash is completely decomposed. The undissolved portions are well washed with a saturated solution of chloride of potassium. The platinum and iridium exist in the mass in the form of bichlorides, and their separation is effected by the employment of the alkaline nitrates, advantage being taken also of the different degrees of solubility of the double chlorides of the platinum and alkaline metals. For the details of this and of the other methods reference is made to the memoirs cited. In all these operations great care must be taken to avoid the poisonous vapors of osmium. Deville and Debray have also published an important memoir on this subject. (*Ann. de Chimie et de Physique*, 3d. lvi. 385.)

Iridium may be fused in the flame of the oxyhydrogen blowpipe or by the voltaic current, giving a hard, brittle, silvery-white metal, with a specific gravity of 21.15. When pure it is not acted on by acids or by aqua-regia, but is readily dissolved by the latter when alloyed with platinum. In its powdered state it is the best material for giving a pure black upon porcelain, and is largely used for this purpose. The black powder known as "iridium-black" is obtained by decomposing a solution of iridic sulphate by alcohol. It is similar to platinum-black in its action upon gases, and will ignite alcohol. An artificial alloy is formed by fusing iridium with platinum, which has valuable properties for many purposes in the arts, but particularly for bushing the vents of heavy ordnance. It is both hard, resisting wear, and indestructible by the gases of the powder. Specimens of this alloy in ingots three inches or more in length were exhibited at Paris in 1867 by Messrs. Johnson, Matthey & Co. of London, known as "Matthey's alloy." One vent shown had fired 3000 rounds from a Whitworth cannon without appreciable wear. WILLIAM P. BLAKE.

**Iridosmine**, a native alloy of iridium and osmium, of great hardness and weight. It is usually in irregular flattened grains and scales rarely broader than the head of a pin, and has a tin-white or steel-gray color and metallic lustre. But the grains vary in size and form in different localities, and even from the same locality, to such a degree as to indicate a great difference in the chemical composition. It is also obtained as a heavy gray powder, and some samples resemble a fine gray metallic sand. Hexagonal crystals have been observed. It is as hard as quartz, and its gravity ranges from 19.3 to 21.12. It is found generally with native platinum, and with placer-gold, but usually in small quantity compared with the bulk of the gold. Nearly all of the gold-regions have yielded more or less of



this mineral, it having been obtained in the Urals, California, Australia, South America at Choco, in Japan, and elsewhere. In California it is more abundant in the northern counties than in the middle or southern, and it is most abundant in the beach-sand deposits of the northern coast at and near Port Orford. According to Dr. Torrey, for a year or two after the establishment of the U. S. assay-office in New York the proportion of iridosmine in the gold from California did not exceed half an ounce to \$1,000,000. The quantity afterwards increased until the average was seven or eight ounces to the million of gold, but it afterwards fell off, showing great fluctuations, dependent, no doubt, upon the opening of new diggings. In melting large quantities of native gold this heavy mineral settles to the bottoms of the crucibles, and accumulates there. It was the practice at the New York assay-office to separate it from the gold by melting the gold with twice its weight of silver, allowing the iridosmine to settle, then pouring off the gold alloy. A mass containing nearly all of the mineral remained, and was separated by repeated fusions with silver and a final digestion in nitric and nitro-muriatic acid and washing. It has been found to accumulate similarly in the melting-pots used in California, and it is common to obtain it in the gold recovered from old crucibles and sweepings. It has been announced as occurring in the same way in the sweepings of the Japanese mint. It sometimes, however, eludes the care of mint-officers and finds its way into coin. Its presence in gold used by jewellers or in the arts is a great disadvantage, for it cannot be cut by a file or steel tools, and so renders the gold unfit for working. Such gold has to be remelted. The superior gravity of the grains of iridosmine carries them to the bottom. Analyses show that the percentage of iridium in samples from different countries varies from 43 to 77, and of the osmium from 17 to 48. Small quantities of platinum, rhodium, ruthenium, and other metals are usually present. A sample of the mixed metals brought from Port Orford, Cal., separated from the fine scale-gold by amalgamation, was found to contain nearly 49 per cent. of iridosmine and 43.54 of platinum.

The value of iridosmine in the arts is chiefly as a source of iridium and for tipping the nibs of gold pens, for which purpose its great hardness, and the fact that it can be attached to the gold by soldering, makes it peculiarly suitable. Grains of the proper form and hardness are much sought for by gold-pen makers. The flat scales are not so suitable as those which are more round and solid and of great hardness. They differ in appearance, as doubtless in composition, from the tabular crystals, and in the California mixtures of this mineral such grains do not usually constitute more than one-tenth of the whole, but sometimes the amount is as great as one-fifth. The pen-makers carefully select such grains. They are so minute that from 10,000 to 15,000 of them do not weigh more than an ounce. A cubic inch would weigh about eleven ounces, and at the price of \$250 per ounce would be worth \$2750. After these grains have been attached to the tips of the gold pens they are ground into the proper shape upon emery-wheels, and sometimes with great difficulty owing to their extreme hardness.

WILLIAM P. BLAKE.

**Iris** [so named from its various colors], in the eye, is a thin contractile curtain, nearly circular in outline, suspended in the aqueous humor between the cornea and the lens. It is perforated by an aperture called the pupil, circular in man and most of the Mammalia, elongated in the cat, the fox, the owl, and some other vertebrates. Its substance is partly fibrous, partly cellular (pigmentary), and partly muscular. The muscle-fibres are involuntary, some of them circular and sphincteric, and some radiating. The former contract, the latter dilate, the pupil under the varying stimulus of light. Opium and Calabar bean contract, while belladonna powerfully dilates, the pupil. In the fetal state the pupil is closed by the *membrana pupillaris*, a temporary structure.

**Iris** [Gr. Ἴρις], in classic mythology, the daughter of Thaumias and Electra and sister of the Harpies. In the Homeric poems she appears as a virgin goddess, who acts as messenger of the gods among themselves, as medium of communication between gods and men, and as conductor of female souls to the shades. On vases and bas-reliefs Iris is represented as a youthful winged virgin, dressed in a long tunic, with a herald's staff and a pitcher in her hands. She is the personification of the rainbow as the messenger of peace; the name may be connected with *εἰρῆνῃ*, "to join," and with *εἰρήνη*, "peace." In the later poets Iris appears as wife of Zephyrus and mother of Eros.

**Iris** [named for the goddess or the rainbow], the fleur-de-lis or flower-de-luce, the leading genus of the order Iridaceæ (which see), consists of numerous species of perennial herbs dispersed over the temperate regions of the

northern hemisphere, all with showy flowers, several of them familiar and ornamental in gardens. They spring from root-stocks or tubers, or a few from bulbs. Their leaves are equitant and sword-shaped, and the flower is peculiar in having the three outer divisions recurved, while the three inner are incurved or erect, and the three branches of the style are large and petal-like, overarched the three stamens, which lie hidden underneath them. The violet-scented orris-root, used in perfumery and tooth-powders, is from *Iris Florentina*, and no less from *I. pallida* and *I. Germanica*, common species of flower-de-luce. All three are cultivated in the neighborhood of Florence for this purpose. There are several indigenous species in the U. S., of which *I. versicolor*, the common blue flag, is most abundant from Canada to Florida.

ASA GRAY.

**Iris** (now *Kasabank* or *Yekil Lemak*), the classical name of one of the largest rivers of Pontus in Asia Minor.

**Irish Corner**, tp. of Greenbrier co., W. Va. Pop. 840.

**Irish Language and Literature.** The Irish or Gaelic language is spoken in Ireland, in the Hebrides and Highlands of Scotland, and in the Isle of Man. It belongs to the Celtic group of the Indo-European tongues. Its relation to English is not greater than that of English to Italian, while it is related to Welsh in about the same degree that English is related to German. The word Erse is applied to that dialect of it spoken in Scotland, and is merely a form of the word *Eryache* or *Iryach*. Those who speak Irish, whether in Ireland, Scotland, or Man, call themselves the Gaedheli and their language Gaedhiliic. A language spoken throughout a region including so many isolated districts has probably had several dialects from remote times, but these are of small literary importance and differ in no considerable degree. Till within the last 300 years the language of Gaedhiliic books, wherever written, was almost uniform. Thus, Bishop Carsuel's prayer-book printed in Scotland in 1567 does not differ from books written at the same age in Ireland. At the present day the most distinct from pure Irish of Gaedhiliic dialects is that of the Isle of Man. The Manx has a curious orthography, based upon Bishop Wilson's Bible, printed in 1755, and it contains a good many words borrowed from the Welsh and from the Northmen. The Gaedhiliic of the mainland of Scotland differs from that of the isles, and the isles differ among themselves. In Ireland the dialect of the southern half differs from that of the northern; Connaught differs slightly from Ulster; Kerry from the rest of Munster. Underlying these trivial differences is a common grammatical structure.

The alphabet contains eighteen letters:

a b c d e f g h i l  
m n o p q r s t u.

To these from an uncertain period names taken from trees have been given. Thus, A is *ailm*, the fir; G is *gort*, the ivy; R, *ruis*, the elder. The characters in which these letters are usually written are old forms of the Roman alphabet, and are found in Early Saxon as well as in early Irish MSS. The number of consonantal sounds is increased by aspiration, a process which may be applied to all the consonants but *l*, *m*, *r*. Thus, *t* aspirated becomes a slight guttural, and *c* aspirated a deep guttural. The system of aspiration, combined with that of eclipsis or silence of one consonant when preceded by another (as *ts*, pronounced *t*), affords the basis of the system of inflection so far as consonants are concerned. The vowels *a*, *u*, *o*, are called broad—*e*, *i*, slender. The alteration of broad syllables to slender and of slender to broad completes the means of inflection known to the language. Orthography and pronunciation are based upon a familiar rule, *eaval le eaval agus beathán le beathán* (broad with narrow and broad with broad). This means that in the same word vowels of equal sound must be on opposite sides of a consonant. It is illustrated when Irish proper names are put into an Irish form: thus, Cromwell will not do, because *o* is broad and *e* slender, and it is not Cromwell. Irish has the usual parts of speech. It has two genders. There is one article *an* (the), and it is declinable and of two genders. Nouns when written alone are declined with terminal inflections. When preceded by the article they have also initial changes. Grammatical differences as to the number of declensions. There are well-defined. The first is marked by an attempt to treat the final syllable in the



genitive, as *bárd* (poet), gen. *báird*. Most of the masculine nouns are of this declension. Most feminine nouns belong to the second, which forms its genitive by the addition of a slender syllable, with consequent attenuation of the preceding syllable, as *caitheach* (thatch), gen. *caitheige*. The third declension forms its genitive by a broad increase, as *cath* (battle), gen. *catha*. The fourth declension has a peculiar plural, but shows no change in the singular, as *cais* (defect), n. pl. *caibaidhe*. The fifth declension forms its genitive by addition of *n*, as *meann* (mind), gen. *meannan*. Adjectives are declined as nouns, and are compared by use of the genitive singular feminine and a prefix, as *geal* (white), *níós gile* (whiter). The pronouns in themselves have no peculiarity, but their compounds with prepositions form one of the chief idioms of the language. These compounds are used directly, as *Is mian an áise a thug si dhuit* compound of *do*, to, and *tá*, thou—"It was good the care which she gave to you"—i. e. "she took good care of you." To express possession, as *Is mian sa leabhar le, with, and mé*, I—"With me myself the book"—i. e. "the book is mine;" to complete a verb, as *Tá dail agam an-ag, at, and mé*, I—"It is a wish at me in it"—i. e. "I wish for it;" and in numerous other ways. There are also regular possessive and relative pronouns. Verbs are conjugated on one main plain. Their tenses and persons are formed by terminal and initial alterations of the root. There are two present tenses and two pasts. The second tense in each case, indicating action in a place, is called consuetudinal. Thus, root *glan*- (cleanse), active voice, pres. (1) *glanaim*; (2) *glanann mé*; past (1) *ghlanas*; (2) *ghlanaim*; future, *glanfaid*; infinitive, *do ghlanadh*; passive voice, pres. (1) *glantar mé*; past (1) *glanadh mé*; past (2) *glantai mé*; future, *glanfar*; conditional, *ghlanfaidhe mé*; past participle, *glanta*; inf. *do bheith glanta*. The imperative active is the root; the imperative passive is the same as the present passive. The consuetudinal present has a distinct form in the active only. There are several irregular or, strictly, compound or defective verbs. The main principle of the syntax is that the verb begins the sentence, as *D'éir si Seamus agus na ghab ri Cathal an ríocht i n'áin*—"Died King James, and took King Charles the kingdom in his stead"—i. e. "King James died, and King Charles reigned in his stead." The subject comes next, and then the rest of the predicate. The adjective, with a few exceptions as *sean bhean*, "old woman", follows the noun, and its gender is marked by the affection of its initial, as *long mhór*, "great ship" (fem.), *sean mhór*, "great man." Here the initial of the adjective is aspirated where the noun is feminine.

Irish prosody comprised several metres. They consist in various combinations of syllables with alliteration and vowel-rhyme, but, except accidentally, they do not show the English syllabic rhyme. The following example is from an ancient MS., and is the original of a well-known modern melody:

*O Thoirigh do Chliodhna cáis  
Is fad éir agus é a háis  
I rí Rhoisín tairbhghil nar tinn  
Do thuirich aoinbhean Eim.*

"From Tory Island to Clidhna the pleasant,  
And a ring of gold with her,  
In the time of Brian, bright-sided, fearless,  
Went around Erin a solitary woman."

Irish historians mention works written in pagan times in Ireland, and of these the most famous is the *Saltair of Pádra* by Cormac Mac Airt, king of Ireland from A. D. 227 to 266. It is stated to have consisted of metrical treatises on the laws and usages of Ireland. Of this and other early works no more than the titles remain. The earliest existing examples of Irish are glosses, chiefly on Latin MSS. of the Scriptures. These are found in codices of the eighth, and possibly of the seventh century. The libraries of Corpus and St. John's Colleges at Cambridge, of Milan and of St. Gall, contain examples. The glosses are sometimes of isolated words, but they are often long sentences, so that they illustrate completely the grammar of the Gaelic tongue at that remote period. A large collection of such glosses is to be found in Zeuss, *Grammatica Celtica*, in Nigra, *Milan Glosses*, and in Stokes, *Goidilica*. The writings of this period are marked, among other peculiarities, by the absence of the rule "broad to broad," etc., by indications of a neuter gender and of a dual number, and the language is called Old Irish. The next period is called the Middle Irish. To it the earliest complete works now existing belong. It fades gradually into the modern form of the language, which has been established without material change for about 400 years. It is to be borne in mind that the absence of works altogether in the oldest Irish is shown not to be due to the intellectual torpor of its age, but to the fact that important compositions of Irishmen of that day remain in Latin. Thus, the wonderful life of St. Colum Cille by St. Adamnan exists in MS. dating from the

period of its composition, the seventh century. The oldest book altogether in the Irish language is called *Leabhar na h-Uidhri*. The original composition is referred by historians to the sixth century, and to St. Ciaran, abbot of Cluain-mic-Nois, but the MS. now preserved, no doubt a copy from an older one, was written about the year 1100 by Moelmuiri mac Ceileachair. This venerable MS. is in fair preservation, and may be seen in the Royal Irish Academy, Dublin. It is a collection of heroic tales, with a few pieces of other character, such as an account of the royal burying-places of Erin, a sermon on the Resurrection, and one on the day of judgment. From the thirteenth century onward MSS. exist in large numbers. They are usually collections of treatises made by learned individuals or by communities. Divinity, law, physic, poetry, history, romance succeed one another, with no further sign of division than an ornate initial where each subject begins. The *Leabhar Breac*, or "Speckled Book," written by the Mac Egnans, the *Book of Leinster*, and the *Book of Ballymore* are examples. In each case the book is a body of transcription, the editors being merely the copiers of earlier MSS. The period of collections of this kind is succeeded by that of separate works. The *Annala Ríoghachta Éireann*, commonly called the "Annals of the Four Masters," Dr. Keating's *History of Ireland*, and the several works of Mac Firbis are examples in the seventeenth century. Printing in the Irish language did not begin till the third quarter of the sixteenth century, and the earliest specimen is a poem preserved in the library of Corpus College, Cambridge. After that time numerous books were printed in Irish in Dublin and on the continent of Europe. All the earlier and most of the later books are printed in the Irish character. The first Irish book printed in English type is a catechism for the island of Rathlin, published about 1730. At the present day, excepting ancient works edited by scholars, the production of books in Irish is limited to a few translations, prayer-books, and now and then a little verse.

Turning from the actual MSS. and printed books to their subject-matter, Irish literature is found to have a wide range. Most works on divinity were written in Latin, but a great collection of sermons and of hymns, some very old and curious, and innumerable lives of saints, exist. In this class two remarkable examples may be mentioned—the *Amhra Cholúim Chille* and the *Féilire of Aengus*. The former was composed in the sixth century by Dallan Forgaill, chief poet of Ulster, and is a poem on the death of St. Colum Cille. The latter is also a poem, and is of great length. After a preface explaining its origin, it recounts the saints of Erin and some of the greater saints of the Church at large, and their glories. Its intrinsic merits are the simplicity of its thoughts, the purity of its devotion, and the richness of its imagery; and it is besides valuable from its numerous allusions to historical and topographical points. The old MSS. contain a large number of legal treatises. From the extreme terseness of their style and their frequent use of obsolete words these works are peculiarly difficult to translate. The best known are the *Senchus Mór* and the *Book of Aicill*. These are collections of legal maxims, of illustrative cases, of judgments and of principles on several branches of law, as on land-tenure, on wrongs and their remedies, and on social relations. The commitment of the *Senchus Mór* to writing is referred by Irish historians to the fifth century. From the Irish word *breitheamh* (a judge) these treatises are often called Brehon laws. They are of profound interest, as showing the growth and history of a very ancient system of jurisprudence, influenced in no important particular by the Roman code. In historical romance Irish literature is particularly rich. The most famous of the old tales is the *Tain Bo Cuailgne*. It tells of a war originating in strife about the finest white bull in Ireland. The men of Connaught invade Ulster, and the incidents of the war form a large part of the tale, and especially the feats of the great champion of Ulster in the first century, Cuchullain. The tale ends with the bull rushing against a rock and dashing out his brains. Many tales recount the deeds of heroes and saints, the courtships of the beauties of old by rival champions, elopements, wars, travels. The *Voyage of Maelduin's Corach* describes an early voyage and discovery of land in the far West, which some late writers have thought to indicate a discovery of America. Of history one of the earliest and most valuable works is *Cogadh Gaedhel re Gallaibh*—the "war of the Irish with the Danes." This was probably written by one who lived in the last days of the wars, and may have been at the battle of Clontarf in 1014. The *Annals of the Four Masters* is a history based upon ancient records. Michael O'Clery was its chief editor, but several other Franciscans took part in the work. It extends from the earliest times to 1616, and is a vast and, for the most part, reliable source



of information. The earliest translations into Irish are of pieces of the Scriptures. In the fourteenth century the travels of Marco Polo and numerous works on medicine were translated into Irish, and later the English version of the Bible, the *De Imitatione Christi*, and other devotional works, while in this century some of Miss Edgeworth's tales have appeared, and Dr. MacHale has given the *Blind* and several of Moore's melodies. In the last century and the one before a great many songs were written, and a few novels. Hardiman's *Irish Minstrelsy* contains a collection of such songs. Some are pleasant, but many have more merit in their simple, lovely airs than in their words. The Irish language has for centuries been systematically attacked by the English rulers of Ireland, and these efforts have at length succeeded in putting an end to its production of literature. It is to be feared that its life is almost at an end, and that in two centuries, at the longest, the air of Ireland will no more convey Gaelic tones, and her people no longer use the speech which for 3000 years expressed the thoughts of their ancestors.

The best grammar of modern Irish is that of O'Donovan; of ancient Irish, Zeuss. A grammar by John O'Nolloy contains an excellent account of the differences of the provincial dialects. The best dictionaries are those of O'Reilly, O'Brien, and MacCurtin. O'Curry's *Lectures on the MS. Materials of Irish History* is a useful introduction to the literature. On the ecclesiastical literature, Dr. Reeve's edition of Adamnan's *Life of St. Columba*, and the somewhat rare works of Colgan, should be consulted. The publications of the English record-office, of the Irish laws commission, of the Irish Archaeological Society, of the Ossianic Society, of the Celtic Society, of the Royal Irish Academy, and of the Royal Archaeological Association of Ireland, contain numerous important works in the language, translated and edited by competent scholars. (For the best account of early Irish (Breton) laws and institutions see Sir Henry Sumner Maine's recent work, *Lectures on the Early History of Institutions*, 1874.)

NORMAN MOORE.

#### Irish Moss. See CARRAGEEN.

**Irish Sea, The**, is situated between Ireland and Great Britain, and connected with the Atlantic, S. by St. George's Channel, and N. by the North Channel. Its greatest width is 120 miles. It contains the Isle of Man and Anglesey, besides some smaller islands. The principal inlets are the estuaries of the Dee, Mersey, and Ribble in England, Solway Frith in Scotland, and Dundrum, Dundalk, and Dublin bays in Ireland.

**Irisite** [Lat. *iris*, "rainbow"], a very singular resinoid substance which is the main constituent of a peculiar American mineral, originally investigated by the writer, and called by him *grahamite*. Grahamite occupies vertical fissures in horizontally-bedded rocks, so far as yet known only in Ritchie co., West Va., and at one other point—in the centre of the continent, 100 miles W. of Denver, Col. A sample from this latter locality, in the possession of Dr. J. S. Newberry, has been identified chemically by the writer as genuine grahamite, containing about the same proportion (80 per cent.) of irisite, the remainder being viscosite (which see), just as in the West Virginia grahamite. [The names originally assigned to the two resinoid constituents of grahamite by the discoverer were *irisine* and *viscosine*. Prof. J. D. Dana has, however, established the terminology in *ite*, and these must therefore be modified to *irisite* and *viscosite*.] The probability is great that other localities will be found. The mean of analyses of grahamite by two analysts is—

Carbon .....	78.66
Hydrogen .....	8.57
Oxygen .....	12.77
	100.00

Density = 1.145.

This is calculated independently of the 2 or 3 per cent. of ash.

Grahamite is black in the mass; of resinoid, but variable lustre; trace, dark chocolate-brown; very soft, fusible under pressure, by reason of the highly fusible viscosite it contains, to a tarry and frothy mass; is *eminently soluble* in chloroform, benzole, bisulphide of carbon, warm oil of turpentine, and some other liquids. The viscosite is readily dissolved out from the irisite by ether or light petroleum-naphtha. The residual irisite may be obtained pure by solution, filtration, and evaporation. Pure irisite is black, brilliant, infusible without decomposition, like ulmine; which last, however, is wholly insoluble. This combination of absolute infusibility with great solubility is characteristic. Its most characteristic property is that thin films of its solutions dry on polished surfaces to gorgeous rainbow hues; whence its name. If to its solutions a drop

of a mineral acid be added, with slight agitation, the irisite coagulates and totally separates. It is now profoundly altered, having become *insoluble* in all its former solvents. No analyses of pure irisite can yet be reported. The no less singular mineral, *albertite*, from the province of New Brunswick, was found by the writer to contain a *little* irisite and viscosite. The grahamite is claimed by some to be albertite (Gesner, Macfarlane, *et al.*), but C. M. Wetherill found for albertite the following composition—

Carbon .....	86.14
Hydrogen .....	8.96
Oxygen .....	1.97
Nitrogen .....	2.93
	100.00

Density = 1.097.

—which differs irreconcilably from grahamite. Its relations to solvents and chemical agents generally are also widely different. The trace of albertite is remarkably *black*, surpassing most charcoal in this respect, and nearly equalling anthracite. Both these minerals are believed by some writers (Lesley, Newberry, Fontaine, Macfarlane, Jenney, *et al.*) to be derived from liquid petroleum, and to be strict "asphalts," formed probably *in situ*. The writer, and with him Peckham, believe this impossible, both geologically and chemically, but rather that they have been injected into their fissures in heated plastic condition. Dana also admits this latter view in his later editions. In 1856 the writer suggested that the West Virginia grahamite might be employed in the gas-manufacture. Since that, over 30,000 tons have been mined and used by gas companies throughout the U. S. for enriching coal-gas. (Under Viscosite some further information will be given regarding grahamite.)

H. WURTZ.

**Iritis**, a frequent and formidable disease of the eye, characterized by inflammation of the iris and the contiguous serous surfaces, by intolerance of light, by adhesions (*synechmata*) to the surrounding parts, and by consequent distortion and immobility of the pupil. The color of the iris also undergoes peculiar changes, so that the skilled diagnostician can usually detect its presence at once. When the iris is at all actively inflamed, it also becomes quite insensible to the action of atropia. Iritis may be traumatic in its origin, or may arise from over-use of the eye or from working in too intense light. It is, however, usually of a rheumatic or syphilitic character. It is often very painful. Local bloodletting, iodide of potassium, mercurials, atropia, and finally tonics, such as iron, quinia, and strychnia, are employed in its treatment.

**Irkutsk**, government of East Siberia, bordered by the governments of Yeniseisk and Yakutsk and the Chinese empire. Area, 267,555 square miles. Pop. 372,833. It comprises the great Baikal Lake, but it is mostly mountainous, traversed by the Nerchinsk Mountains and the Jablonovy. Large tracts are covered with pine forests; rye and oats are the common crops; rhubarb is much cultivated. Of animals, reindeer, sables, ermines, and foxes abound, and excellent fish, especially sturgeon and cod. Gold, silver, lead, jasper, topaz, emerald, rock-salt, and coal are found. But agriculture and the transit trade between China and Russia are the chief pursuits of the inhabitants.

**Irkutsk**, town of Siberia, the capital of the above government, at the confluence of the Irkut and the Angara, in lat. 52° 17' N. and lon. 104° 16' E. It is the seat of the governor-general of East Siberia and of a Greek archbishop, and has many educational institutions. Its houses are mostly built of wood, and its manufactures of linen, leather, glass, and soap are merely local. But it is the principal station of the trading route between China, Siberia, and Russia, and large quantities of tea, silk, porcelain, rhubarb, and furs are here exchanged for European goods. Pop. 23,856.

**Ireneus**, **Wernerius**, or **Garnier**, b. at Bologna, Italy, in the second half of the eleventh century, became professor of Roman law at the university of that city, in which capacity he discovered and expounded the *Enchiridion* of Justinian, and other eminent ancient jurists, thus becoming the restorer of Roman jurisprudence. D. at Bologna between 1126 and 1128.

**Iron as a Metal.** Iron is the most important metal at the command of man, and the use of it, in its many different forms, has elevated barbarism into civilized society. It may, then, seem strange to say that iron is a rare metal, but such is the fact; for it is almost unknown in a state of chemical purity. It is scarcely possible to obtain pure iron, such is the strength of its combination with certain elements. The metal ordinarily known as iron is virtually a combination of the elements iron and carbon. According to the amount of carbon present the metal is called *wrought iron*, *steel*, *malleable iron*, and *cast iron* or *pig iron*, begins



ning with the metal containing least carbon. Wrought iron and steel have been known from the earliest times. Iron was used by the Egyptians; it is supposed, anterior to the time of Moses; it was extensively applied by the Assyrians, and Indian steel was largely imported into Persia under the name of Parthian iron, which was steel in its rudest though a valuable form. The first steel produced in Europe was made in the thirteenth century in bars in small open fires, while cast steel was invented by Huntsman little more than 100 years ago. Cast iron was unknown till the fourteenth century, having been made about the same time in England and in Alsace (Alsace).

The properties of iron claim our attention in the first place. They are physical and chemical; the physical properties include the mechanical properties of the metal, and the chemical properties include its combinations with various elements and the characteristics of its salts.

**PHYSICAL PROPERTIES.**—*Color.*—Pure iron is silvery white, slightly grayish, with a mild but brilliant lustre. The color of the various forms is mainly determined by the amount of carbon present, since other elements, such as manganese, silicon, phosphorus, etc., modify the lustre rather than the color. The color of wrought iron is gray, which is also that of steel, the varieties with most carbon being lightest in shade; in steel the color is darkest in the unhardened state, and when hardened the metal becomes whiter in proportion to its content of carbon. Cast iron varies from deep gray to white as the amount of free carbon (graphite) present decreases.

*Fracture.*—Wrought iron has a fibrous fracture, the fibres being longer and more silky the purer the metal is, the more it has been worked, and the more gradually like a tear the fracture has occurred. Steel is crystalline when broken; when hardened the crystalline character becomes almost imperceptible and the fracture conchoidal. Cast iron is also crystalline, white iron being crystallized in large plates, which decrease in importance as the graphite increases, till in deep gray iron the crystals are indistinct, so far as iron is concerned, but the graphite appears in scales of considerable size.

*Specific Gravity.*—The specific gravity of electro-deposited iron is 8.139; that of cast-steel bars and plates averages 7.823; that of tilted and hammered iron bars and forgings ranges from 7.76 to 7.798; that of rolled iron plates and bars varies between 7.76 and 7.54; while that of unwrought puddled bar averages 7.40. We find that wrought iron is very bad when its sp. gr. is less than 7.50. The sp. gr. of cast iron ranges from 6.85 to 7.35, that used in construction averaging 7.10.

*Conduction of Heat and Electricity.*—The conductivity of silver being 100 in each case, that of wrought iron for heat is 11.9, and for electricity 12 to 14.8.

*Expansion by Heat.*—From the freezing to the boiling point of water cast iron expands in bulk 0.0033, and wrought iron 0.0036; and wrought iron has a linear expansion of  $\frac{1}{1000}$  for each degree between 212° and 572° F. Cast iron exposed to continued heat becomes permanently expanded to the extent of  $\frac{1}{16}$  to 3 per cent. in length, so that grate-bars, for instance, should have 4 per cent. play. In cooling from a melted state gray cast iron contracts 1 per cent., and white cast iron 2 to 2½ per cent. In a state of fusion the behavior of cast iron is the reverse of that of water, for the hottest iron is the densest and sinks to the bottom. This property enables us to melt it in a reverberatory furnace by a flame applied on the upper surface of the metal, and also to keep it hot when melted. If melted iron acted as water does, it would be practically useless.

*Fusibility.*—Pure iron is doubtless as refractory as platinum, but its fusibility rapidly increases with the amount of carbon present. Cast steel is estimated to fuse at 4000° F., and cast iron at 2780° F.

*Welding.*—Iron differs from almost all other metals in the fact that, though nearly infusible, its particles agglutinate at a white heat into a nearly homogeneous mass. All methods of producing wrought iron depend on this principle.

*Tenacity.*—In this quality iron vastly excels all other metals. The statements respecting the strength of American irons have been, unfortunately, overestimated by 25 to 30 per cent., owing to a defective method of breaking the test-piece at a point where its area was suddenly reduced. Calculated for the original area of the test-bars, the following are correct statements of breaking strains:

		Pounds to sq. inch.
Steel.....	Hard cast steel.....	132,000
	Medium ".....	110,000
	Soft ".....	95,000
	Steel plate (homogeneous metal).....	72,000
	Bessemer steel (rails).....	80,500
	Spring steel.....	72,500
	Puddled steel.....	71,500

		Pounds to sq. inch.
Wrought iron....	Iron wire.....	84,000
	Bar iron.....	60,000
	Plate iron.....	54,000
	Unwrought puddled iron.....	30,000
Cast iron.....	Strong cast iron.....	28,000
	Average ".....	16,500
	Weak ".....	15,000

*Ductility.*—Iron possesses this quality in a high degree, being excelled in it only by gold, silver, and platinum. The tenacity of a metal has a greater effect in producing ductility than has the malleability; hence, the purer kinds of wrought iron can be drawn into wire of excessive fineness, even down to a diameter of 0.01 inch in continuous coils 49,000 feet long.

*Resistance to Compression.*—Wrought iron under pressure loses shape and proportion like lead, and no definite point is marked at which crushing can be said to occur; yet under a load of 38,000 pounds per square inch the metal is too much distorted for practical use. Cast iron, on the contrary, can be crushed by a load varying from 44,500 to 140,000, the mean usually assumed being 95,000 pounds per square inch, or about six times the mean of its tensile strength. Wrought iron resists compression with a strength about two-thirds that with which it resists extension.

*Hardness.*—Iron is relatively one of the hardest of all metals, but there are among the various kinds many degrees of hardness. Hardened steel is the hardest of metals, and some kinds of white cast iron are nearly as hard, while wrought iron and homogeneous metal are sometimes nearly as soft as copper.

*Stiffness and Elasticity.*—Wrought and cast iron are elastic under a strain kept within certain limits, and both are safe in structures so long as the strain remains within the elastic limit. There are two limits of elasticity—one for compression, the other for extension. Under compression the limit of elasticity of cast iron may be stated as 35,000 pounds per square inch, that of wrought iron about 27,000 pounds, and that of steel say 76,000 pounds per square inch for hard cast steel and 36,000 for soft steel of finest quality. Under tensile strain the limit of elasticity of cast iron is about 8000 pounds per square inch, that of wrought iron about 26,000 pounds, and that of steel varies between one-half and two-thirds of the breaking strains of the various kinds. Bessemer steel, containing about 0.45 per cent. of carbon, breaks under a minimum tensile strain of 74,000 pounds, and will bear in tension as well as in compression a minimum strain of 38,000 pounds per square inch without exceeding its elastic limit. It is a curious fact that cast iron yields at first to a given compressing strain twice as much as wrought iron, yet it will bear without crushing three times as much pressure. Cast iron can be exposed under extension to a strain only one-third to one-fourth as great as that it bears under compression. Wrought iron will bear within elastic limits under extension three-fourths of the force it bears under compression, but in practice it is usually taken the other way, owing to the fact that long struts of wrought iron are very liable to fail by flexure. The limit of elasticity, or the working strain of steel, seems practically equal for compression and extension. Steel is made more uniform than wrought iron, and will therefore gradually supersede wrought iron in most structures, with an increase of safety if not a diminution of weight. The popular term *toughness* means a combination of tenacity, ductility, and hardness happily joined to resist concussions and irregular strains. In judging a metal, tenacity alone would be a false guide, for hard, brittle steel shows the greatest tensile strength. Therefore, it is necessary to see that the metal stretches considerably before breaking; that is, not less than 5 to 30 per cent. for good qualities of the different grades of steel, and from 30 to 60 per cent. for the different grades of wrought iron.

Such is iron as we all of us know it in its various forms and every-day applications. The chemical properties of the metal are not so evident as the tangible physical ones, yet they are the immediate causes of the great variety of characteristics exhibited by the various forms of iron.

**CHEMICAL PROPERTIES.**—Iron differs from all other metals in the fact that it combines at a high temperature with carbon to form fusible compounds; the fusibility of these compounds decreases as the carbon decreases. Iron represents a most important group of metals, distinguished by their capability of combining with oxygen, chlorine, etc. in both odd and even proportions. These are iron, nickel, manganese, cobalt, chromium, and uranium. The first five are closely allied, have the same atomic volume, and their specific gravities and atomic weights form a regular sequence. The following is a list of the principal salts of iron, the atomic weight of iron being 56:



Ferrous Compounds (even).	Ferric Compounds (odd).
Protochloride..... $\text{Fe}^{+2}(\text{Cl})$	Perchloride..... $\text{Fe}_2^{+3}(\text{Cl})_3$
Perochloride..... $\text{Fe}^{+2}(\text{O})_2$	Sesquioxide..... $\text{Fe}_2^{+3}(\text{O})_3$
Protosulphide..... $\text{Fe}^{+2}(\text{S})$	Hydrated sesquioxide..... $\text{Fe}_2^{+3}(\text{O})_3 \cdot 3\text{H}_2\text{O}$
Protosulphate..... $\text{Fe}^{+2}(\text{SO}_4)$	Sesquisulphide..... $\text{Fe}_2^{+3}(\text{S})_3$
$7\text{H}_2\text{O} \cdot \text{Fe}(\text{OSO}_3)_2 \cdot 7\text{H}_2\text{O}$	
Protocarbonate..... $\text{Fe}^{+2}(\text{CO}_3)$	

In addition to these we have—

Magnetic oxide of iron..... $\text{Fe}^{+2}\text{Fe}_2^{+3}(\text{O})_4$
Magnetic pyrites..... $\text{Fe}^{+2}\text{Fe}_2^{+3}\text{S}_4$
Bisulphide of iron..... $\text{Fe}^{+2}\text{Fe}_2^{+3}\text{S}_2$

The old notation with atomic weight 28 is enclosed in brackets. Of the above salts, the protocarbonate occurs in nature as spathic iron ore, and the protosulphate as copiapite. The salts of iron possess an inky, astringent taste, but the two classes have marked characteristics by which they can readily be distinguished from each other and from the salts of other metals. (1) *Ferrous Salts*.—These salts have a pale green color. *Alkalies* throw down white or greenish-white precipitates, which quickly oxidize and turn brown on exposure to air. *Potassium ferriocyanide* (red prussiate of potash) occasions a bright blue precipitate in neutral or acid solutions. (2) *Ferric Salts*.—In solution these salts exhibit a yellow or yellowish-brown color. *Alkalies* throw down a reddish-brown precipitate, insoluble in excess of alkali. In neutral or acid solutions *potassium ferriocyanide* occasions no precipitate, merely imparting a greenish hue to the solution. Solutions of ferric salts, to which an alkali has been added till a permanent precipitate begins to form, are completely decomposed on boiling, the iron being precipitated as an insoluble sub-salt. This property enables us to separate iron from manganese, nickel, and cobalt, which do not possess it. Further, we find that the protoxide of iron and the ferrous salts are magnetic, whilst the peroxide and ferric salts are not.

The salts and compounds of iron are highly useful in the arts. Copperas or green vitriol is a valuable disinfectant and a most important mordant in dyeing. The various sulphides of iron, in their natural state as pyrites, furnish most of the sulphuric acid of commerce. Iron unites with cyanogen and hydrogen to form acids, which in turn combine with iron, making ferro- and ferri-cyanides of iron, both of them brilliant blues, and the latter known as Prussian blue. A neutral solution of a ferric salt treated with tincture of galls yields a bluish-black precipitate possessing the peculiar property of remaining in a state of partial solution, as writing ink. In medicine, iron is an invaluable tonic, ferric chloride especially, while the dried persulphate is a most efficient agent in stanching the flow of blood from wounds.

The metallurgical chemistry of iron can be most clearly explained under the following heads:

*Iron and Oxygen*.—Iron in a compact state suffers no change in dry air or oxygen at ordinary temperatures, but in a spongy state burns readily in air. In pure water iron remains unchanged, but the presence of carbonic acid causes a rapid oxidation, which is counteracted by the presence of the alkalis and of lime, and by a coating of zinc. Sea-water dissolves the iron of cast iron completely in the course of time, leaving the carbon. At a high temperature iron burns vividly in air, and decomposes steam at a red heat, in each case forming magnetic oxide of iron. Welsh nail-makers keep their anils hot during forging by throwing a little blast of air upon them. In the puddling furnace iron burns with great readiness. *Peroxide of iron* is a powerful base, and plays an important part in metallurgical operations. It has a powerful affinity for oxygen, and the power of decomposing water. *Peroxide of iron* is infusible except at high temperatures, when it is converted into magnetic oxide. It has little or no affinity for silica, but is easily reduced to the metallic state by carbon, even without intimate contact. *Magnetic oxide of iron* is an important product and agent in metallurgy, particularly in puddling. In the course of the oxidation of iron various oxides are formed containing less oxygen than magnetic oxide, the most important being *hematite* or *smith scale*.

*Iron and Carbon*.—When metallic iron is heated in contact with carbon, the result is wrought iron, steel, or cast iron, according to the degree of heat applied and the length of time. The influence of carbon in modifying the properties of iron is one of the most extraordinary phenomena of metallurgy, and the variations caused are so great that the compounds are, practically, distinct metals. While there are no characteristic properties which distinguish one metallic compound from the others, and the difference consists mainly in the degree in which particular characters are presented, yet in practice the separation of the compounds is fixed by two striking phenomena—viz. the fact that at a certain point graphite ceases to separate from *cast iron* slowly cooled, and the fact that *steel* hardens on being

plunged at a red heat into water. The greatest total amount of carbon pig iron will contain is about 5.9 per cent., but this is only when manganese is present, the ordinary amount being 3.2 to 4.7 per cent. When the percentage of carbon falls to 2.25, the *cast iron* refuses to part with graphite even when slowly cooled for days. Iron with 2 per cent. of carbon is not malleable nor weldable, but falls to pieces on heating. When the percentage of carbon is about 1.75, the metal can barely be welded, but with 1.3 to 1.1 per cent. of carbon the peculiar properties of *steel* are all clearly developed—viz. fusibility, combined with capability of hardening and weldability. As the carbon diminishes the two first qualities decrease and the third increases. With 0.4 per cent. of carbon steel can barely be hardened enough to give sparks with flint, and below this percentage the compound is designated *wrought iron*, but is called *steely iron* or puddled steel till the carbon falls to about 0.25 per cent. Bessemer steel, as now usually made, is a true steel. Soft wrought iron seldom or never contains less than 0.08 per cent. of carbon. Ordinary wrought iron is not homogeneous in composition, but is made up of fibres or masses varying greatly in their percentage of carbon. The presence of other elements, such as silicon, phosphorus, etc., modifies the above boundaries, but not materially.

Carbon exists in cast iron in two states—combined carbon and graphite. The proof of chemical combination is given by the fact that infusible carbon heated with nearly infusible pure iron forms a fusible compound (*cast iron*), out of which, when very highly heated, part of the carbon separates as graphite. Iron containing much graphite is called *gray iron*; when, on the contrary, it contains much combined carbon, it is called *white iron*, the total amount of carbon being in ordinary pig irons substantially constant. The two kinds pass into each other by insensible gradations, and at a certain stage are both visible in the same piece, which is then called *mottled iron*. The varieties are often graded by numerals into eight classes, but in this country usually into five, as follows: No. 1 foundry, No. 2 foundry, No. 3 or gray forge iron, mottled iron, white iron. The last two grades are often called forge irons. White iron, containing manganese, is called *spiegel iron*.

*Iron (Carbon) and Manganese*.—In cast iron manganese increases the amount of combined carbon and diminishes the amount of silicon. It is chiefly beneficial as a flux in removing sulphur, etc. In cast- and in Bessemer steel it is present in various proportions, 0.1 to 1.0 per cent., and improves the working of the steel. It is seldom found in wrought iron.

*Iron (Carbon) and Sulphur*.—Iron combines freely with sulphur, the effect of which on cast iron is to diminish the amount of carbon and hinder the separation of graphite. In small quantity it is advantageous for castings like cannon, as it makes cast iron stronger. In steel and wrought iron the effect of sulphur is to make both weak and ragged when worked below a yellow heat, hence the term *red-shortness*. Steel resists better than wrought iron, but 0.1 is sufficient to injure either. Copper acts similarly, but less strongly, than sulphur, and diminishes the weldability of the metal.

*Iron (Carbon) and Phosphorus*.—Iron is seldom free from phosphorus. In cast iron this element increases the hardness, and makes the metal more fluid when melted, but weakens it when cold. Pig iron contains from 0.5 to 2.25 per cent. of phosphorus. It makes wrought iron easy to work while hot, thus counteracting sulphur, but brittle when cold, and renders steel more brittle than iron. The presence of 0.25 per cent. in iron and of 0.1 in steel is disadvantageous.

*Iron (Carbon) and Silicon*.—Silicon exists in all varieties of iron, and in gray cast iron in greatest quantity, because the heat causing grayness in the iron also aids reduction of silica, and because silicon aids separation of graphite. White cast iron seldom has more than 1.0 per cent., but gray iron sometimes contains as much as 5 per cent. of silicon. Ordinarily, it does not injure pig iron, but is beneficial when it is converted into Bessemer steel. But the effect of silicon on wrought iron is to make it brittle, rotten when heated, and less ready to weld. On steel the effect is the same, and an amount less than 0.1 per cent. is decidedly noticeable for the worse.

*Iron and Carbon* also combine with *tungsten*, *titanium*, *chromium*, and *tin*. They all impart greater hardness, if not brittleness, displace, except tin, carbon in cast iron, and reduce the weldability of wrought iron. Tungsten combines with great difficulty, and titanium scarcely at all; both are probably useful in making the grain of steel finer and increasing its strength and hardness. Chromium combines readily with iron, is said in some respects to be useful, and seems to render steel less liable to injury from overheating. Tin renders wrought iron utterly worthless, even when only 0.2 per cent. is present.

*IRON ALLOYS*.—All the above compounds are sometimes



incorrectly called *alloys*, but that term denotes the mechanical mixture of two or more metals, either as such or (rarely) holding in admixture a chemical combination of the metals with each other. The term cannot apply to the combinations of iron with metalloids, nor to the combination of metals with carbon and iron. The abuse of the term *alloy* doubtless arises from indefinite use of the term *iron*. Our knowledge of the alloys of pure iron is exceedingly scanty. Iron alloys with copper, nickel, and cobalt in various proportions; with zinc also, but only when zinc is the principal ingredient, the iron not exceeding 11 per cent. The process of *galvanizing* or coating iron with zinc was first practised at Rouen about 1786. Iron alloys with copper, zinc, and tin to form *sterro-metal*, a close-grained alloy of great strength, suitable for hydraulic-press cylinders and for cannon, but the iron present does not exceed 2 per cent. *White brass* is an alloy of 80 zinc, 10 copper, and 10 iron; it has the appearance of zinc, but is much harder, very tenacious, and specially adapted for journal castings. Iron alloys also with tin in various proportions up to 50 per cent., making highly brittle crystalline alloys of little use. When clean wrought iron is dipped into melted tin it becomes firmly coated with tin (*tin plates*), and thereby protected from rusting. Iron alloys with aluminium in all proportions, producing bright and hard but forgeable alloys when the aluminium does not exceed 12 per cent. Aluminium is supposed to cause the *damask* of Indian steel wrought at Damascus into swords. Iron alloys with other metals, but the alloys have no practical importance. *Ferro-manganese*, a combination of manganese iron and carbon, which contains 30 to 60 per cent. manganese and as little carbon as possible, is valuable in steel-making.

**Iron, Ores of.** The ores of iron consist of the metal in an oxidized state, more or less mixed with clayey or siliceous impurities. Usually the more iron the ore contains the greater its value, but frequently ores of one class are valuable in facilitating the smelting of ores of another class, and sometimes the presence of other oxides—manganese, for instance, in ores for spiegeleisen—or the presence of coal (in black-band ore), is most desirable. Nothing which contains less than 20 per cent. of iron can be considered an iron ore.

#### Ores of Iron.

Name	Composition	Iron in 100 parts.
Magnetic iron ore.....	Iron and oxygen.....	72.400.
Red hematite (specular).....	Iron and oxygen.....	70.
Brown hematite.....	Iron, oxygen, and water.....	61.40 water 12.
Spathic iron ore.....	Iron, oxygen, and carbonic acid.....	48.70.
Argillaceous iron ore.....	Iron, oxygen, carbonic acid, and clay.....	Average 33.
Black-band.....	Iron, oxygen, carbonic acid, clay, and carbonaceous matter (coal).....	Variable, 20 to 35 10 to 25 coal.

1. *Native Iron*.—This is a curiosity, but not an iron ore. It occurs in minute particles in basaltic rocks, and in situations where it has been reduced from ore by organic matter. It is found also in meteorites, which are malleable and consist mainly of iron, with from 6 to 14.6 per cent. of nickel.

2. *Magnetic Iron Ore* ( $\text{Fe}_3\text{O}_4$ ).—Sesquioxide of iron 69, protoxide of iron 31 = 100. This ore is named from Magnesia in Lydia, where its attractive powers were first observed. It is iron black in color, with a specific gravity of 4.9 to 5.2, and leaves a black streak when rubbed on unglazed porcelain. It is often strongly magnetic, sometimes possessing polarity, when it becomes the loadstone (*loadstone*) of yore. It is found massive, in sharp crystalline grains as sand, and ochreous as an earth. It is not changed by exposure to air, and is broken up but not oxidized by roasting. It occurs mostly in primary crystalline rocks, and most abundantly in metamorphic rocks, in which it is found in vast beds. It abounds in Sweden, Norway, Russia and North America, and is almost wanting in England; as sand it is found in North America, New Zealand, and India, but in this state is apt to be made refractory by the titanate acid it contains. Its principal impurities are iron pyrites, copper pyrites, and phosphate of lime (*Apatite*); where the two former or sulphurous impurities abound, the latter is usually absent.

3. *Specular Iron Ore, or Red Hematite* ( $\text{Fe}_2\text{O}_3$ ).—Iron 70, oxygen 30 = 100. Anhydrous sesquioxide of iron. Specular ore is dark steel-gray in color, very thin pieces being blood-red by transmitted light, while the earthy varieties (*red hematite*) are red; both varieties leave a red streak. The specular variety is named from its brilliant lustre (*speculum*, "mirror"), and occurs massive and in shining scales (*micaceous iron ore*). It is found in Russia, Spain, Brazil, and in vast abundance in Elba, where it has been mined for 2000 years. The red hematite variety is

named from its dark-red color (*alpha*, "blood"). It occurs massive, sometimes highly fibrous, as an ochre, and in an argillaceous form. As an argillaceous ore it sometimes resembles jasper, and in the fibrous form it is very beautiful, on account of the striking internal structure and the high polish of the outside of its rounded masses. Red hematite occurs all over the world in remarkable abundance, being especially noted at Lavaulte in France, Cumberland and Lancashire in England, Bilbao in Spain, Marquette, Pilot Knob, Iron Mountain and other localities in this country, and also in Algeria. This ore occurs in rocks of all geological ages, and at volcanoes as a result of igneous action, but is especially abundant in metamorphic rocks. It has no characteristic impurities, but quartz nearly always accompanies it; it contains usually very little sulphur and little phosphorus.

4. *Brown Hematite, or Hydrated Sesquioxide of Iron* ( $\text{Fe}_2\text{O}_3 \cdot \text{H}_2\text{O}$ ).—Sesquioxide of iron 85.6, water 14.4 = 100. The variety *Göthite* is rather a mineral than an ore, but brown hematite or limonite (from *Aequum*, "meadow") is one of the most important ores of iron. It is found massive (*pipe ore*, etc.) and earthy, also containing fossils (one kind of *fossiliferous iron ore*); when loose or porous it is called *bog ore*. Its specific gravity is 3.6 to 4, and it leaves a yellowish-brown streak. It is extensively worked all over the world in secondary or more recent geological formations, and is so widely distributed that no special locality need be mentioned. Beds of it in the compact state have been worked for 150 years at Salisbury and Kent in Connecticut, which are celebrated for the quality of their iron. This ore is the result of alteration of other ores and minerals by air, water, etc., is still being formed, and derives its peculiar character from this origin. It is mixed with clay, sand, wood, etc. Its impurities are, naturally, phosphate of iron, organic matter, and seldom either sulphates or sulphur; it also contains manganese. Interesting instances of its modern formation are the "lake ores" of Sweden and the ponds of Eastern Massachusetts.

5. *Spathic Iron Ore* ( $\text{FeCO}_3$ ).—Protoxide of iron 62.1, carbonic acid 37.9 = 100; specific gravity 3.7 to 3.9. Color light yellow, turning to brown when the ore is exposed to the weather; before exposure its streak is white. It is found pure, massive, crystallized in veins and vast beds, also in globular masses, and in an earthy state with clay or sand. Part of the iron is usually replaced by manganese, which often renders the ore valuable for making white iron containing manganese (*spiegeleisen*). In its impure varieties, mixed with clay or sand, it forms the greater part of the *clay ironstone* ores. Spathic ore proper is found in vast conformable deposits in the clay-state formations of Styria and Carinthia, in Westphalia and Nassau in numerous small veins (mostly owned by Krupp of Essen), and in Cornwall.

6. *Clay Ironstone, or Argillaceous Iron Ore*.—Clay ironstone is the miners' name, denoting a distinct class of ores, which singly have little in common except their mixture with clay and sand. We find *broken clay ironstone* in compact masses and nodules, leaving a yellow-brown streak; *argillaceous hematite*, a hard, heavy ore, reddish-brown to dark-red in color, sometimes oolitic in structure, when it is called *fossiliferous iron ore* or *lenticular iron ore*; and lastly, *spathic clay ironstone*, an earthy or siliceous impure carbonate of iron, which is often called simply *carbonate ore*. The first two kinds are of local occurrence, but spathic clay ironstone is found in all countries, more particularly in the coal formations, of which it is the characteristic ore. In these formations it is sometimes found in continuous strata, sometimes in irregular masses imbedded in and under the shales and limestone rocks (*nodular and buhrstone ore*), and again found loose in clays (Tertiary formations in Maryland, etc.). It often occurs in the coal measures, in beds alternating with limestone and coal, and is always more or less calcareous. In these cases it is particularly adapted for smelting. Its color varies from gray to brown, and its weight is less than that of other iron ores; hence, at first sight, some varieties do not appear to be iron ores, and were till recently thrown away (Wales, Westphalia). This ore is much more uniform in composition than might be expected, its percentage ranging between 30 and 40, with an average of 33. The impurity varies, however; in England clay predominates, but in America sand, especially in the anthracite coal-measures. The Pennsylvania carbonate ore contains an average of 34 per cent. of iron.

7. *Black-band*.—When clay ironstone contains coaly matter in excess of 10 per cent. it becomes dark-brown or black in color and often shaly, resembling cannel or slaty coal. The clay ironstone often occurs along with it, and the Scotch miners call one layer *clay-band*, the other *black-band*. It occurs in all coal-measures more or less—in Westphalia and in Ohio, for instance—but is especially devel-



oped in Scotland. It is a valuable ore, for its coal suffices to roast (*buen*) it, and it is enriched by burning to 50 or 70 per cent. of iron.

8. *Franklinite*.—This is strictly an ore of zinc, but after the extraction of the zinc the residue is smelted to produce spiegeleisen, a peculiar white iron valuable in steel-making from its high percentage of manganese (10 to 24 per cent.) and carbon (4 to 5.5 per cent.). It is found only in New Jersey in compact veins in Silurian limestone. It is iron-black in color and leaves a brown streak; its specific gravity is 5.1. It is composed of peroxides of iron 58.99, manganese 8.32; and of protoxides of iron 7.58, of manganese 3.71, of zinc 21.37 = 100.

*Iron pyrites* can scarcely be called an iron ore, though it certainly is a most persistent impurity of all iron ores, and is the chief source, rather than coal, of the sulphur in cast and wrought iron. By itself it is useful in furnishing, when burnt, sulphurous gases for sulphuric acid manufacture; but the attempts to utilize its ash have not succeeded, though it is rich in iron.

All ores of iron seem to be benefited by roasting before use in the blast furnace, but it is necessary to roast the carbonates and all sulphurous ores. Roasting is beneficial in removing water and carbonic acid and cracking the lumps, thus enriching the ore and rendering its reduction easy, and also in removing sulphur somewhat, thus rendering the pig iron purer and grayer with a given amount of fuel. The loss in roasting varies from 10 to 35 per cent., the carbonates losing most. When the ore contains no carbonaceous matter the coal required for roasting is 1 to 10 down to 1 to 20 of ore, but coal-slack and waste are used for the sake of cheapness.

**DISTRIBUTION OF IRON ORES.**—The brown hematites and carbonate ores are worked in all countries in widely distributed localities, while the magnetic and red hematite ores occupy a more limited range. The brown hematites lie sometimes in rock, but mostly in very accessible positions on or near the surface in clay, and are dug and extracted by washing away the clay; the other ores lie *in place* in rock, and must generally be regularly mined. The red hematite, magnetic, and spathic ores, proper, occur by themselves, and bear the whole expense of mining, but some clay ironstones and the black-band occur so near the coal that they are mined along with it. Since the ores except brown hematite occur in distinct geological formations which are highly developed in some countries, while almost absent from others, it is evident there will be great diversity in the ores worked in different countries. In *Russia* the most iron is made from magnetic ores, which occur in great profusion in the Ural Mountains, while in *Sweden* and *Norway* the magnetic ores are substantially the only ones, the limonite lake ores being very limited in quantity. *Austria* possesses vast and extensively worked deposits of magnetic ore in the Carpathian Mountains, in Hungary, and in the Banat; the earthy red hematites are the principal ores mined in Bohemia, with the exception of a remarkable deposit of brown clay ironstone; in Carinthia, in the Eastern Alps, there are most extensive deposits of brown hematite, 15 to 100 feet thick in rock, while a short distance northward, in Styria at Eisenerz, lies the greatest known deposit of spathic iron ore, the stratum of ore being 200 to 600 feet thick and containing 60 to 350 feet of pure ore. *Prussia* (German empire): In Silesia the brown hematites, spathic clay ironstone, and black-band form the principal ores. In Prussia proper bog ore is the only ore worked. In Westphalia, black-band and carbonate clay ironstone are mostly mixed with brown hematite in inconsiderable amount, while in Rhenish Prussia, Siegen, and Nassau spathic ore proper is the ore of the country, with some specular ores. This district furnishes the iron used in the great German steel-works, and also most of the spiegeleisen used. W. of the Rhine the principal ores are the coal-measure ironstones. *Saxony* contains principally magnetic ore and specular ore, apt to be siliceous, but some little bog ore is mined for special purposes. *France* is not rich in iron ores, earthy brown hematites being the main ores smelted; at Lavoulte, however, an extensive deposit of earthy red hematite occurs. France imports ore from Elba, Spain, and Algeria. *Belgium*: The ores chiefly smelted are earthy brown hematite and oolitic red hematites. All are lean (20 per cent. ore), hence a great deal of ore is imported. *Italy*: In general the country has little iron ore, but remarkable deposits exist at Traversella in the Alps and on Elba. That at Traversella is an irregular mass of magnetic ore 6 to 100 feet thick, worked from time immemorial. On the island of Elba hills of the purest specular ore have been worked equally long, but without energy, producing yearly 100,000 tons, three-fifths of which is exported. *Algeria*: In the eastern part of the province of Constantine great veins of red hematite of high purity occur; they cover a large extent of country, but are worked mainly to supply the French demand. *Spain*:

The principal deposits occur near Bilbao, and are mined for English use. They are mainly compact red hematites in deposits of unusual thickness and accessibility, and contain a good deal of calcareous spar, while quite free from hurtful impurities. *Great Britain*: The argillaceous carbonates are by far the most important ores, fully two-thirds of the entire product of the United Kingdom being made from them. They are largely mined in all the coal-fields either as clay-band or as black-band, and are worked on a vast scale in Yorkshire, as the Cleveland ironstone. Brown hematite is extensively worked in the Forest of Dean and in Cornwall, and a sandy oolitic variety in Northamptonshire; and in Cornwall, at Perran, a great vein of spathic ore has recently been opened. In Lancashire and Cumberland there exist very rich deposits of red hematite of great purity, which supply much of the English iron for Bessemer steel, and have been long celebrated for their quality. *Canada*: The principal ore worked in Canada is magnetic ore, and in Nova Scotia the principal ore is red hematite; some brown hematite is also mined. *United States*: In this country large deposits exist of every variety of ore, many of them of surprising extent and purity. It is hard to say which is the principal ore, but it is probable that the magnetic ores supply fully one-third the total product of pig iron; the specular ores are next in rank, with nearly as much; brown hematites and the clay ironstones being as yet comparatively unimportant. The principal deposits of magnetic ores are on Lake Champlain, in New Jersey, and on Lake Superior. The principal deposits of specular ore are on Lake Superior, where beds 150 feet thick are quarried at the Jackson and Superior mines, and in Missouri at the Iron Mountain of massive ore, and Pilot Knob of slaty iron ore like that on Lake Superior. Eastern Pennsylvania is rich in brown hematite in clay, but the greatest deposits of this ore occur in Virginia, Tennessee, and Alabama, vast in extent and in close proximity to coal. Extensive veins of fossil ore (red hematite) occur in Western New York and in Michigan. Bog ore is but little worked, and exists principally along the eastern coast. The carbonate ores amount to nothing in our anthracite measures, and in the bituminous coal-fields are unreliable in thickness, except in Ohio. A carbonate ore (Triassic) occurs in loose masses in clay along the W. coast of Chesapeake Bay. Spathic ore has been mined in small quantities in Connecticut, Vermont, and Tennessee.

**PURITY OF IRON ORES.**—They may be impure either in having too much earthy or siliceous admixture, or in having in themselves elements which are difficult to remove and which injure the quality of the iron made from them. All iron ores are more or less impure in the first sense; the furnace man thinks of them as *argillaceous ores*, *siliceous ores*, and *calcareous ores*, and mixes them accordingly with each other and with limestone in the proper proportions to promote fusion. It is seldom that ores yield an average over 50 per cent., and probably the general average of all ores worked will not exceed 42. The lowest limit of economical extraction is 25 per cent. when the ore contains lime or can be enriched by roasting. American furnaces cannot afford to work an average under 35 per cent. of iron. In regard to the other class of impurities, the following general facts may be stated: The brown hematites and clay ironstones, when used alone, make the worst iron—viz. cold-short iron—on account of the phosphorus in the ores. Scotch pig iron contains so much phosphorus that it has special value as a foundry iron from its fluidity. Magnetic and specular ores make the purest iron, with a tendency to red-shortness from the sulphur in the ores. Spathic ores usually make pure pig iron, neither cold nor red short, as do also some of the best kinds of the others. The ores are used to neutralize each other according to the qualities desired in the pig iron. The purity of an ore can be generally predicated as above, but there are so many variations that each individual stratum even of the same mine should be separately examined.

**ASSAYING.** The richness of an iron ore can be readily ascertained by powdering it and mixing it with charcoal to reduce, and a flux to cover the iron when melted. The whole is put into a small crucible lined with charcoal, and subjected for some time to a white heat. On breaking the crucible the iron is found at the bottom in a clean button, and the percentage can be ascertained by weighing it. Thus is the *dry assay*, its results are somewhat too high, for the iron takes up carbon. The *wet assay* gives more accurate results. The ore is dissolved, and all the iron is exactly reduced to the ferrous state, and then a known solution of known strength, usually bichromate of potash, is slowly added till the iron is shown by potassium ferrieyanide (red prussiate) to be entirely converted into the ferric state. By measuring the oxidizing solution used the percentage of iron is directly ascertained.

**Iron, Manufacture of.** We shall describe how



wrought iron is made from ore and from pig iron. When wrought iron is made from ore the process is called the *direct process*, in contrast with the *indirect process*, in which pig iron is first made and afterward converted into wrought iron. (For manufacture of pig iron, see **BLAST FURNACE**; for manufacture of steel, see **STEEL**; for apparatus and machinery, see **FURNACE**, **ROLLING-MILL**, and **STEAM-HAMMER**.)

Wrought iron was first made directly from the ore, and is still so made in localities where the ore is rich and quality is the principal object. The fires used are called *bloomery fires* or *Catalan forges*; when the iron was reheated in a similar fire this was called a *chafery* (fire); but the regular reverberatory furnace has long since taken its place except in making iron for tin plate, when a *hollow fire* of partially coked coal is used. When cast iron is the raw material, the fire is called a *forge* (fire), or in England always *finery*.

The *direct processes* are wasteful, but produce superior iron, partly because, the heat being low, impurities are carried off in the slag, partly because the product is usually a low steel. It requires great care to make soft iron direct from the ore by the bloomery processes. The ores best adapted to the bloomery are the compact brown hematites, easily disintegrated by heat; all other ores should be burnt, and the impurities removed by leaching (sulphur) or by mechanical separation (quartz, etc.). The first bloomeries in Asia and India were simply holes in the ground or in a mass of clay, in which charcoal was burnt by a weak blast from a goatskin bellows, ore being added at intervals in small quantities. Similar fires are yet used in India and Africa, and the lumps of iron are extracted by breaking away part of the clay. The lumps weigh from 5 to 30, or even 100 pounds, and 200 pounds may be made in sixteen hours. These old bloomeries were improved in Catalonia, a province of Spain (whence our name "Catalan forge"), and in Ariège in France. The original form, used in the Pyrenees since A. D. 1293, was about 2 feet high, with a small cylindrical hearth about 11 inches deep, flaring out conically at the top. Two tuyeres were used, which were set about 10 inches above the bottom. The lumps of iron weighed some 35 pounds, about 140 pounds being made in five hours. At the end of the eighteenth century the hearth was 20 inches deep, proportionately larger, and the product had increased to 300 pounds in five hours. This increase was due to the stronger blast produced by the *trompe* or water-jet blowing apparatus invented early in the seventeenth century. The form of hearth still used in the Pyrenees is rectangular, one side at least being a heavy cast-iron plate. One tuyere only is now used, and from it to the opposite side the hearth measures 24 inches by 26 inches the other way, in which direction, at the freest end, is the iron side through which, near the bottom, a "tapping-hole" is made. The tuyere is set 20 inches above the bottom; it

filled with charcoal, and on the side opposite the tuyere coarse ore is placed, filling not quite half the hearth, charcoal filling the remaining space. The blast is started at

FIG. 2.

View of a bloomery, showing the mode of raising the lump of reduced iron, or *masse*.

3 pound pressure: in the course of six hours it is gradually raised to 1½ pounds, while the whole fire, except a small part of the ore, is closely covered with fine ore and charcoal-dust, thus forcing the gases (carbonic oxide) to pass out through the ore and reduce it. The ore gradually sinks down, and the slag is let off (*tapped*) every hour. At the end of the operation a lump of iron weighing about 350 pounds is pried out of the fire, hammered under a 1400-pound helve-hammer, and cut up into three pieces. These are reheated during the next operation, and forged out into bars, making about 330 pounds. Four operations or *heats* are made per day. The slag is kept very rich in oxide of iron, and the blast is turned sharply down on the metal, which thus becomes *wrought iron*; the softness (low percentage of carbon) depends on the skill of the forgerman. In the *Catalan process* 3 tons of ore yield 1 ton of bar iron, for which 2½ to 3 tons of charcoal are required. In the *Genoese forge*, another variety of the Catalan, the waste heat of the fire is used to roast the ore beforehand, and scrap iron is charged along with the ore, thus shortening the time required for a *heat* and increasing the yield of iron. Separate fires are used to reheat the lumps for forging. By these means five heats are daily made instead of four, with a consumption of 30 per cent. less charcoal than the amount required by the Catalan process: the weekly product is about 4½ tons of bar iron. The Catalan processes required that the whole fire be remade each time iron was got out. The Germans (Alsace) therefore went back to the old method of putting the ore in a *fine state* in layers in the charcoal. This plan permits a fire to be worked without any other interruption than the withdrawal of the lumps as they are formed. The details are substantially the same, except that larger fires can be used, and a greater product made by this method; so that the Germans increased the size and product of their bloomeries at an early date. The means of regulating the quality of the iron made in bloomeries are very imperfect. They consist in varying the angle at which the tuyere is directed on the iron, and the amount and kind of slag kept in the bottom to cover the soft metal in course of reduction. The metal in the Catalan forge is also protected by the charcoal. For the sake of distinction the bloomeries just described are usually called *German bloomeries*, and have reached their highest development in America. It is an interesting fact that the earliest bloomeries were probably Catalan forges, which changed into German bloomeries, and it is equally interesting that in Pennsylvania practically all the bloomeries became forges (fineries) using pig iron as early as 1740. The Catalan process made good iron, but involved too much waste of ore and too much loss of time. There are still a great number of bloomeries in operation in this country, about 37 works in all; of these 28, with 147 fires, are in the State of New York. These American bloomeries have one feature peculiar to themselves—viz. the use (since 1844) of the waste heat to make a *hot blast* (550°), thus saving 20 per cent. of charcoal and increasing the product.

The hearths of the American bloomeries average about 32 inches square by 13 inches deep. The sides and bottom are cast-iron plates 2 or 3 inches thick; the fire is open at the front, but is walled in at the sides and back; the tuyere is at the side, and the oven which heats the blast is placed

FIG. 1.



Catalan forge: A, coarse ore; B, coarse charcoal; C, *masse*, or lump of iron being formed; D, slag or cinder; E, covering consisting of charcoal-dust and fine ore.

inclines at an angle of 40°, and projects about 8 inches into the fire. In this hearth a bottom, made of slag and charcoal, is glazed over at a high heat. The hearth is half



over the fire. The ore is thrown on the charcoal, becomes reduced, and with the melted slag goes to the bottom of the fire: thence the slag is run out more or less frequently according to the desired quality of the iron. The iron balls up into a "loup," which is "dug up" or taken out every three hours, and shingled under helve hammers weighing 1½ to 2 tons. In one day eight heats and 2400 pounds of blooms are made per fire. When *billets* are made, the loup is reheated and forged out, but *slabs* for boiler plate are finished without reheating. No bar iron is made, but the *billets* are rolled down into bars and wire and converted into cast steel. The New York blooms or *billets* are usually low steel, resonant, and showing a fine grained fracture. One ton of blooms requires 1½ tons of dressed ore, or from 2 to 4½ tons of raw ore, and about 270 bushels (or say 2½ tons) of charcoal.

The idea of making iron direct from ore in a single operation, without the blast-furnace, has always been a favorite one, as is evident from the list of processes given below. All except the recent plans of Blair and Siemens have failed on account of excessive cost of reduction, great loss of iron in working up, and the intermittent character of the work—in other words, small product. *Chenot* (France, 1831), rich ores mixed with charcoal treated in a vertical tube externally heated to redness, then passed into an air-tight cooling chamber. The cool sponge treated like puddled iron. Improved by internally heating and also reducing the ore by a current of hot carbonic oxide gas.

*Clay* (England, 1837, 1840), same method, but reduced iron put directly, while still hot, into a puddling furnace. Also, a mixture of ore, coal slake, and salt reduced with pig iron in a puddling furnace.

*Renton* (U. S., 1851), a sponge reduced, from mixture of 25 parts ore and 75 parts coal, in a vertical retort, and discharged direct into a furnace to be welded into blooms. *Harvey* substituted inclined soapstone trays for the retort.

*Gurlt* (Prussia, 1857), used *Chenot's* improved plan, but mixed air with the carbonic oxide, thus raising the heat; gave the gas, at will, a carbonizing action in order to combine carbon with the reduced iron, and make steel or cast iron by melting the product in a furnace placed under the retort.

*G. Hand Smith* (U. S., 1855), plan like that of *Gurlt*, characterized by the substitution of a puddling furnace for a vertical retort, and the use of petroleum or coal-tar gas to carbonize the iron sponge.

*Whelpley and Storor*, U. S., apply pulverized fuel to the mixture of ore and coal on hearth of a puddling furnace.

*Rogers* (England, 1862), reduced the mixture of ore and coal in a rotary furnace placed over a puddling furnace, and heated by the flame from the latter.

*Dr. Dupuy* (U. S., 1871), proposes to reduce a mixture of ore and charcoal in a casing of thin sheet iron, which shall protect the sponge from subsequent oxidation.

*Siemens* (England, 1870), combined the plans of *Clay* and *Rogers* with his open hearth melting furnace, in which, as in *Clay's*, the sponge is melted in a bath of pig iron. This process is in successful operation at Landore, Wales, where it is also carried out in a rotary puddling furnace.

*Blair* (U. S., 1872), has improved *Chenot's* process, especially as to cooling the sponge: this he compresses cold by hydraulic power into blooms, which can be welded in a heating furnace or melted into soft steel. This method is in successful operation near Pittsburgh.

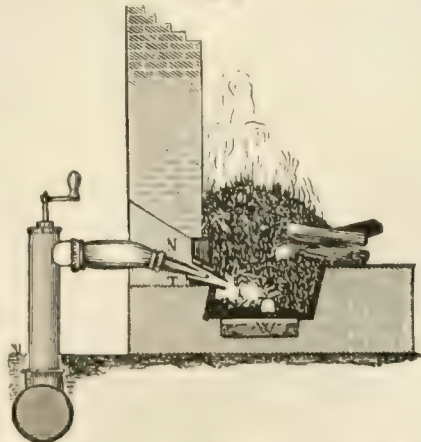
*Blair* conducts his process in a circular retort 30 feet high and 4½ feet in diameter. In the upper 10 feet hangs a metal pipe ¾ feet in diameter, so that the ore and charcoal pass down an annular space about 1½ inches across. Heat is applied outside the retort and inside the tube, and the reduced ore remains in the bottom of the tube till

cool. One retort gives about 2 tons of sponge in twenty-four hours, which is compressed and melted with half as much pig iron in a Siemens open-hearth furnace. Loss, about 15 per cent.

As early as the end of the sixteenth century it was found better to make cast iron first in a blast furnace, and then convert it into wrought iron in forges. A vastly greater amount of ore can be smelted in this way in a given time than by the bloomery process, which also requires very pure and rich ores. The bloomeries exist to this day, however, in localities where charcoal is as cheap as coal, because the total amount of fuel required to convert ore into bars is about the same as by the indirect processes, and the quality of the bloomery product is superior. When pig iron is the *raw material*, it is advantageous to use none grayer than No. 3, for in general the less carbon the easier the conversion. The removal of carbon is effected in two ways—either, first, by the action of air direct in a blast, or, second, by the indirect action of the air through the medium of melted cinder or ore, parting freely with oxygen and taking it again from the air. The operations of the first class are the forge or finery, the refinery, and the Bessemer process (for latter see STEEL); the puddling process is the representative of the second class. It is evident that the burning out of the carbon can be stopped at any point; hence steel is actually made by all these processes.

The operation of making wrought iron is the same, but the method by which it is made in the bloomery is the reverse of that used in the forge. In the former carbon (charcoal) burns out the oxygen of the ore; in the latter, air burns out the carbon of the pig iron. The hearths are substantially alike, but the forge hearth is shallower below the tuyeres—i. e. 8 inches deep. One or two tuyeres are used, according to the size of the hearth, and the blast is sometimes hot, but usually cold. There were recently fourteen distinct methods of making wrought iron, and five of making steel in forge fires, depending on the kind of pig iron used, the different ways of working it during the refining, and the ways in which the blooms were made into bars. Swedish iron for conversion into steel is nearly all made in forges by the Lancashire or Walloon process. Since 1840 little or no bar iron has been made in America by means of forges, which now make principally slabs for best boiler plate; the description is therefore simplified.

FIG. 4.



Vertical section of a German forge-fire: T, tuyere; N, nozzle, made of light sheet iron attached to a leather bag, and by that to blast-pipe.

The process consists in carefully melting down about 230 pounds of pig iron at a time, and when melted in keeping it constantly exposed to the blast, both by turning the tuyeres down upon it, and by stirring it up with an iron bar, till the carbon is nearly burnt out and the mass becomes pasty. The fire is then driven, the heat raised, and the metal worked and squeezed with a bar, so as to collect the whole into a ball or loup, as free from cinder as possible. The cinder should be rich in iron, and should be frequently let off when wrought iron is desired; for steel the cinder is left over the metal, and the blast is lessened and less sharply directed on the metal, so that its action may be less violent. The loup is raised and welded and forged under a heavy (2 ton) hammer into *billets* or *slabs*. The bloom is seldom reheated in the same fire. Forges in Pennsylvania usually work only thirteen hours per day, and make in that time six lous, weighing about half a ton; the product of a fire is therefore about 3 tons per week. When the cast iron is *refined*, as it usually is, a fire makes 1 ton daily. A ton of *billets* requires about ⅓ ton of char-

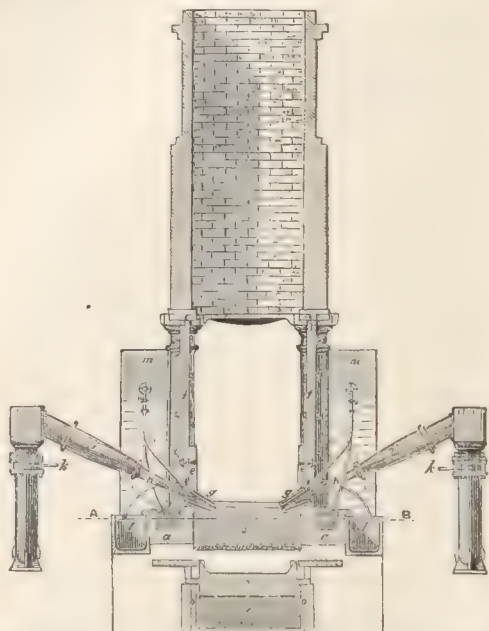


coal and 24 cwt. of cast iron. There are now 46 forge-works in the U. S., of which 31 lie in Pennsylvania with 95 fires.

It is therefore advantageous to refine the iron, since the product is increased, but refining also lessens the waste of iron, by removing silicon, and also makes it possible to use

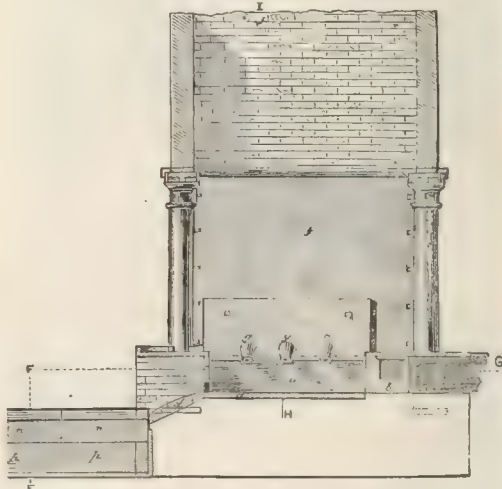
poorer and more impure ores in the blast furnace. Pig iron is refined in the *refinery* or *run-out fire*. It is probable that the idea originated in the Eifel Mountains at Eiserfey, where for three centuries the pig iron in the hearth of a charcoal blast furnace has been refined previous to being let out, by turning the tuyeres right down, and blowing sharply into the iron. The modern refinery is a rectangular box 42 inches wide by 66 inches long and 12 to 18 inches deep—that is, large enough to hold  $1\frac{1}{2}$  to 2 tons of pig iron and some slag. The sides and one end are of iron blocks, cooled with water, while the bottom and the other end, out of which the iron is tapped, are made of refractory sand. Four to six tuyeres are used, their points being protected by

FIG. 5.



Refinery, Bromford Iron-works, Birmingham, Eng.: vertical cross-section through two opposite tuyeres on the line E, F, G, H, I, Fig. 6.

FIG. 6.



Refinery, Bromford Iron-works, Birmingham, Eng.: vertical section.

Figs.  
5 & 6, *a, a*, hollow sides of cast iron.  
5 & 6, *b, b*, hollow back of cast iron.  
6, *c*, front or dam-plate of cast iron, containing the tap-hole.  
5 & 6, *d*, flat bottom of sand, which is continued beyond the tap-hole plate, from which it slopes downward.  
5 & 6, *e, e*, plate of cast iron screwed on *f*, through which the tuyeres pass.

Figs.  
5 & 6, *f, f*, cast-iron plate.  
5 & 6, *g, g, g*, water-tuyeres.  
5, *h, h*, blast-pipes.  
5, *i, i*, leather connecting-pipes between the blast-pipes and the blast-main.  
5, *k, k*, throttle-valves for regulating the blast.  
5, *l, l*, water-troughs of cast iron to receive the water from the tuyeres.  
5, *m, m*, tanks of cast iron for water to supply the sides and back of

Figs.  
the hearth and the tuyeres with water.  
5 & 6, *n, n, n*, long cast-iron or running-out bed, to receive the molten metal from the hearth.  
5, *o, o*, cast-iron box, forming a channel, *p*, over which the running-out bed is supported.  
5 & 6, *p*, channel under the running-out bed, through which water is kept in circulation for refrigeration.

*water-tuyeres*. The iron is sometimes (for *tin plate*) melted in the refinery, but is usually run into it melted, as it issues from the blast furnace. The iron is then covered with coke and the blast kept on it, burning away carbon, silicon, and some iron, while the metal boils from evolution of gas, till the desired point of purity and whiteness (low per cent. of carbon) is reached. The refined iron is then let out into a long cast-iron trough, in which it cools in thin plates, which are broken up for subsequent conversion; hence refined iron is often called *plate iron*. One refinery can refine 100 to 160 tons of pig iron per week, with 10 per cent. total loss, most of which can be recovered from the cinder made, and requires about 4 cwt. of coke per ton of iron when the iron is run in melted.

The greater part of the wrought iron used is made by *Puddling*; but before describing the process it is proper to mention the Ellershausen process, a method of *refining* intended to displace puddling. Pure magnetic or specular ore is powdered and mixed with the molten pig iron as it flows from the blast furnace. The heated ore parts with its oxygen, which burns out, more or less completely, the carbon and impurities in the pig iron. The balls or "*pig blooms*" thus made consist of a mixture of wrought iron and oxide of iron, and must be subjected for an hour or more to a high heat in a puddling furnace to separate the superfluous ore before they can be rolled into bars. The process has not met the expectations entertained.

Cort was the first to puddle iron successfully. The reverberatory furnace used by him had a bottom of siliceous sand, which could not resist the action of cinder, and either mottled pig iron or refined iron was used alone, the conversion being effected mainly by the action of the flame. His process is therefore called *dry puddling*, or simply *puddling*. The waste of iron was fully 7 to 10 per cent., and the quality poor. The pig iron laid on the furnace bottom crumbled, as it became hot, into a sandy mass, which gradually melted. By the combined action of unburned air in

the flame and of silica in the bottom, enough cinder was formed to convert the mixture of iron and cinder into a pasty mass easily acted on by the flame. Gray iron remains too liquid after melting for use in this method, but refined iron becomes pasty almost immediately. Hence with ordinary ores refining is quite necessary. S. B. Rogers reconstructed the furnace with an *iron bottom* cooled by air, and thus increased the weekly product of one furnace from 8 tons to 20 or 24 tons per week. Hall then introduced the process of *wet puddling*, usually called *boiling*. Here cinder rich in iron and oxygen is charged with the pig iron, which is then, as it were, melted and worked *wet* in a liquid bath of cinder, by the agency of which the carbon, etc. in the iron is burnt out. The boiling process does not require refined iron, and involves no loss of iron, but rather a gain, for the sides of the furnace bed are protected by a thick coating of ore, which is partially reduced. The cinder is a silicate of protoxide of iron, which readily dissolves the ore, forming a new combination containing magnetic oxide; this is constantly reduced by the carbon and silicon in the iron, and by the iron itself, but is reoxidized by the flame till all the pig iron has been converted. The form of the furnace used is such as to furnish a chamber about 60 inches long by 48 inches wide, and 20 to 24 inches high in extreme dimensions. The superficial area of the bed is about 20 square feet, and the grate usually has about one-third this area—more or less, however, according to quality of coal. The bed and grate are covered by an arched roof, highest over the grate and sloping down to the other end of the chamber, so as to *re-accumulate* the flame strongly down on the bed of the furnace before reaching the exit flue: this is placed low, and its area must not exceed one-fifth that of the grate. The stack is 20 inches square inside, and about 40 feet high; it can be closed at the top by a damper to regulate the heat, but the blast from a fan blown underneath the grate is now generally substituted for natural draft. The grate and puddling chamber



or bed are separated by a brick wall, the *fire-bridge*. An iron frame about 9 inches high rests on the iron bottom plate and forms the sides of the bed; it is hollow, and cooled by water circulating through it or with air, while the bottom is cooled by the circulation of air. The iron bottom consists of plates 3 inches thick; when used it is covered with a thick layer of nearly infusible cinder and ore carefully smoothed and consolidated at a high heat. The sides are covered with lumps of ore or a thick mass of ore and roasted cinder; this lining is intended to waste and be renewed. Access to the bed is had through a hole about 20 inches square closed by a door, lined with firebrick and moving vertically. The door has at its bottom a small hole, the *stopper-hole*, for the insertion of a long bar or *rabble*, as the intense heat must not be lowered by opening

FIG. 7. SINGLE PUDDLING FURNACE.

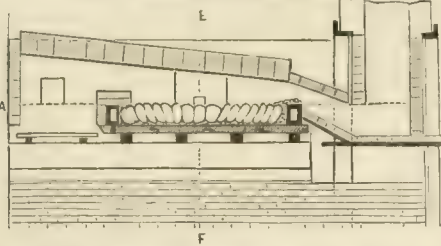


Fig. a, longitudinal section on C, D, Fig. b.

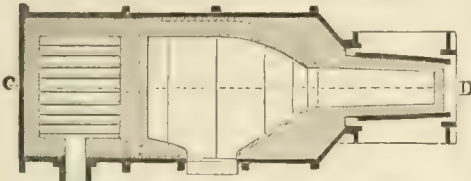


Fig. b, longitudinal section on A, B, Fig. a.

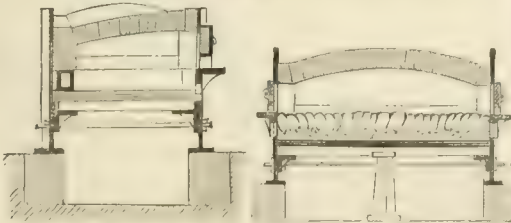
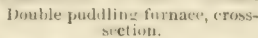


Fig. c, cross-section on E, F, Fig. a.



Double puddling furnace, cross-section.

the door. The essence of puddling, as distinguished from other operations, is the refining pig iron on the bed of a reverberatory furnace by means of heat applied by flame.

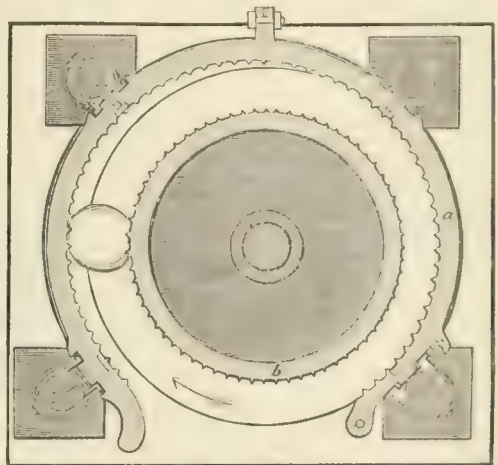
We have described the *puddling* process, and shall now describe that of *Boiling*. A charge of 500 to 600 pounds of forge iron is laid on the bed of the furnace, often with as much as 100 pounds of cinder and scale. The whole is then quickly melted at a high heat; when fluid, fresh mill-scale or water is thrown in to partially chill the cinder and iron, so that they may be thoroughly intermixed. The heat is then raised again, when the oxides of iron in the cinder react on the carbon and silicon of the iron with such effect as to keep the mass frothing in a state of lively ebullition. During this part of the process the ore lining furnishes oxide of iron to keep the cinder rich, and the yield of iron is increased by the reduction of this oxide, usually the magnetic oxide. The boiling gradually ceases, bright white spots of iron appear, the cinder seems to sink to the bottom, and the whole soon comes into a spongy state, or is *brought to nature*. This sponge is well worked together by means of the *rabble*, and broken loose from all parts of the furnace, the heat meanwhile being kept high. The puddler (*boiler*) now separates the whole mass into six or more balls, patting and squeezing them, with the *rabble*, into shape and firmness. All this is done under a smoky or *reducing flame* to avoid burning the iron. The balls when made are put into the hottest part of the furnace near the bridge, receive a very strong final welding heat, and are drawn out separately with tongs. They are then carried to a *squeezer* or to a hammer, in order that the cinder may be expelled and the iron welded together.

Both processes of puddling are still in ordinary use, that of puddling, however, for inferior iron. In *boiling*, a No. 3 iron is usually used in America, but in England it is customary to use refined iron largely. With gray forge iron six heats of 480 pounds each are boiled in twelve hours,

but with white iron (one-half the charge refined) seven heats of 540 pounds are made in the same time. On an average 2436 pounds of pig and 2548 pounds of refined iron make 2240 of puddled bars, wasting, say, 9 to 12 per cent., with a consumption of  $\frac{1}{2}$  to  $1\frac{1}{2}$  tons of coal. The largest production per furnace is made in Wales; there a single furnace averages eight heats in twelve hours, or 18 tons weekly, and a double furnace 36 tons. *Puddling* requires 2300 to 2400 of refined metal to 2240 of bars. A single furnace using only refined iron averages in Wales about 23 tons per week, and burns per ton  $\frac{1}{2}$  to  $\frac{2}{3}$  ton of coal. These productions are all those of a low grade of iron; where quality is aimed at, the product per furnace averages 10 to 12 tons per week.

For ordinary iron Burden's squeezer is almost exclusively used in this country, and the hammer, as a rule, for higher grades. The Burden squeezer is a rotary machine, the best form of which consists of a serrated wheel, with a vertical axis or shaft placed eccentrically inside a fixed ring, the inner surface of which is also serrated. The wheel is driven by gearing, and its eccentricity is so gauged that the opening at the starting-point is 15 inches, but diminishes gradually through nearly the whole circumference to about 9 inches. The external diameter of the wheel is 5 feet and the internal diameter of the ring is 7 feet. The puddle-ball

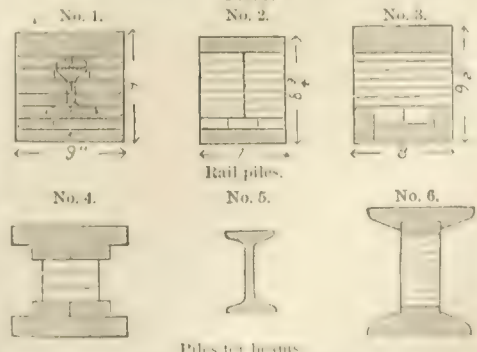
FIG. 8.



Rotary squeezer, horizontal section: a, strong cylindrical cast-iron frame; b, strong cast-iron wheel.

is put into the squeezer in a roughly round shape, and is seized, rotated, forcibly compressed, formed into a cylinder, and delivered at the point of entrance still hot enough for rolling. (For the trains of rolls and mechanical appliances for rolling puddle balls into bars, etc. see ROLLING MILL.) The puddle or mill bars are usually about  $3\frac{1}{2}$  inches wide, and are cut up into pieces 4 to 5 feet long. They cannot, like a forge or blooming billet, be directly worked into bars, for they are too rough and imperfect. They are therefore piled one on another into a "pile," reheated to a full welding heat in a heating furnace, and rolled again into a square or round bar for ordinary iron, or into a flat bar for further working. The more iron is *worked*, either by hammering or rolling, the more fibrous and homogeneous it becomes. Hence, the best iron is often rolled three or even four times before receiving final shape. In order to economize work

FIG. 9.



several kinds are often used on the same pile, thus being especially the case in rail piles, where a few qualities are also desired in the different parts. Nos. 1, 2, 3 are rail

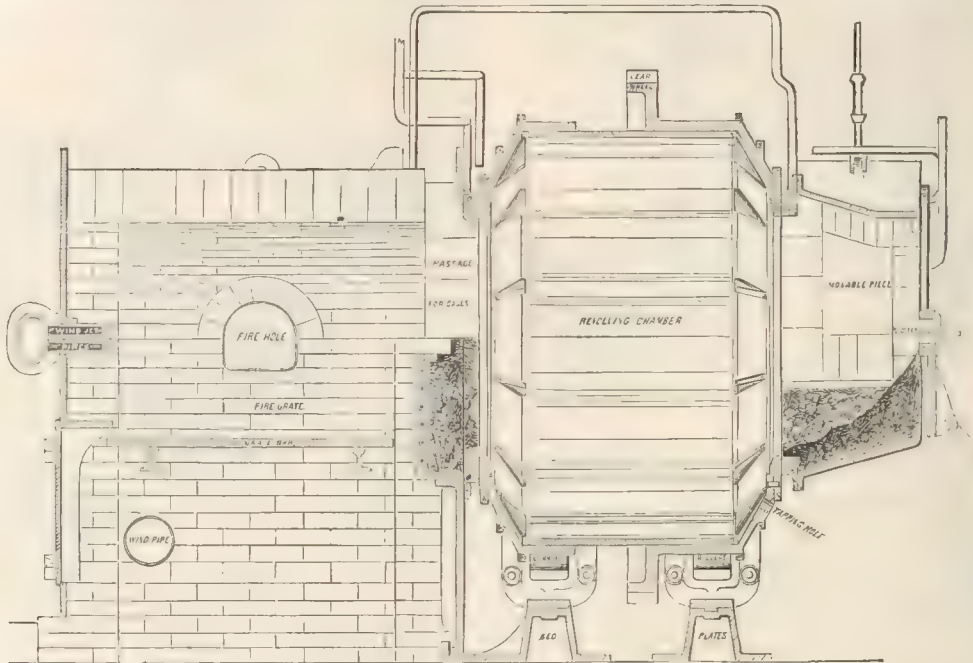


piles; the first is a good American pile, the top layer being three times rolled, the rest twice; the second is average American, the top and bottom layers being twice rolled iron—the second layers, for top and bottom, old rails, the rest puddled bar; the third is unusually good English, the top layer being hammered iron, the bottom (hatched) layers twice-rolled iron, the rest puddled bar. The average reduction in size from the pile to the rail is about 16 to 1, the finished rail being shown in the centre of pile No. 1. The economy of rail-making depends on these arrangements, and the engineer wants good iron in the head and flange, but allows comparatively poor iron in the rest or stem of the rail. The piles for girder beams like No. 5, Nos. 4 and 6, are similarly made up as to quality of iron, and exhibit expedients to avoid waste of metal (No. 4), and to secure strength (No. 6), the latter pile being also formed as it is because a large beam is to be rolled from it. Round bars if large are often rolled from round piles, and the size of a pile for a square bar is proportioned to the bar to be

made from it, so as to ensure soundness. The waste in each heating is 3 to 5 per cent., and the coal required is about 1 ton per ton of iron. Bars are rolled from 30 to 70 feet long, rails usually 25 to 30 feet, but sometimes double these lengths, and other forms as long as their weight allows. The ends of rails, etc. must be cut off to produce a solid end, the waste from this source being 8 to 12 per cent., which is not lost, but must be reworked.

Various machines have been invented to lighten the labor of hand-puddling. These are of two kinds: *first*, mechanical arrangements to move the rabble as is done by hand; *second*, to rotate the furnace itself, and thus cause the whole charge to work itself by the action of gravity. The arrangements of Eastwood, Whitham, and Dumény and Lemut are those most used; they lighten labor, but scarcely increase product, nor do they much diminish wages; hence they can hardly be considered as permanent improvements. But machines of the second class, like those of Menehaus, Danks, and Danks improved by Jones, may be re-

FIG. 10.



Danks' rotary puddling machine, sectional elevation.

garded as solving the problem. This furnace has a fan blast under the grate, and also jets of blast over the fire. The workmen can thus suit the heat to the requirements of the charge. The ash-pit and fire-hole are closed by doors, the fire-hole casting being cooled by circulation of water in a coil of pipe cast in it. The bridge-plate is also cooled with water, and has a lining of firebrick next the fire and fettling next the charge. Fastened to the bridge-plate is a ring cooled by water, against which the revolving chamber rubs closely. The revolving chamber has two end-pieces hooped with iron and resting on carrying rollers; these ends are connected by a series of stave-plates to form a cylinder. The stave-plates have hollow ribs to hold the lining fast and keep it cool. A movable head-piece connects the revolving chamber with the chimney, and acts both as door and flue. When it is removed balls of great weight can readily be taken out; it is cooled with water and provided with a stopper-hole for observation. The vessel is revolved by a toothed wheel fixed on it and geared to a suitable engine, so that the rotation may be regulated. The chamber is first lined with a thick paste of powdered iron ore and pure lime, which sets hard and about an inch over the ribs. The fettling is then made by throwing in pulverized ore and melting it, thus glazing the lining and leaving a paste of melted ore to hold lumps thrown in all over the surface. For fettling a 700-pound rotary furnace 2 to 2½ tons of ore are required. In working, more scale or cinder than usual is used, and the iron is melted in 30 to 35 minutes, when the furnace is rotated for 5 or 10 minutes to produce a thorough action of the cinder. Water is injected through the stopper-hole, and a portion of the cinder solidified, which carried down into the molten iron combines with the impurities. The heat is then raised, and the cinder liquefied so as to float on the iron, and it is

then tapped off. The heat is again raised, and the furnace rotated six to eight times per minute. The charge is thus dashed violently about, and the particles of iron soon begin to adhere; the velocity is now lowered to two or three revolutions per minute, and the ball speedily forms. Loose pieces are moved to the side of the ball, which is made to fall on them. The movable head-piece is then removed, a large fork suspended from a crane is shoved into the chamber, and the ball is rolled on to the fork by a turn of the furnace and removed.

The difficulties of the rotary mechanical furnaces are the wear of the fettling and frequent break-downs. When, however, the fettling is suited to the metal used and the iron is refined, no difficulty is experienced on that score, and Mr. Jones has overcome the mechanical objections. He constructs the Danks furnace with a double casing and a water-jacket, so that all parts are kept perfectly cool (90°) and work easily. This furnace works day and night, while the single cased furnaces usually work only by day. Mr. Jones uses iron in a melted state, and charges 1550 pounds of refined metal, which is puddled in 35 minutes into a single ball 4 feet long by 15 inches in diameter. This ball is cut up while hot, reheated and rolled into bars (Mr. Heath rolls direct into bars). Each furnace makes six heats in eight hours, averaging 50 tons per week, with a consumption of about 1000 pounds of coal for puddling (less than a ton, including reheating), 1000 pounds of fettling per ton, and no loss of iron. Charges of a ton can be puddled in 40 minutes, and thus a furnace can make 85 tons per week.

The rotary furnaces of Crampton are successful at Woolwich. Sir John Alleyne is working well with Maudslay's soup-plate machine, consisting of a rotary horizontal bed and a mechanical arrangement to move a rabble in one di-



rection. He makes five heats per day, each of 675 pounds. M. Pernot uses the original Maudslay rotary bed with inclined axis, so as to work the charge by gravity, and mounts the bed on wheels to facilitate repairs. He puddles 1 ton heats of white iron, making 18 cwt. of bars with 14 cwt. of slack coal and 2½ cwt. of tefling to the ton of bars. Siemens also has in use at Landore a rotary furnace like that of Sellers (see FURNACE), but with the Siemens regenerative system. This furnace is also working the direct process, as mentioned above.

**Iron, History of.** The Scriptures ascribe the discovery of working iron to Tubal Cain, while Egyptian tradition made Isis and Osiris the patrons of metallurgy, but credited the actual discovery to Hephestus, the king preceding Osiris, who in date would coincide with Tubal Cain and is probably identical with him. Canaan is described in Deut. viii. 19 as "a land whose stones are iron." The books of Moses, written before 1451 B. C., mention iron frequently; the Arundel Marbles fix a date before 1570 B. C., and about 1600 B. C. we find the use of iron recorded in the Scriptures for tools, arms, and cooking utensils (Deut. xvii. 5; xix. 5; 1 Chron. xxii. 3; Lev. vii. 9). The Philistines on conquering the Jews about 1050 B. C. prohibited any "smith in Israel" (1 Sam. xiii. 20). The Egyptians made iron in the district between the Nile and the Red Sea, but imported most of their iron from Assyria. The Assyrians used iron very freely, and before 880 B. C. used it as a core to save brass in articles cast in brass; Layard found at Nineveh Assyrian helmets and chain armor. Herodotus (i. 25) mentions the vase of Alyattes at Delphi, inlaid with iron by Glaucus of Chios, to whom is attributed the discovery of welding. Pliny (vii. 37) credits the Daetyli of Mount Ida in Crete with the discovery of the magnetic properties of iron, and ascribes the invention of the blacksmith's forge to the Cyclopes. Lycurgus of Sparta used iron as money (about 850 B. C.). The Hebrews were doubtless familiar with steel, as Jeremiah (xv. 12) says: "Shall iron break the northern iron and steel?" meaning probably the material derived from the Chalybes of Pontus, the blacksmiths of the ancient world, who hardened iron instruments for cutting, and first used coal. Their iron was made, according to Aristotle (322 B. C.), from sand ore dug from river banks, washed, and put into the furnace along with the stone *pyramachus* (fire-maker)—that is, coal. The Greeks and Romans supply few facts of interest. Plutarch (A. D. 110) mentions that the Celtiberians "bury iron rods till the rust eats out the weaker parts of the metal," and make their excellent swords out of metal so prepared. Strabo (A. D. 25) mentions the exhaustion of the productive iron ore mines of Chalchis and Euboea, and states that Great Britain furnished iron to the Romans. The Romans, however, derived their chief supply of iron and steel from Noricum, now Styria. Strabo also ascribes the introduction of iron-making in Great Britain to Odin, perhaps with reason.

The later history of iron may be sketched as follows from authentic data:

- A. D.  
790. Iron-mines opened on island of Elba.
- 712. Styrian iron-mines reopened. Bede mentions iron as an important manufacture in Great Britain.
- 950-1000. High-bloomeries (Stücköfen) general in Elsass and Burgundy.
- 1160. Iron-works recorded at Kimberworth, Yorkshire.
- 1265. Bloomeries first used in Silesia.
- 1370. First foundries in England.
- 1488. Mines of Dannemora opened.
- 1490. First foundries and first stove cast in Elsass.
- 1543. Cannon first cast in England by Ralph Hoge, at Buckstead, Sussex.
- 1546. Agricola records three kinds of furnaces: (1) Catalan forge; (2) German bloomeries, 3 feet high; (3) bloomeries 5 to 6 feet high, the product of which was remelted before shingling.
- 1550. Wooden bellows invented by Hans Lobsinger, Nuremberg.
- 1584. Severe legislation to protect English forests.
- 1699. *terrea*. Blast furnace 24 feet high constructed in Harz Mountains with 6-foot hearth.
- 1612. Sturtevant obtained patent for smelting iron with pit coal, as also did Rozenon in 1613.
- 1613. Heating furnace (reverberatory) invented by Rozenon.
- 1614. Regular blast furnace introduced by Germans into Sweden, at the instance of Gustavus Adolphus.
- 1619. Dud Dudley made pig-iron with pit coal only, 3 tons a week.
- 1621. Wooden bellows improved and largely made in the Harz.
- 1622. First bar iron made in American colonies.
- 1640. Trompess water-driven blowing-machines first used in Italy.
- 1642. First blast furnace built in American colonies.
- 1650. Coal first used in forge fires for reheating.
- 1668. Peat used by the Dutch for iron-making.
- 1674. English blast furnaces charcoal make 8 tons in six days.
- 1681. Tin-plate making introduced into England from Bohemia by Yarrington.
- 1701. Peter the Great, through Demidoff, establishes charcoal blast furnaces 15 feet high in the Ural.
- 1720. *terrea*. Rolling plate iron invented by John Barbury.

- A. D.  
1722. Steel-making by cementation described by Réaumur.
- 1735. Coal coked by Darby and successfully used in blast furnace.
- 1760. Cast-iron blast cylinders made by Smeaton.
- 1760. *terrea*. Cast steel invented by Huntsman.
- 1769. Watt's single-acting engine used for blowing-engines.
- 1783. Grooved rods for bars invented by Cort.
- 1784. Puddling invented by Onions, who used fan-blast with closed ash-pit.
- 1784. Puddling made successful by Cort.
- 1785. *terrea*. Hot-blast originated modern process of refining.
- 1791. Cast steel made direct from ore in a crucible by Lucas.
- 1796. Charcoal furnace substantially abandoned in England.
- 1814. Waste gas of blast furnaces applied by Aubertot.
- 1828. Hot blast invented by Neilson.
- 1830. Water-tuyere invented by Condie.
- 1834. Puddled steel first made at Francisbach in Carinthia.
- 1836. Anthracite first used by Crane in Wales.
- 1838. Anthracite first used in U. S. at Mauch Chunk by Baughman, Giteau & Co.
- 1839. First three-months blast with anthracite at Pottsville, by Lyman.
- 1839. Heath invented the use of manganese in steel manufacture.
- 1840. Burden invented the rotary squeezer.
- 1842. Nasmyth invented the modern steam-hammer.
- 1850. Puddled steel first successfully made by Rippe.
- 1855. Bessemer decarbonized iron without fuel by blowing air through it. Kelly invented same process in U. S.
- 1856. Mushet made Bessemer process successful by inventing use of spiegel iron as a recarbonizing agent.
- 1856. Siemens invented the regenerative system of using gaseous fuel.

We see above that there have been few inventions originating systems, but that from time immemorial one thing has slowly developed into another. The Catalan forge grew into the German bloomery (English, *air-bloomery*), that into the high-bloomery (English, *blast-bloomery*), that into the low blast furnace with cold weak blast; then came stronger blowing-engines, and then the blast was heated, when it was found that the furnace could be enlarged to its present height and size. Here are seven steps to reach one modern result. But it is remarkable that a process once perfected is sacredly retained, and all the early steps are still in daily use. We find, however, that the history of the trade resolves itself into various epochs: (1) The perfection of mechanical art to enable blast furnaces to be used—1589 to 1621. (2) The general use of coke as fuel—1735-50; and the use of cast-iron blast cylinders—1760. (3) Application of steam-engine in iron-works first to blowing-engines—1769. (4) Inventions of rolling and puddling by Cort—1783-84. (5) Use of hot blast and application of waste gases—1828-36. (6) Economy of fuel by improved apparatus and processes, and perfection of works, engineering—1856 to present time: extended use of steel.

The history of the art in Great Britain and America runs as follows: The Phenicians seem to have made iron in the British Isles very soon after they discovered them (600 B. C.). A hundred years before Caesar's invasion (55 B. C.) the Britons exported iron to the Continent (Gaul) in their own ships. Caesar found, to his cost, plenty of iron in England, both as money and weapons of war. When the Romans secured possession (A. D. 61), they established iron-works; Adrian built (120) a great military forge at Bath, and supplied it with iron from the Forest of Dean, where immense cinder-heaps still exist. The Romans encouraged iron-making till 409, when they abandoned Great Britain. Then all arts were thrust aside, by Saxon and Danish conquest and civil war, till the reign of Alfred the Great. No record is made of iron till the Domesday Book mentions that William the Conqueror (1066) demanded iron bars as tribute from the city of Gloucester. After the Conquest iron and steel were mostly imported from Germany. Little was made in the N. of England, for raiding Scots in 1317 could find none till they reached Furness, where they seized all they found. In 1355, Edward III. forbade the export of iron from England. During the fourteenth and fifteenth centuries Germany and Spain supplied iron and steel largely, till the importation of articles which could be made in England was forbidden in 1483. In the reign of Elizabeth (1558) severe laws were enacted to prevent the general destruction of the forests by iron works; these laws were in force till 1756. Charles I. appointed inspectors in 1639 to stamp bar iron according to quality, and see that no woods were cut down contrary to law.

The scarcity of timber and charcoal caused numerous futile attempts to use coal; finally, Dud Dudley succeeded in 1619. He gave in his *Metallus Martis* a sad history of the effects of the envy of importers and fellow-manufacturers. He built five works, was tricked out of three, one was destroyed by riot, and one by flood. He was a royalist, and Major Wildman, with Cromwell as partner, bought his estate to wring his secret from him, but they failed. Venart, Wildman, Copley, Buck and J. Blawstone all failed to make iron with coal, though others used coal in forges instead of charcoal. Dudley kept his secret, and left it to his relatives; it lay on his shelf in making bellows and in coking coal. Toward the end of the seven-



teenth century Dr. Plot stated as the general opinion that "coke was fit for most uses but for melting, fining and refining iron, which it cannot be brought to do." Meantime, early in the eighteenth century, wood grew exceedingly scarce, and about 1740 large importations of iron, mostly pig, came in from Russia and Sweden; American exports were encouraged. England had only 59 furnaces, with a product of 17,350 tons, and depended on foreign countries for pig iron for her forges. Some English companies had their furnaces in America and their forges in England. Darby, however, had experimented with coke since 1713, and by 1735 was able to use it regularly, while Smeaton erected in 1760, at Carron, a powerful blowing-engine consisting of four single-acting cast-iron blowing-cylinders driven by a water-wheel in the rotation required for a uniform blast. Smeaton applied the cylinder, but Wilkinson, who invented a correct boring-machine for Watt, was the first to apply the steam-engine to blow furnaces. After 1740 iron-making thrived with surprising vigor, and 53 coke furnaces were built before 1788. The charcoal furnaces averaged 294 tons yearly in 1740 and 545 tons in 1788, but in that year the coke furnaces made an average of 909 tons. The use of coke and blowing-engines quadrupled the production of pig iron in fifty years. Bar iron, however, was still made in charcoal forges; the British forests were exhausted, and Sweden and Russia rapidly advanced the price of bar iron. Great Britain then laid a heavy duty on bar iron, beginning with £2 16s. and rising continuously, till 1825, to £6 10s. in England and £7 18s. 6d. in foreign ships. In 1797, Pitt abandoned his intention of taxing English iron 20s. per ton, though he had exhausted his last resources of taxation to carry on the war against Napoleon. In 1783 and 1784 Henry Cort of Gosport obtained patents for puddling iron and rolling it into bars (plate-rolling having been invented by Harbury). At this time the forge hammers could make no size less than  $\frac{1}{2}$  inch square, and all smaller sizes, for nail-roads, etc., were cut in a slitting mill. The hammers made 1 ton of bars in twelve hours, while Cort's rolls made 15 tons, and 5 tons of the smallest sizes. His puddling furnaces made less than 5 tons a week. The original processes worked well, but were never fairly developed by Cort, though they came immediately into general use. Homfray first refined iron to prepare it for Cort's puddling. The only remuneration Cort ever got was a pension of £160 for six years, and £100 to his widow, renewed by Lord Palmerston to his children. The capital used by Cort came from Jellicoe, a paymaster who defaulted; Cort's patents were then confiscated and locked up by Trotter and Lord Melville, both rascals. The latter a few days after Cort's death got from the House of Lords a release to himself of £25,000, on the score of the great and unrequited merit of Cort's inventions! From this point British iron manufacture steadily increased, the charcoal furnaces disappeared, and Gibbons and others largely increased the product of blast furnaces by alterations of form. The hot blast was discovered by Neilson in 1829, the opinion being general that the colder the blast was the better. It was successful at the Clyde works, being essentially aided by Condie's water-tuyere, without which hot blast could not be used. At the Clyde, 1 ton of iron required  $8\frac{1}{2}$  tons of coal coked, but in 1831 hot blast was used, raw coal was substituted, and only  $2\frac{1}{2}$  tons of coal were needed to the ton of iron. Mushet discovered blackband in 1801, and in 1825 used it alone, with a saving of one-quarter the coal and one-third the limestone before required. The great production of Scottish iron dates from this time. In 1844 the wild railroad mania stimulated all production, particularly that of Scotland, and gave rise to speculation on warrants drawn against pig iron in store; the stock then held at Glasgow often reached 430,000 tons. In 1831, Perdonnet in France discovered that anthracite could be used with cold blast by excessive care and in mixture with coke. In 1837, Mr. Crane of Ynesedwin found that with hot blast he could successfully use anthracite coal alone.

Since 1840 wages have gradually increased and improvements made to save labor. The puddling furnace has been the subject of constant attention in a mechanical direction, with the results described above. Iron was applied to a great variety of uses, especially to iron ships in 1834. For these, forgings up to 35 tons weight were required for shafts, which were forged under Nasmyth (1842) or Condie (1843) hammers. Great improvements have been made in rolling-mills, both in strength and design; the rolls were reversed, to save labor, and Ramsbottom adopted Nasmyth's suggestion to reverse the engine itself. These systems are now used in every English works. The enormous consumption of fuel at iron works led Siemens (1856), and others to seek economical systems, that of Siemens being now in general use for almost every purpose, with a saving of 40 to 60 per cent. The hot-blast stoves have been improved by Whitwell and Cowper on the Siemens principle,

and the ordinary cast-iron stoves by Player, Ford, Giers, and many others. The temperature of the blast has been raised to 1300°, at which a ton of iron has been made with a ton of coke. In a business point of view, England has found since 1840 that joint-stock companies for iron-making were anything but a success.

The period just described is marked by the struggle for economy in all aspects of the trade, but after 1850 invention proper took a new course—viz. in the direction of steel. Steel had been made in bloomeries up to the end of the seventeenth century, when it was found that bar iron could be converted into steel by heating it in large closed chests with charcoal, and the converted bars when sorted, piled, welded, and forged, made excellent *shear* steel for cutlery. But for finer purposes shear steel was defective in temper and on account of seams. Then Huntsman, a manufacturer of watch-springs, discovered in 1740 that the converted or blister steel from the best bars, when sorted and melted in crucibles with bottle-glass, made a faultless material. He built works at Sheffield in 1770, controlled the market, and kept his process secret for many years. Something *cheaper* was needed, and in 1800 Mushet melted bar iron direct with carbon to make steel. Lucas in 1804 tried to decarbonize pig iron by cementing with oxidizing substances, as ore (the origin of *malleable iron*), but without success. Then Heath in 1836 found that the use of 1 to 3 per cent. of a carburet of manganese, or materials producing it, made sound cast steel out of blister steel from cheap British bar, thus saving at least 40 per cent. of the cost. This discovery is the basis of modern steel processes. Heath was betrayed by his agent Unwin, and, as the *third* in our list, got nothing for an invention which established the Sheffield steel trade. By the use of manganese to make a thin slag, and also of spiegel iron added near the end of the puddling process, Westphalian and English firms made good *puddled* steel under Riepe's patent (1850). Want of uniformity has prevented any general use of puddled steel. Uchatius made steel in 1800 by reducing ore in crucibles with coal; Parry (1855) attempted to make steel by *direct action of air* in a puddling furnace. Kelly (1856), in the hearth of a blast furnace, and Bessemer (1856) in a close vessel. Bessemer finally made a peculiar metal by blowing the air in *numerous fine jets* (Martin) through the iron, but did not make a reliable material till he used Mushet's "triple compound of iron, carbon, and manganese," or spiegel iron (1856, date of discovery) to make the steel *malleable*. The Kelly and Bessemer patents are united in America, and Mushet was so unfortunate as to allow his important one to lapse. It is now possible to attain in the Siemens and Eickmann furnaces a heat high enough to melt wrought iron with enough cast iron to convert it into steel (Martin, France, 1866). By the use of these processes steel is now rapidly approximating iron in cost, and is supplanting the best iron for engineering purposes.

We have seen above the development of the art in England; we shall see in American history the course of its application. The Indians had no knowledge of iron. The first iron made in America was forged at a bloomery of the Virginia Company by John Berkeley in 1622, on the James River, 12 miles below the present site of Richmond. The Indians destroyed the forge, and, owing to the lucrative tobacco-trade, no more iron was made in Virginia till 1724. Meanwhile, the people of Massachusetts Bay had built one "iron-mill" at Lynn in 1631, and a London company, represented by John Winthrop, Jr., built in 1644 a blast furnace at Hammersmith and works at Baintree in 1646, and Raynham (Taunton) in 1652, agreeing to erect "an iron furnace and forge, and not a bloomery only," and to sell bar iron under £20 per ton. They cast *iron pots*, etc. in 1646, under the direction of Joseph Jenks, who made our first *saws* in 1652. They exceeded the fixed price for iron, and would not trade in kind, so that complaints of damage, rascality, and want of money on the part of the people brought these works to an end in 1670, during King Philip's war. But the increasing price of iron in England gave profitable occupation to our furnaces after 1702, when the era of regular iron-making in the colonies began. In Plymouth (Mass.) a furnace was built in 1702 by Despard and the Barker family, and was succeeded by many others, working 25 per cent. *puddled iron* (manganese, mixed with 35 per cent. bog ore from Egg Harbor, N. J.). By 1804 they had seriously injured the forests in that part of the State, and emigration had taken place for want of occupation. They all made *castings* (not pig iron) direct from the furnace, at a cost of \$49.77 per ton in 1804. New England exported no iron, but obtained pig for her forges from Pennsylvania. Massachusetts bar iron cost in 1727, £12 5s. to £12 10s. per ton. In Virginia, Col. Spotswood built the first furnace in 1724, and made castings out of an air furnace in 1732. There were four furnaces in 1732 between the Potomac and Rappahannock, each making 20 tons of pig iron per week, or 800 tons a



year, which sold for £6 in England, and netted the producer £3 to £4 per ton. In Maryland, Mr. England and Augustine Washington (father of Gen. Washington) built a forge in 1717 at Principio, where they made excellent iron, which sold in England up to 1770 for £10 to £16 per ton. Maryland and Virginia exported their entire product to England, and Col. Spotswood remarked, that Pennsylvania would do so too had she ships, but failing these must manufacture it herself. John Winthrop, Jr., built iron-works at Pequot (New London) in 1644, and in 1657 a blast furnace at New Haven, which, singularly enough, ran on English ore. No great activity was afterwards manifested, though in 1655 the colony granted privileges to John Tucker of Southold, L. I., for steel-making, and in 1727, Joseph Highy made good steel, and exhibited samples of it; both these were probably blister steels. George Eliot made steel in a bloomery from magnetic ironsand in 1761, and also had a cementing furnace, built before 1750. In New York the Stirling furnace and works were built in 1751, and the Anram works, built in 1749 to use Salisbury ore, made 3318 tons 12 cwt. of pig iron and 1302 tons of bar iron in the years between 1750 and 1756. The great chain weighing 186 tons stretched across the Hudson in 1778 was forged at these works in six weeks. In 1801 the first forges were built in Essex co., at Willshoro' Falls on the Boquet. In New Jersey the earliest works were bloomeries. Col. Morris built works in Monmouth co. in 1685; the Petersburg bloomery, Morris co., was built in 1725, and the Oxford furnace, in Warren co., in 1745; the latter is still running. The principal impetus to iron making in the State was given by the London Company, Baron Hasenclaver and others, who built the Ringwood furnace in 1762, and other works soon after, utilizing the ponds of the region to great advantage as a source of power. The last manager of the original Ringwood works was Robert Erskine, afterwards chief of staff and engineer of the Continental army. In Pennsylvania the first forges were built by Hall, Nutt, and Rutter in 1717 on the Schuylkill, while the first furnace was built on the Christina River, near New Castle, now Delaware, by Sir William Keith in 1726. The Durham furnace was built in 1728, and other furnaces built by the families of Potts and Nutt from 1734 to 1737, and by Grubb in 1742 at Cornwall, followed in rapid succession; 10 furnaces and 9 *finery forges* in all were built before 1750. The furnaces made 20 to 25 tons a week, running about 10 weeks at a blast, and the forges made about 60 tons of iron yearly; both stopped in summer. Pennsylvania exported iron (Grubb's) to England, the West Indies and New England. Pig iron sold at the furnace in 1731 for £5 10s. in Pennsylvania currency; in 1759, for £3 6s. 8d. to £3 10s. sterling. In the latter year bar iron sold for £10. Philadelphians believed in 1750 that when labor became cheaper they could undersell English iron; and this feeling was general in England. When the colonies began to export bar iron in 1717, an agitation sprang up which ended in 1750 with the *absolute prohibition, as a common nuisance, of the production of bar iron (nail plate) and steel in America.* The colonies continued to export pig iron largely. Between 1717 and 1770 a total quantity of about 1,500,000 tons pig and bar iron was exported to England. The Revolution gave a great impetus to the trade; new works were erected; all were occupied on war material. Congress reopened the steel-works of Philadelphia, and took possession of the Andover iron-works to provide them with pig iron. On the return of peace in 1783 the iron-trade was nearly destroyed. The States became independent sovereignties, with customs regulations often mutually hostile; the machinery of the works had not improved, as might have been expected from the familiarity of Robert Grace and others with British work. The old wooden blowing tubs furnished blast for charcoal furnaces, and bellows blew the forges, while all works operated on a small scale. Meanwhile, coke had come into general use in England, and the processes of puddling and rolling had superseded the forges in Great Britain. That country shipped iron hither duty free, while she herself levied a duty of 3.5 1/2 per cent, and in 1780 prohibited the export of any tools, engines, models, or plans of machinery *used in making iron* under a penalty of one year's imprisonment, £200 fine, and confiscation of the articles shipped or intended to be shipped. This state of things led to Hamilton's report in 1790, which caused the adoption of the protective policy to encourage the natural products of our country.

The system of internal improvements inaugurated between 1825 and 1836 by many States marks the real commencement of iron manufacture in this country, for it made the use of coal possible and facilitated large operations. Previous to 1825 the Atlantic coast depended on English mines for fuel. Coke was first used in the blast furnace by F. H. Oliphant of Fayette co., Pa., in 1836, and anthracite coal first at Mauch Chunk by Baughman, Giteau & Co. in

1838, though Mr. Lyman at Pottsville received \$5000 offered by Nicholas Biddle and other citizens of Pennsylvania for the *first continuous blast of three months*, which was completed in Jan., 1840. David Thomas came hither in 1839 at the instance of Erskine Hazard of the Lehigh Navigation Co., built the first furnace of the Crane Iron Co. in one year, and started it on July 4, 1840. The Messrs. Reeves built a furnace in 1837, and Burd Patterson & Co., Biddle, Chambers & Co., and George Patterson built in 1838; all started before July 2, 1840. Before 1840 the forges of Pennsylvania had practically ceased to make bar iron—though Gen. Philip Benner made his "Junata iron" celebrated all over the West—and confined themselves to slabs for boiler plate; the puddling furnace took their place in making bar iron and common boiler plate; and it is probable that the Martin furnace or Bessemer converter will soon do so for the best boiler plate. Raw bituminous coal was first used by the Mahoning (now Adair) furnace in 1846 by Wilkeson & Co. The refinery has been neglected in this country, and the yield of puddling furnaces consequently remains small. The quality of our iron has, however, been kept at the highest point. The design of the machinery used at American works steadily improved, blowing-engines were made powerful enough, and rolling mill engines were soon made sufficiently strong for rolling rails, which were probably first made at the Mount Savage works in 1810 and at the Great Western Works (Bundy's Bend) in 1841. Since that time a great deal distinctively American has been done in mechanical improvements of all kinds, such as Thomas's blast furnaces, Burden's squeezer, Lauth's plate-rolls, Fritz's hanging guides and feeding tables for rolls, Holley's improved Bessemer plant, Kent's hot blast stove, Pearce's cupola; in engines the Corliss and that of Moore have been prominent. Banks, by his improvements in the lining of rotary puddling furnaces, has made them successful, and Kelly divides with Bessemer the credit of perfecting the process of making steel by blowing air through iron, having, it is said, succeeded in doing so in 1851. The vigor and ability displayed in the inventions by which our iron trade has been supported, and in the Bessemer trade, at least, placed at the head of the world, deserve the highest praise; in fact, the mechanical has overshadowed the metallurgical side of the art. Attention must now be directed to improvement of processes by the universal application of chemistry with a view to economy.

**Iron, Statistics of.** We find the present annual production of pig iron in the world to be as follows:

Year.	Gross tons.	Year.	Gross tons.
Great Britain.. 1873 ..	4,500,151	Italy .....	1872 .. 73,709
United States.. 1873 ..	2,500,306	Spain .....	1870 .. 54,007
Germany .....	1,654,862	Norway .....	..... 20,000
France..... 1873 ..	1,281,000	South America	..... 15,000
Belgium..... 1872 ..	652,665	and Mexico.....	..... 9,370
Austria, with	.....	Japan .....	1871 .. 7,500
Hungary .....	424,606	Switzerland..	1872 .. 40,000
Russia..... 1871 ..	354,000	Asia .....	..... 20,000
Sweden..... 1872 ..	322,000	Africa .....	..... 10,000
Luxembourg .. 1872 ..	309,000	Australia .....	..... 14,485,972
Canada.....	10,000		

Gruner estimates approximately the production of wrought iron and steel in 1872 as follows, in gross tons:

	Wrought iron	Steel
Great Britain .....	3,500,000 .....	500,000
United States .....	1,005,212 .....	117,000
Germany .....	1,150,000 .....	200,000
France .....	883,000 .....	138,000
Russia .....	592,000 .....	15,254
Belgium .....	300,000 .....	49,750
Austria .....	191,800 .....	12,600
Sweden and Norway ..	215,000 .....	7,294
Russia .....	35,000 .....	250
Spain .....	24,000 .....	
Italy .....	70,000 .....	
Canada, India, etc .....	8,806,722 tons. 1,066,988 tons	

The product of Great Britain may be summed up as follows for 135 years:

Year.	Charcoal	Coke	Raw coal.		Total
			Gross tons	Net tons	
1740	50	17,350	50	55,200	17,350
1758	26	14,500	59	125,000	125,000
1796	.....	.....	121	250,406	250,406
1806	11	7,800	222	250,406	250,406
1823	.....	.....	370	675,111	675,111
1825	.....	.....	323	1,051,021	1,051,021
1826	2	800	400	1,051,021	1,051,021
1837	.....	.....	511	2,000,000	2,000,000
1851	.....	.....	308	978,000	978,000
1854	.....	.....	500	2,741,445	2,741,445
1857	.....	.....	557	5,672,751	5,672,751
1874	.....	.....	.....	9,943,000	9,943,000

\* In blast, " previous figures meaning "total furnaces."



Great Britain produced the following amounts of bar iron and steel in

1869..... 4,734,145 gross tons. | 1871..... 5,566,175 gross tons.  
and exported iron, steel, and manufactures thereof—  
1871..... 3,169,219 gross tons. | 1872..... 3,388,622 gross tons.

*Prices of English Bar Iron at Liverpool.*

Year.	£	s	d	Year.	£	s	d
1866.....	17	0	0	1837.....	9	1	3
1867.....	16	0	0	1838.....	9	4	7
1868.....	14	10	0	1839.....	9	15	0
1869.....	15	0	0	1840.....	8	7	6
1870.....	14	10	0	1841.....	7	5	0
1871.....	14	0	0	1842.....	5	17	6
1872.....	13	10	0	1843.....	5	2	6
1873.....	13	6	8	1844.....	6	2	6
1874.....	13	18	4	1845.....	9	5	0
1875.....	13	13	4	1846.....	9	13	4
1876.....	12	2	6	1847.....	9	13	4
1877.....	10	12	6	1848.....	6	12	6
1878.....	12	1	8	1849.....	5	17	6
1879.....	12	5	0	1850.....	6	0	0
1880.....	10	13	4	1851.....	11	0	0
1881.....	8	18	4	1852.....	10	0	0
1882.....	8	1	3	1853.....	11	0	0
1883.....	8	0	0	1854.....	9	0	0
1884.....	8	19	2	1855.....	8	0	0
1885.....	12	14	2	1856.....	7	10	0
1886.....	9	15	10	1857.....	7	0	0
1887.....	9	7	6	1858.....	9	10	0
1888.....	7	18	4	1859.....	8	10	0
1889.....	6	16	8	1860.....	7	10	0
1890.....	6	3	9	1861.....	7	0	0
1891.....	5	13	9	1862.....	8	0	0
1892.....	5	13	4	1863.....	8	10	0
1893.....	6	12	11	1864.....	14	0	0
1894.....	6	18	9	1865.....	14	0	0
1895.....	6	10	0	1866.....	12	14	8
1896.....	10	12	6				

In the U. S. the statistics of iron manufacture are as follows, in gross tons:

*In 1810.*

153 charcoal furnaces..... 53,908 tons pig iron.  
349 bloomeries and forges..... 24,541 " bar  
34 rolling and slitting mills..... 6,500 " nails, rods, etc.

*In 1840.*

202 charcoal furnaces..... 183,343 tons pig iron.  
Bar iron made (including 5835  
tons "bloomed" from ore)..... 112,866 " "  
14 steel-works..... 1,000 " steel, all kinds.

*In 1840.*

450 furnaces (av. product, 772 tons ea.)..... 347,700 tons pig iron.  
797 bloomeries, forges, and rolling-  
mills..... 197,233 " bar, rod, etc.

*In 1845.*

523 charcoal furnaces..... 441,000 tons pig iron.  
17 anthracite "..... 45,000 "  
954 bloomeries, forges, rolling and } 291,600 " bar, plate, etc.  
slitting mills..... 30,900 " blooms.

*In 1849.*

303 charcoal furnaces..... 379,624 tons pig iron.  
57 anthracite "..... 151,331 " "  
7 raw coal "..... 7,800 " "  
10 coke " (estimated)..... 25,000 " "  
552 bloomeries, forges, and rolling-mills..... 278,044 " bar iron.

*Detailed Statistics by States in 1856 and 1873.*

STATES.	1856.		1873.	
	Pig iron, all kinds.	Wrought iron and steel, all kinds.	Pig iron, all kinds.	Wrought iron and steel, all kinds.
Maine.....	2,100	4,500	780	21,210
New Hampshire.....		600		300
Vermont.....	2,420	2,150	3,100	6,788
Massachusetts.....	13,007	57,142	21,136	118,669
Rhode Island.....		4,475		11,662
Connecticut.....	12,876	7,709	26,977	11,492
New York.....	69,031	75,242	296,818	186,835
New Jersey.....	28,217	33,561	102,341	77,688
Pennsylvania.....	451,496	278,211	1,389,573	858,946
Delaware.....		2,211		11,617
Maryland.....	41,718	15,292	55,986	58,025
Virginia.....	14,828	29,350	26,475	15,608
West Virginia.....			23,056	51,796
North Carolina.....	450	1,397	1,432	110
South Carolina.....	1,506	1,850		
Georgia.....	2,807	940	7,501	10,624
Alabama.....	1,495	252	22,283	500
Tennessee.....	28,476	10,997	43,134	16,561
Kentucky.....	36,563	21,376	69,889	39,060
Ohio.....	87,011	30,980	406,029	272,066
Indiana.....	1,800		32,486	36,006
Illinois.....	1,900		55,796	143,017
Michigan.....	3,678	2,298	123,506	8,542
Wisconsin.....	2,500		74,148	39,495
Missouri.....	10,138	5,325	85,552	25,055
Texas.....			280	
California.....				7,420
	814,017	1,587,238	2,868,278	2,029,009

Of the iron made in 1873, 890,077 net tons were rails; of these 129,015 were Bessemer steel, and 26,377 steel-headed rails. Besides these there were imported 159,571 tons steel and 99,202 tons iron rails, making a total consumption of 1,148,850 tons of rails in 1873. There were 875,133 tons of angle, bar, etc., iron, 201,235 tons of cut nails and spikes, and only 32,863 tons of blooms from ore, and 29,701 from pig iron. The manufacture of blooms has remained stationary for many years.

The production of Bessemer steel in the U. S. has been, in net tons, as follows:

Year.	Tons.	Av. price per gross ton.
1867.....	3,000.....	\$160.00 currency.
1868.....	8,500.....	158.50
1869.....	12,000.....	132.25
1870.....	40,000.....	106.75
1871.....	45,000.....	102.50
1872.....	111,000.....	112.60
1873.....	157,000.....	120.50
1874.....	175,000 (est.).....	94.25

The production of cast steel of all kinds has been as follows:

1865.....	15,262 net tons.	1870.....	35,000 net tons.
1866.....	18,973 " "	1871.....	37,000 " "
1867.....	19,000 " "	1872.....	38,000 " "
1868.....	21,500 " "	1873.....	50,000 " "
1869.....	23,000 " "		

The consumption of pig iron in the U. S., gauged by the population of the country, has risen as follows:

In 1810 the consumption was 16 pounds per head.

1829.....	"	25	"
1832.....	"	47	"
1846.....	"	100	"
1855.....	"	117	"
1873.....	"	155	"

The production per head in the U. S. constantly rises: in 1855 it was 84 pounds, and in 1873 it was 143 pounds. The growth of some districts is so rapid that we may soon expect production to equal consumption in ordinary times. We find, for instance, that Pittsburg, which in 1828 rolled 3291 tons of iron, now makes nearly one-sixth the entire amount produced in the country.

In connection with the statistics of iron, two very striking facts appear. First: that the cost of iron consists almost entirely of wages paid for labor. A ton of pig iron requires 10 to 13 days' labor of one man. Second: that the quantities of raw materials used are so great that the iron trade requires more transportation than any other industry. It is estimated that in 1874 the iron-trade freight of this country amounted to about 37½ out of a total of 175 million tons moved over all our railroads, or more than 21½ per cent. More than one-third of all coal mined in the U. S. is required for the manufacture of iron and steel.

I am indebted to the American Iron and Steel Association for recent statistics; the earlier ones relating to America I have extracted from reports of the secretary of the treasury and *Hazard's Register*, while those relating to Great Britain I have compiled from several old authorities.

JOHN B. PEARSE.

\* New Hampshire ceased in 1865 to make pig iron.

† The figures for the other States are wanting.

‡ Of this total, 7280 tons were steel.

STATES.	1856.					1873.				
	Charcoal.	Anthracite.	Raw coal.	Coke.	Bloomery forges.	Charcoal.	Anthracite.	Raw coal and coke.	Bloomery forges.	Steel-works.
Maine.....	1				1	1				2
New Hampshire.....	1				1	1				1
Vermont.....	1				1	1				1
Massachusetts.....	1				19	5				24
Rhode Island.....					2					2
Connecticut.....	14				6	10				9
New York.....	29	14			3	13	17	36	28	26
New Jersey.....	6	4			18	2				6
Pennsylvania.....	113	93	6	1	111	91	39	149	74	31
Delaware.....										19
Maryland.....	21	6			2	13	14	4		6
Virginia.....	39				43	12	34	1		4
West Virginia.....										1
North Carolina.....	4				36		8			7
South Carolina.....	4				2	3				1
Georgia.....	7				1					2
Alabama.....	41				11		11			2
Tennessee.....	41				30		17			1
Kentucky.....	30				4		17			11
Ohio.....	41	13			15	37	51			47
Indiana.....	2				1					11
Illinois.....	42				1					1
Michigan.....	3				3	2	29	1		3
Wisconsin.....	3					10	3			1
Minnesota.....										
Missouri.....	7				3	4	9	9		7
Oregon.....							1			3
Kansas.....							1			
Texas.....										1
Utah Territory.....										1
California.....										
	416	121	19	24	204	189	209	10	287	309



**Iron, Medicinal Uses of.** Iron is an important ingredient of the substance of the red blood corpuscles, and its administration in some unknown way directly induces an increased formation of these bodies. In health this effect takes place only to a limited extent, but in the morbid condition known as *anæmia*, where from any cause the blood is unnaturally poor in red corpuscles, this action of iron is far more striking, and the normal proportion of these elements is often rapidly restored by its influence. On account of this peculiar property, iron is commonly called a blood tonic, and its preparations thus have a unique medicinal use in curing *anæmia*. To a full-blooded individual, on the other hand, they are injurious. Locally, the preparations of iron differ greatly in action. Some are powerfully astringent and styptic, and have thus special uses by virtue of this property; others are nearly destitute of this action. The astringent group are also exciters of the digestive faculty, and for some unknown reason also cure *anæmia*, in some cases more promptly than the bland preparations. Almost all chalybeates tend to cause constipation, and the astringents again more than the others. The "muriated tincture," the most used of the astringent group, has, moreover, a great reputation in some special diseases, notably in erysipelas and diphtheria. The preparations of iron used in medicine are very numerous. Indeed, unnecessarily so. They embrace both soluble and insoluble forms, but as the latter are readily dissolved by the aid of the gastric juice, they are as active as the former. The non-astringent preparations are reduced iron (*Ferrum reductum*), known also as "iron by hydrogen" or "Queen's iron," consisting of the pure metal in a state of fine powder; pills of the carbonate ("Vallet's ferruginous pills"); the so-called sub-carbonate or "saffron of Mars," consisting of the hydrated sesquioxide with a little undecomposed carbonate; and numerous salts, embracing the phosphate, pyrophosphate, oxalate, citrate, ammonio-citrate, citrate of iron and quinine, and of iron and strychnine, and the ammonio and potassio-tartrates. The astringent preparations are ferric chloride, principally used in alcoholic solution under the name of "muriated tincture of iron;" ferrous sulphate or "green vitriol;" ferric nitrate in solution; lactate, a feebly astringent salt; and the so-called solution of the subsulphate, or "Monsel's solution," chiefly used as a powerful styptic to stop bleeding. Ferrous iodide is used to combine the medicinal effects of iron and iodine; the hypophosphite, to combine those of iron and hypophosphorous acid; iron alum, as a simple astringent; and the hydrated sesquioxide, in the moist state, when freshly precipitated, as an antidote in arsenical poisoning.

EDWARD CURTIS.

**Iron, county in the S. E. of Missouri.** Area, 500 square miles. It abounds in the best of iron ores, and contains lead, gold, and other metals. It is mountainous and heavily timbered. Pilot Knob and Iron Mountain are near its N. E. extremity. Wool and grain are staple products. It is traversed by the Iron Mountain R. R. Cap. Ironton. Pop. 6278.

**Iron, county of the S. of Utah,** extending from E. to W. across the State. Area, about 7000 square miles. It is largely unexplored. The Colorado intersects the E. portion. The western part is in a basin which has no water flowing into the sea. The staple product is wool. The county is believed to possess great mineral wealth. Cap. Parowan. Pop. 2277.

**Iron, tp. of Iron co., Mo.** Pop. 1118.

**Iron, tp. of St. Francis co., Mo.** (See IRON MOUNTAIN.) Pop. 2655.

**Ironclads.** See SHIPS, IRON-CLAD OR ARMORED, by ISAAC NEWTON.

**Iron Crown,** the ancient diadem of the Lombard kings, is a jewelled circlet of gold, containing a fillet of iron said to have been made of one of the nails of the true cross, presented by Pope Gregory I. to Theodelinda, wife of King Autharie, in 590. In 991 it was used at the coronation of Agilolphus; in 771, at that of Charlemagne; and by thirty-four other sovereigns. Henry VII. of Germany was crowned with it in 1312; Frederiek IV. in 1452; Charles V. in 1520; Napoleon I. in 1806. In 1866 it was given at the close of the Italo-Prussian war by the emperor of Austria to the king of Italy, Victor Emmanuel.

**Irondate,** post v. of Washington co., Mo., on the St. Louis and Iron Mountain R. R., 6 miles N. of Iron Mountain.

**Irondate,** post-v. of Saline tp., Jefferson co., O., on the Cleveland and Pittsburg R. R., 8 miles from Wellsville. Pop. 751.

**Iron-dequoit,** post tp. of Monroe co., N. Y., having Lake Ontario on the N. and Irondequoit Bay on the E. Pop. 3990. It is very fertile.

**Iron Mask.** The Man with the, a mysterious prisoner of state who was in 1679 confined by the French government at Pignerol in Savoy; was removed in 1681 to Exilles; in 1687, to the island Ste. Marguerite in the Mediterranean; in 1698, to the Bastille, in which he d. Nov. 19, 1703. He always wore a mask of black velvet. Much has been written with a view of determining this unfortunate man's identity. He has been in turn held to have been the duke of Vermandois, the duke of Beaufort, the duke of Monmouth, an illegitimate son of the queen, and a twin-brother of Louis XIV.; but it is now generally held that he was in reality the count Matthioli, minister plenipotentiary of the duke of Mantua to France, unlawfully held a prisoner by the French court, or perhaps a chevalier de Kissenbach, confined for plotting against the king's life.

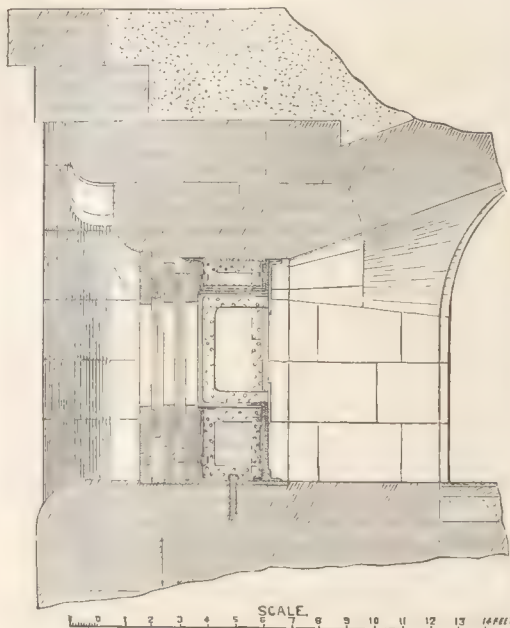
**Iron Mountain, or Iron Mount,** post v. of Iron tp., St. François co., Mo., on the St. Louis and Iron Mountain R. R., 81 miles S. W. from St. Louis. Here is the famous Iron Mountain, 228 feet high and covering 500 acres. It is of mamillary shape, and consists chiefly of an iron ore which yields 55 or 60 per cent. of excellent iron. The ore is softer and less siliceous than that of Pilot Knob (which see). It is very rich and uniform, nearly free from sulphur, and carrying only 0.12 per cent. of phosphorus. It is magnetic, with distinct polarity, and acting in several parts very strongly on the needle. The amount of ore in Iron Mountain seems to be immense, the main body having a thickness of 50 feet, and continuing indefinitely in depth; 262,477 tons of ore were shipped in 1871; 371,474 in 1872. The whole deposit has been described by Dr. Litton in the second annual report of the geological survey of Missouri (1855), and by Prof. Raphael Pumpelly and Dr. Adolph Schmidt in the volume on *Iron Ores and Coal Fields* of the new geological survey (1873). The village of Iron Mountain has several blast furnaces and other manufactures. Pop. 2018.

**Iron Plating for Fortifications.** It was an American soldier and engineer, the late Gen. J. G. Totten, who earliest realized the need and predicted the introduction of guns of greatly increased calibres into our sea-coast defences, asserting the desirableness and practicability of a 20-inch gun as early as 1844. It is to the same distinguished officer to whom is due the first introduction of *iron plating* in the surroundings of the "embrasure" (or port) of our masonry casemates. (See "Report to the Secretary of War," 1857, *Prof. Papers Corps of Engineers*, No. 6.) But the 10-inch smooth-bore represented at that date the limit of gun development. The system he skilfully devised, and during the ensuing three or four years caused to be extensively applied to the casemated works then in construction, proved inadequate, simply because this was precisely the era of the commencement of the great changes which have substituted immense calibres and rifled bores for small calibres and smooth-bores in artillery, and which have introduced the "armored" ship and made it an essential and most formidable agent of naval warfare. It was nearly the era, too, when a great maritime nation, England, undertook a revision and reconstruction of her sea-coast fortifications. At a time when "the 68-pounder was the heaviest gun contemplated," and when the introduction of rifled artillery of more than one calibre (the 110-pounder Armstrong) was not anticipated, evidently it was not expected that attacking vessels would bear heavier ordnance or be clad in mail perfectly proof against such guns. Before much advance had been made by the English the necessity of a partial substitution of iron for masonry in the exposed fronts of masonry casemates became apparent, though neither the precise degree of resistance ultimately to be offered, nor the scientific means by which iron could best be made (*if at all*) to yield that measure, were understood. Hence, nearly all the works which had been designed as masonry casemated batteries after the old models were modified by making, in the casemate fronts, openings of 12 feet horizontal dimension, by 8 feet vertical, to be subsequently filled up by an iron "shield," the intervening masonry piers and front wall being *also* modified so as to furnish solid masses or "merlons" of about 15 feet thickness. In adapting and executing this masonry construction the question as to the precise character of the iron shield was left an open one. Experiments to determine the construction commenced as early as 1862, and are fully described in various English publications: (*Prof. Papers Royal Engineers*, vols. xiii., xiv., xvi., xvii., xviii., xix.; *Report of the Special Committee on the Gibraltar Shields*; *Report of Iron Plate Committee*, etc.). The failure of the "Gibraltar" shields (*i. e.* shields which had been prepared for the new works at Gibraltar and Malta under the experimental firings (Oct. and Dec., 1867, and Jan., 1868), to give the resistance expected, and the not altogether satisfactory trials of the "Plymouth breakwater" experi-



mental construction (June, 1868), appear to have temporarily arrested progress in the application of iron to the otherwise nearly completed works. Renewed experiments finally led to the adoption of a shield construction (see Fig. 1 for section of shield as fixed in the casemate), described as follows:

FIG. 1.



"The armor consists of three 5-inch plates, made to the full size of the shield by a process recently adopted in the fortification branch, with intervals of 5 inches between them, in which a concrete composed of iron turnings and tar mixed hot, and weighing about 240 pounds per foot cube, is introduced. The front plate is bolted to the second by means of ten 3-inch armor bolts with plus threads (3½ threads to the inch) and spherical nuts at each end, seated in corresponding holes in the armor plates. The second and third armor plates are held back to the supports by eight bolts of similar pattern. These bolts, however, are secured to the skin of the supports by means of spherical nuts in coiled washers of special construction, similar to those used in the two small targets above referred to. The fastenings are so laid out that in no case does an armor bolt appear at the back of the shield. The port opening in the front armor measures 4 feet high, and 2 feet 5 inches wide, and admits of the 10-inch 18-ton gun training 70°, elevating 10°, and depressing 5°. The 12 inch and 25 ton gun would train 60° behind the shield, elevate 8°, and depress 5°. The supporting structure is composed of 1-inch plate, and 6-inch by 6-inch by 1-inch angle-irons, built in the form of a case, to cover the whole of the back of the armor except in the central space required for the working of the gun. The depth or thickness of this case is 2 feet 6 inches. It stands upon a 1½-inch base-plate, the ends of which pass under the piers of the masonry structure in which the shield is fixed. The whole of the case is filled with iron concrete. The shield is held down by means of 2-inch bolts to a 3-inch plate, bedded in the foundation at a depth of about 2 feet below the floor level.

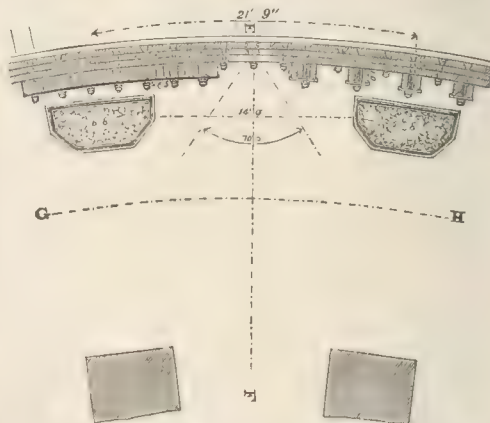
"It will be observed that this shield presents some important points of difference from any that had preceded it: *First.* Each of the three 5 inch thicknesses was *one single plate*. The joints, which had been such a source of weakness in former shields, no longer existed. *Second.* The three plates, instead of being in immediate contact, were separated by intervals of 5 inches, filled with the mixture or concrete of iron filings and tar. *Third.* The three plates are not connected by bolts running through the whole structure. The front and second plates are held together by ten 3-inch bolts, with plus threads and spherical nuts at each end, seated in corresponding holes in the armor plates. The second and third plates are held back to the supports by eight bolts of similar patterns. The fastenings are so arranged that in no case does an armor-bolt appear at the back of the shield. *Fourth.* The bolts used are peculiar."

With some improvement of details the shield described has been applied to the English casemated works and to open batteries, and it is regarded by the English engineers

as so satisfactory that were new works to be built but a very slight modification would be made in the arrangement of masonry and iron. An additional iron plate may be added whenever greater thickness may be judged necessary.

For points of peculiar character and very great importance, the artificial or otherwise contracted sites of which require the greatest possible concentration of guns, and which may be closely approached and enveloped by hostile fire, a type of works like the "Plymouth breakwater fort" has been adopted; the characteristic being a *continuous envelope of iron around that part of the work occupied by gun casemates*. Fig. 2 gives a ground-plan of a casemate

FIG. 2.



of the work at Plymouth breakwater. The iron envelope is, like the shields, made up of three thicknesses of 5-inch plates. In more recent inter-aqueous constructions at Spithead both the intervals between the three thicknesses are made five inches and filled with concrete or brickwork, as described for the shields. Fig. 3 shows one of these works as first designed. In actual construction the turrets have been omitted.

FIG. 3.



*Barbette batteries*—that is, of guns firing over a parapet without front protection—are seldom used by the English, but unless in very high positions (100 feet or more) these open batteries are protected with iron shields almost identical with those described for the casemates.

The history of the subject would contain a great variety of designs for the combination and arrangement of iron plates, beams, rails (or channel-irons), timber, rubber, etc., etc., as "shields" or protecting walls for sea-coast guns—some few of which have indeed, in Europe,<sup>3</sup> been realized in construction—but the English system described is the only one which has been the outcome of long protracted and logically connected experiments, and which too, has been, on a grand scale, carried into actual execution. In this country, though the subject has been much studied (see "Report on Fabrication of Iron for Defensive Purposes," *Prof. Papers Corps of Eng'rs*, No. 21, and *Supplement*), and many experiments made, yet, on account of the costliness, and on account of the as yet unsettled relations between gun-development and shield-resistance, no iron construction for fortifications has been ventured upon.

J. G. BARNARD.

**Iron Ridge**, post-v. of Dodge co., Wis., on the Chicago Milwaukee and St. Paul R. R. (northern division), 47 miles N. W. of Milwaukee. It has abundant iron ores of good quality and extensive iron-works.

**Irons** (WILLIAM JOSIAH), D. D., b. at Hoddesden, Herts, Eng., Sept. 12, 1812; graduated at Queen's, Oxford, in 1833; became prebendary of St. Paul's in 1860; was Bampton lecturer in 1870, and became rector of Wadingham and rural dean. Author of several volumes of sermons, lectures, etc., and many controversial and other pamphlets.

<sup>3</sup> Thus, among the numerous recent additions to the maritime defences of Cronstadt is a battery having six iron revolving turrets.



His translation of the *Dice Ire* is considered the best in the language.

**Ironton**, post-v. of Arcadia tp., cap. of Iron co., Mo. It has 2 weekly newspapers. Pop. 573.

**Ironton**, tp. of Lincoln co., N. C. Pop. 2162.

**Ironton**, city, cap. of Lawrence co., O., on the Ohio River, 140 miles above Cincinnati, at the terminus of the Iron R. R., 13 miles in length. It is the centre of the "Hanging Iron region," and is the head-quarters of business for a large number of iron furnaces; has a large nail mill, 2 rolling mills, a stove foundry, 2 machine shops, and boiler-yards, 2 planing mills, 3 English and 2 German newspapers, 2 national banks, 1 private bank, 15 churches, gas and water works; does an annual business in pig iron of \$2,000,000; of nails, \$600,000; bar iron, \$750,000, etc. Capital invested in iron business, \$3,500,000. Pop. 5686.

E. S. WILSON, ED. "REGISTER."

**Ironton**, tp. and post-v. of Sauk co., Wis., 22 miles W. of Baraboo. It has iron works and a machine-shop. Pop. 1216.

**Iron-wood**, a name given in the U. S. to the two species of *Hornum* (which see). The iron-wood of commerce is from *Metcasia decaspora*, a myrtle of Eastern Asia. *Mecasia ferrea* and species of *India* (Guttiferae), *Eupris undulata* (Diosmaceae), and *Olea lanifolia* (Oleaceae), the last two from South Africa, and *Sida indicum trilobum* (Cinchonaceae), are all called iron-woods, and all have exceedingly hard timber. To these we may add *Sideroxylon* (Sapotaceae), of which the U. S. have one species, *S. pallida*, a tree of Florida. *S. incense*, of the Cape of Good Hope, is a valuable timber tree.

**Iroquois**, the name of a confederation of Indian tribes which formerly inhabited the central and western part of the State of New York. The confederation consisted originally only of five tribes—the Mohawks, Oneidas, Onondagas, Cayugas, and Senecas—but in 1712 the Tuscaroras were admitted to the league, which now adopted the name of the "Six Nations." The total number of members was about 15,000. They lived in villages and pursued agriculture. Each tribe was governed by sachems, but affairs concerning the whole confederation were decided upon by general assemblies. On the whole, the Iroquois were of all the Indian tribes of North America not only the most powerful, but also the highest developed, and some of their leaders—as, for instance, Red Jacket of the Seneca tribe and Brant of the Mohawk—were men of valor, understanding, and eloquence. In the Revolutionary war they sided with the English, and in 1778, Brant attacked and nearly destroyed by fire and sword the settlements of Cobleskill, Andrewstown, and German Flats. But in the next year the Americans retaliated, and Gen. Sullivan nearly broke the power of the confederation. The Iroquois present a remarkable exception to the supposed general law of decrease among the American Indians, they having increased at every enumeration since the war of 1812, when they reached their lowest point in numbers. Nearly one-half of the Iroquois have removed from New York to points farther W. The largest reservation is that of the Mohawks, on the Grand River in Ontario, 150 miles W. of Niagara. This was given to the Mohawks by the British government in consideration of their services in the Revolutionary war, and the celebrated chief Joseph Brant resided there until his death. The Mohawks of Grand River number nearly 2000; with them are some hundreds of Tuscaroras and a few individuals of other tribes. Five-sixths of the Oneidas, or about 1200, live on a reservation on Green Bay, Wis., and some 400 Senecas reside in the Indian Territory. The Cayugas are the least numerous of the Six Nations. Having long since sold all their own lands in New York, they are scattered among the sister-tribes, with whom they have intermarried. Their language is consequently nearly extinct, there being now less than a score who speak it. The greatest collective number of Cayugas at one place is 55, now living at the Cattaraugus-Seneca reservation in Erie co., 20 miles S. of Buffalo. All the Six Nations have enjoyed the benefits of missions from an early period in the century, and for twenty years past their schools have been supported by the State, the teachers being mainly natives. A teachers' institute was organized in 1871 among the Seneca teachers, numbering 15. An annual agricultural fair has for several years existed among the same Indians, and a republican form of government was established in 1850. A president and 18 councillors, with other officers, are annually elected by ballot. The languages of the Six Nations are considered as distinct; they are closely related to each other in grammar, and but little less in vocabulary, belonging to the same linguistic group with the Hurons and Wyandots. Some resemblances to the Cherokee language have been discovered. Special works on their history are—Colden,

*History of the Five Nations* (1727); Casick, an Indian of the Tuscarora tribe, *Sketches of the Ancient History of the Six Nations* (1826); Schoolcraft, *Notes on the Iroquois* (1846); Morgan, *League of the Iroquois* (1851). A grammar and dictionary of the Mohawk language was published by the Jesuit Bruyas in New York (1862).

**Iroquois**, port of entry of Dundas co., Ont., Canada, on the N. shore of the St. Lawrence, 99 miles above Montreal, on the Grand Trunk Railway and at the foot of the Iroquois Canal. It has large factories and mills. Pop. of sub-district, 781.

**Iroquois**, county of Illinois, bounded on the E. by Indiana. Area, 1100 square miles. It is a fertile prairie, traversed by the Illinois Central, the Chicago Danville and Vincennes, and the Toledo Peoria and Warsaw R. Rs. Cattle, grain, and wool are staple products. The S. part of the county is believed to contain beds of coal. Cap. Watseka. Pop. 25,782.

**Iroquois**, tp. and post-v. (CONCORD STATION) of Iroquois co., Ill., on the Cincinnati Lafayette and Chicago R. R. Pop. 679.

**Iroquois**, tp. of Newton co., Ind. Pop. 619.

**Irrawad-di**, a river of Farther India, rises in Thibet, and flows, after a course of about 1200 miles, into the Bay of Bengal, in lat. 16° N. and lon. 94° E. In lat. 17° N. it separates, and between its easternmost branch, the Rangoon, and its westernmost branch, the Bassain, it forms a delta intersected in all directions by its minor branches, comprising an area of 10,000 square miles and covered with tank forests and inextricable jungles. It is navigable for vessels of 200 tons burden as far as Ava, 100 miles from the sea, even at low tide, and canoes ascend safely 180 miles farther up the river.

**Irrel'ative**, in music, a term applied to such chords or keys as have no elements in common to produce relation or connection. Thus, the triads of C minor and of C $\sharp$  major are irrelative; and a transition from the key of C major into that of F $\sharp$  minor would be into an irrelative key.

**Irriga'tion** [Lat. *irrigatio*]. In the broadest sense of the term, irrigation embraces all artificial modes of using water for agricultural purposes. We shall consider the complex effects of irrigation according to the several media in which they are manifested.

*Soil*.—The immediate effect of irrigation upon the *consistence* of the soil is to soften it and render it more easily penetrable by the plough and by the roots of plants. Hence, in dry climates water is frequently applied, before ploughing, at the rate of about 100 or 500 cubic yards to the acre, or barely enough to loosen the earth to the depth of a foot without drenching it. But it is most important to observe that the ultimate effect of long-continued irrigation is to condense and harden the surface to a very inconvenient degree. Irrigation affects the *quality* of the soil by introducing into it common air and other gases, and vegetable and mineral matter held in suspension or solution by the water. In most cases the substances so introduced are beneficial to vegetation, but in some they are highly noxious. Even the water of large rivers sometimes, as has been observed in India, deposits on the surface, or introduces into the texture of the soil, salts which in the course of time render it wholly sterile. Irrigation also acts upon arable soil by facilitating the decomposition of soluble organic and inorganic matter contained in it, and carrying off such matter from it. The extent of this latter action is disputed, but it must be considerable, for constituents of vegetable growth have been found in underdrain water from cultivated fields, and large tracts of ground, impregnated with salts to such a degree as to make them incapable of cultivation, have been rendered fertile by washing with fresh water. (See Duponchel, *Hydraulique Agricole*.) Irrigation often injuriously affects the *subsoil* by charging it with water, which stagnates in it and renders it cold and *sour*, as sometimes expressed, to the roots of plants which descend into it. In countries where irrigation has been immemorably practised this effect has not attracted much attention, but in the British Indian provinces watered by the new canals constructed by the government, and elsewhere when irrigation is first introduced, it is very observable. It also exercises an important influence on the *supply* of lands lying at a lower level, by diverting from their natural channels streams which naturally flowed through such lands; and on the other hand by concentrating upon their surface surplus water from irrigated fields, or by saturating them with water conveyed to them from such fields by subterranean infiltration. These effects are seen not only in the soil itself, but in the diminished or augmented volume of spring and well water. Irrigation modifies the *temperature* of the soil, especially and markedly by communicating or abstracting heat, and by promoting



evaporation from the surface, which is necessarily attended with some cooling of the ground.

**Atmosphere.**—Irrigation affects the *humidity* of the atmosphere by increased evaporation from the surface, and its *temperature* by the refrigeration which accompanies evaporation. Scientific observation has been very little directed to this subject, and the measure of the former effect is embarrassed by the constant mobility of the air, which not only may remove from a given locality, but may bring to it, a supply of atmospheric moisture so rapidly as to render the determination of the local effect of irrigation in this respect very difficult if not impossible. But the atmospheric temperature of artificially watered districts is, at certain times, sensibly lower than that in unwatered regions, while at other times the vapor thrown off from an irrigated surface may check radiation from the soil, and thus prevent or compensate the lowering of the temperature by evaporation. Irrigation has also a certain influence on the *chemical constitution* of the atmosphere, by depositing on or in the soil organic or inorganic decomposable substances, and promoting the decomposition of such foreign matter on or a little below the surface of the ground, and thus disengaging gases which may diffuse themselves through the air.

**Sanitary Effects.**—Humidity, temperature, and the composition of the air we breathe are terms in the equation of health. All these elements are subject to modification by agricultural irrigation, and hence it is evident that water cannot be applied, in considerable quantities, to the soil or to the leaves of plants without exerting some influence on the sanitary conditions of climate. It has been observed that pure water moving freely over the surface or through the texture of the soil is not generally sensibly injurious to health. But when it stagnates on or in the ground it soon becomes a dangerous and often very destructive source of disease. Hence, for sanitary as well as other reasons already alluded to, superficial or underground drainage is an imperious necessity in all irrigated lands where nature has not provided, either in the configuration of the surface or the texture of the soil, sufficient conduits for the speedy discharge of the water applied. Even in India, where the neighborhood of tanks and reservoirs is not unhealthy, fever makes its appearance in the provinces irrigated by means of the new canals, and can be prevented only by underdraining.

**Effects on Vegetation.**—Watering the soil promotes the germination of the seeds of cultivated plants, and, unfortunately, of weeds, and water is in and of itself a necessary element of vegetable growth. Besides this, it is never quite free from extraneous matter, and it always contains, in solution or in suspension, foreign substances useful or injurious to vegetation. Hence, in climates and on soils where the natural supply of water is insufficient for the normal growth of plants, remunerative agriculture is impossible without artificial arrangements for procuring and administering it. And even where agricultural industry yields fair returns without irrigation, it is generally, if not universally, true that the application of water according to the common methods increases the *quantity*, or at least the *volume*, of leaf, flower, bark, ligneous tissue, root, bulb, edible grain and other seeds, fruits, oleaginous and watery fluids, coloring-matter, aromatic and medicinal substances, produced on a given area of ground. Until lately, this augmented product has been too generally regarded as a positive advantage directly proportional to the increase; and this opinion has done much to promote the extension of the practice of irrigation. But agricultural chemistry and more careful observation have shown that in many cases the increase in quantity is more than counterbalanced by a deterioration in the *quality* of the product; and, further, that on ground of loose and light texture, rich in humus or other partially decomposed organic matter, the hygroscopicity of the soil is often such that it absorbs from the atmosphere, even in dry weather, moisture enough to supply the vegetation upon it, and consequently even the bulk of the crop is little or not at all increased by irrigation. The present opinion seems to be that all the annual products of irrigated vegetables, including even the leaves, are inferior in nutritive properties, in flavor, and in all other valuable qualities, except mere bulk, to those of unwatered plants. It appears to be well settled, however, that the *wood* of timber trees is not only much quickened in growth, but improved in quality by judicious irrigation; for, as between trees of the same species, those whose grain shows the largest yearly increment usually furnish the best timber. But, though the annual products of watered plants are generally comparatively inferior in quality, and in some rare instances—as is said to be the case with the yield of olive-oil, for example—even in quantity, there is reason to believe that if cultivators knew enough of the laws of vegetable physiology to be able to apply water always in just quantity and at the right time, irrigation might be-

come universally useful. There is probably *some* period in the lifetime of every plant when it would be benefited by an artificial supply of water, at least for the best development of the special product which alone makes it worth cultivating, if not for its general growth. The formation of all the various tissues, juices, and organs of a plant does not go on *pari passu*, and watering may stimulate some particular vegetable process when it is not necessary, or even advantageous, to the whole organism. Cultivated plants are, in a sense, artificial machines, and we rear them not for the sake of regular, but for *abnormal* products, for the growth of which we can afford to sacrifice the rest of the plant. This subject needs to be specially studied with reference to seasons and quantities in irrigation. The problem of compensation of inferiority in quality by increase in quantity is complicated by the antagonism between the interests of the producer and those of the consumer. It is hard to persuade the producer of a crop which he grows for sale, not for his own consumption, that he ought not to aim exclusively at increase of quantity, and consumers of few agricultural products are supplied with sure tests by which they can readily detect inferiority in quality. Comparative weight is perhaps the most generally accepted standard in this respect, but this is not of universal applicability. The heaviest potatoes, for example, are not the best. The relative quality of watered and unwatered crops is now exciting much attention in Europe, but popular opinion on questions of rural economy is controlled by apparent results, and at present the tendency is strongly towards the extension of a system which offers such tempting visible advantages. The importance of irrigation as a means of destroying noxious insects and small rodents in and upon the soil must not be forgotten.

The growth of large forests may be promoted by irrigation. The grounds which it is most important to clothe with wood as a conservative influence, and which also can best be spared from agricultural use, are steep hillsides. But the performance of all the offices of the forester to the tree—seeding, planting, thinning, and finally felling and removing for consumption—is more laborious upon a rapid declivity than on a level soil, and at the same time it is difficult to apply irrigation or manures to trees so situated. Experience has shown that there is great advantage in terracing the face of a hill before planting it, both as preventing the wash of the earth by checking the flow of water down its slope, and as presenting a surface favorable for irrigation, as well as for manuring and cultivating the tree. But even without so expensive a process very important results have been obtained by simply ditching declivities. "In order to hasten the growth of wood on the flanks of a mountain, M. Eugène Chevandier divided the slope into zones forty or fifty feet wide, by horizontal ditches closed at both ends, and thereby obtained, from firs of different ages, shoots double the dimensions of those which grew on a dry soil of the same character where the water was allowed to run off without obstruction." (Dumont, *Des Travaux Publics*, etc., pp. 94-96.) The ditches were about two feet and a half deep and three feet and a half wide, and they cost about 40 francs the hectare, or \$3 the acre. This extraordinary growth was produced wholly by the retention of the rain-water in the ditches, whence it filtered through the whole soil and supplied moisture to the roots of the trees. It may be doubted whether in a climate cold enough to freeze the entire contents of the ditches in winter it would not be expedient to draw off the water in the autumn, as the presence of so large a quantity of ice in the soil might prove injurious to trees too young and small to shelter the ground effectually against frost. Chevandier computes that, if the annual growth of the pine in the marshy soil of the Vosges be represented by one, it will equal two in dry ground, four or five on slopes so ditched or graded as to retain the water flowing upon them from roads or steep declivities, and six where the earth is kept constantly moist by infiltration from running brooks. (*Comptes Rendus à l'Académie des Sciences*, t. xix., Juillet-Dec., 1844, p. 167.) The effect of accidental irrigation is well shown in the growth of the trees planted along the canals of irrigation which traverse the fields in many parts of Italy. They flourish most luxuriantly, in spite of continual lopping, and yield a very important contribution to the stock of fuel for domestic use; while trees situated so far from canals as to be out of the reach of infiltration from them are of much slower growth under circumstances otherwise equally favorable. In other experiments of Chevandier, under better conditions, the yield of wood was increased, by judicious irrigation, in the ratio of 7 to 1, the profits in that of 12 to 1. At the Exposition of 1855, Chambrelent exhibited young trees which, in four years from the seed, had grown to the height of sixteen and twenty feet, and the circumference of ten and twelve inches. Chevandier experimented with various



manures, and found that some of them might be profitably applied to young, but not to old trees, the quantity required in the latter case being too great. Wood ashes and the refuse of soda factories are particularly recommended. I have seen an extraordinary growth produced in fir trees by the application of soap-suds. According to *Compendio Vocab. di Agricoltura*, now publishing—a high authority—irrigation of trees promotes the growth of foliage and wood, but deteriorates the quality of the other products, whether fruits or juices. Of course it is suited for shade and ornamental trees and shrubs, though not for olive trees, vines, and mulberries, in which latter the leaf becomes abundant, but less nutritious. See MULBERRY.

*General Physical and Social Effects.*—The diversion of water from its original channels of discharge, which is always a necessity in irrigation, interferes with natural hydrology, though not always injuriously. Its effects on springs and wells at lower levels are among the most important, though habitually least noticed, of these effects. The reclamation of marshes by this process is a familiar example of beneficial results. The reduction of the supply of water for mechanical power, and the obstruction of free communication over the surface by canals of derivation and distribution, are evils too obvious to need to be dwelt upon. The measurement of flowing water, and its apportionment between different persons entitled to use the same source of supply, are very difficult in practice, and when the quantity is not abundant they are occasions of endless contention and litigation. The effect of these embarrassments is to discourage landholding in moderate parcels, to oblige small proprietors to sell their grounds and become day-laborers, and of course to diminish the numbers of rural homesteads and rural inhabitants. This is an evil much to be dreaded in countries with popular institutions, and it ought to engage the earnest attention of American public economists.

*Economical Considerations.*—The partial grading of the surface of the ground for the reception of water, the construction of reservoirs, aqueducts, canals, and siphons for its supply and distribution, as well as of drains on or below the surface for its discharge, and the care and labor involved in its application, are all expensive. Irrigation ought never to be undertaken on a considerable scale without a certainty that the supply of water is adequate in quantity, and that it is of such chemical composition and such temperature as to be useful to vegetation; and, further, without enough of preliminary experimentation to show that the probable increase of product will warrant the expenditure. The importance of the first of the cautions here suggested is much increased by the fact that the habits of watered plants soon become so modified that a failure of the accustomed supply affects them more severely than almost any merely natural drought does unwatered plants. This modification may become hereditary, and therefore it is prudent to take it into account in employing imported seeds. On most of these points we may observe that European experience, though not to be neglected, is not by any means altogether a safe guide. The difference in soil and climate, in the usual objects of cultivation, and in the cost of labor, is so great between the two continents that we cannot confidently reason from one to the other. Before quitting this branch of our subject it is well to notice that in many localities, *circling* or horizontal side-hill ploughing, which is a cheap method of terracing sloping surfaces, answers most of the purposes of irrigation, and that water enough for crops may often be found by means of small reservoirs for retaining rain and snow water, common wells, cheap artesian borings, or short tunnels into hillsides, which intercept subterranean currents and bring them to the surface as springs.

With respect to the economical aspects of great systems of irrigation, it ought to be observed that unquestionable as are the financial advantages, and even necessity, of the practice in many climates, yet in regions where rural husbandry is possible without it European experience shows that in most cases of costly arrangements for this purpose, as indeed in very many industrial enterprises of other kinds, the original capital is entirely sunk, and a pecuniary return is reaped only by those who acquire the works at a price far below the original cost. Cattaneo, one of the ablest economists of this century, maintains, in reference to Lombardy, that the income from irrigated lands is not proportionate to the entire expenditure incurred in canals, the grading of the soil, and other necessary works, and thinks this observation applicable to Holland and other countries of advanced agriculture. (See Cattaneo, *Memorie di Economia Pubblica*, Milano, 1860, vol. i. pp. vi. 246; also Baird Smith, *Italian Irrigation*, vol. i. p. 297.)

*Quantity of Water and Method of Applying it.*—In Europe the quantity of water supplied during the season to ordinary ploughed or hoed field crops varies from twenty to

forty inches, though in the rice-fields, the *marciti* or water-meadows of Lombardy, and many other grass-grounds, this amount is vastly exceeded. Experience alone can determine the proper quantity and seasons on our soil and under our sky. The modes of application are by flowing with running, and flooding with partially stagnant water; by infiltration from superficial ditches or furrows, and more rarely from underground conduits; and by sprinkling with scoops or other light hand-implements. The evening hours are considered the most favorable time, but this rule is by no means universally observed.

*Legislative Action.*—The evils we have referred to under various heads are such that legislative measures ought to be taken without loss of time to obviate them as far as possible in the American States. We have space here to indicate but one which is of urgent necessity in all those parts of our territory where irrigation is necessary or probably highly advantageous; and another which is of even greater general importance. The first is the assumption by government of the absolute title to all natural waters of sufficient volume to possess any real importance as sources of supply, and the enactment of codes or the creation of special boards to control the construction of all hydraulic works and the distribution of water from them, including, of course, proper arrangements for disposing of the surplus water from irrigated lands. The second is the adoption of systems of forest economy which shall prevent the destruction and secure the permanence, and where necessary extension, of the woods around the sources and along the upper basins of the rivers.

*Literature of the Subject.* The theoretical and practical, juridical and economical literature of irrigation is immensely voluminous, and, cautiously used, of very great value. We have no space for criticism, but we recommend either as easily accessible or as specially important to the American public the following works: Romagnosi, *Trattato della Ragione Civile delle Acque* (Firenze, 1834, 8vo); Romagnosi, *Della Condotta delle Acque* (Firenze, 1833, 2 vols. 8vo); Calandra, *Manuale Idraulico legale* (Savigliano, 1870, 12mo); Negri, *Idée Elementari per una Legge in Materia delle Acque* (Turin, 1864, pamphlet); Niel, *L'Agriculture des États Sardes* (Turin, 1856, 8vo); Vigan, *Étude sur les Irrigations des Pyrénées Orientales* (Paris, 1867, pamphlet); Cuppari, *Manuale dell'Agricoltore* (Firenze, 1870, 12mo); Bous-singault, *Economie Rurale* (Paris, 1851, 2 vols. 8vo); Hervé Mangon, *Expériences sur l'Emploi des Eaux dans les Irrigations* (Paris, 1869, 8vo); Cosimo Ridolfi, *Lezioni Orali di Agronomia* (Firenze, 1869, 2 vols. 8vo); Baird-Smith, *Italian Irrigation* (London, 1855, 2 vols. 8vo, and atlas); A. Vignotti, *Des Irrigations du Piémont et de la Lombardie* (Paris, 1863, pamphlet); G. Tagliascocchi, *Canali dell'Alta Lombardia* (Milano, 1872, 8vo); Duponchel, *Traité d'Hydraulique et de Géologie Agricoles* (Paris, 1868, 8vo); Millet, *Les Merveilles des Fleuves et des Ruissaux* (Paris, 1871, 12mo); Denton, *Water-Supply for Farms* (London, 1865, pamphlet); Dumas, *La Science des Fontaines* (Paris, 1857, 8vo); Marsh, *Man and Nature* (new edition, New York, 1874, 8vo), and *Letter to Commissioners of Agriculture on Irrigation* (Washington, 1873, pamphlet); Beardmore, *Manual of Hydrology* (London, 1862, 8vo); Dumont, *Des Travaux Publics dans leurs Rapports avec l'Agriculture* (Paris, 1848, 8vo); Passy, *Étude sur le Service Hydraulique* (Paris, 1868, 8vo); Joubert de Passy, *Poppe en Espagne* (Paris, 1819); Aymard, *Irrigations du Midi de l'Espagne* (Paris, 1864, 8vo, and atlas); C. R. Markham, *On Spanish Irrigation* (London, 8vo), and works there cited. The works of Nadauld de Buffon on irrigation and general agriculture are all of great value, and the numerous papers on this subject by the eminent Italian engineer Lombardini, chiefly published in scientific periodicals, are indispensable to a knowledge of the hydraulic system of Upper Italy, which is unrivalled in scientific merit and practical value. GEORGE P. MANSU.

**Irrigation, Practical.** Irrigating canals are usually derived from rivers. The water is raised to the required level by a weir or dam thrown across the river, and the head of the canal is placed above the dam. In the deltas of rivers, where the ground to be irrigated is little if at all above the level of the water in adjacent portions of the rivers, the problem is solved much more simply, and at a much lessened expense, than in the general case where the river flows along the lowest line of the valleys, and where the adjacent lands rise from the river banks on either side. In this latter case it is necessary to fix the head of the canal at a considerable distance above the land to be irrigated, and consequently a line of canal more or less in length, often making many miles, must be made to bring the water out on the level of the ground. For illustration, let us suppose that the water in the river at the head of the canal is raised by a dam to a level 10 feet below the banks. Give a slope to the bed of the canal of 1 foot per



mile, and assume that the country slopes along the line at a rate of 5 feet per mile; then for each mile the canal-water will gain a relative elevation of four feet, and it follows that the water-level in the canal will emerge from the excavation at a distance of 2½ miles from the head. On the other hand, in deltas the ground falls from the banks on either side, and a command of the land is quickly gained. If this upper and, so to speak, unprofitable section of the canal passes through a broken country, the difficulty and expense of construction are largely increased. In India we find illustrations of both systems. In the Madras provinces the deltas of the Cauvery, Godavery, and Kistnah rivers afford instances of the most successful irrigation at a small outlay, while the Ganges and other large canals in the uplands of Northern India abundantly prove the greater difficulties in their several cases.

In the projection of an irrigating canal intended to water a given area, the first point which presents itself is this—namely, How much water will be required per acre? The answer to this question results from a consideration of a number of circumstances. It will depend upon the amount of rainfall in the irrigated district, and upon its distribution, both as to quantity and as to time; upon the temperature in the growing season; the kind of cultivation, whether of rice, cotton, sugar, cereals, or of vegetables; and finally upon the character of the soil, whether retentive of moisture or sandy and easily drained. Again, if the climate permits cultivation throughout the year, and the water-supply is perennial, irrigation may be continuous, and a part of the land may be devoted to one kind of cultivation in the winter, and the remainder to a different cultivation in the summer. One cubic foot of water supplied each second for twenty-four hours will cover 4 acres with a trifle less than 6 inches of water, and supplied for 100 days, it will cover 400 acres with 6 inches, or 200 acres with 12 inches of water. A cubic foot of water per second throughout the season is sufficient to mature rice in quantities varying from 30 acres to as much as 90 acres: this last case existing in districts of India exposed to heavy falls of rain. In Northern India, where the rivers are fed from the snow-reservoirs, and where there is a heavy fall of rain, with a winter and a summer cultivation, the average area irrigated in some cases rises to 400 acres per cubic foot a second. In most cases, however, it does not much exceed 200 acres per foot. This is for other cultivation than rice, and principally relates to cereals. In California 12 inches of rain, with timely application, suffice to ensure a crop of cereals.

In proportioning the water-supply to the irrigable area, it is usual to make a large allowance for the ground which in a particular season will lie fallow, and for that which will be taken up by roads, fences, forests, and buildings. Having determined, after full consideration, the capacity of the canal, which should exceed by 15 or 20 per cent. the estimate for irrigation, in order to make up for loss by absorption, evaporation, and waste, we may proceed to determine its dimensions and the slope of its bed. Many irrigating canals are arranged for navigation. New conditions, more or less incompatible with those pertaining to mere irrigating canals, are thereby introduced. The ideal canal for irrigation transports the water at the highest velocity which is admissible, for the reason that its section is thereby reduced. The mere navigation canal should have no velocity, as by absence thereof transportation is facilitated. The canal which shall subserve both ends must carry its water at a low velocity to permit navigation, and it must have an increased section to enable it to transport the required volume of water for irrigation. There are cases where the slope of the country compels a low grade for the bed of the canal, and there are soils which will not maintain themselves under any but a very low velocity. In such particular cases the conflicting conditions of irrigation and of navigation are measurably harmonized. The relations existing between the slope of the bed, the mean velocity, and the section are conveniently expressed in this formula, which is sufficiently accurate for the purposes to which it is

applied:  $v = \frac{92}{100} \sqrt{1.48 s}$ , in which  $v$  is the mean velocity

in feet per second;  $s$  is the slope of the bed in feet per mile;  $d$  is variously termed the "hydraulic radius" or "the hydraulic mean depth," and it is obtained by dividing the area of the section of the water-way, expressed in square feet, by the wetted perimeter expressed in linear feet. The velocity of the water ought not to be so great as to cause erosion of the bed and banks of the canal, and it ought to be great enough to prevent the growth of water-plants, which interfere with the service of the canal. A stiff clay soil will stand under a mean velocity of as much as 4 feet per second, and where the bed is of shingle, a higher velocity may be permitted with safety. In a light

sandy soil 3 feet per second is a maximum velocity, and in some particular soils disturbance of the bed and banks takes place with a considerable lower velocity. In a hot climate a velocity of 2 feet per second is necessary to prevent the growth of plants in the water-way. If the water derived from the river is laden with earthy particles in suspension, as is often the case, deposits will occur unless the initial velocity is maintained. If the silt is of a fertilizing character, it is desirable that it be transported to the cultivated fields in order to sustain their productiveness. When it is deposited along the line of the canal, periodical closures become necessary to effect clearance, which is attended in many cases with great expense. In order to carry the silt to the fields, it will be necessary to increase the fall of the ditches as their section is diminished. Something is gained by transporting the matter beyond the main channel to the minor ditches, where its clearance will not require the canal to be closed, and from which it can be removed at a lessened expense. In some cases the velocity near the head is slackened by diminishing the slope or by enlarging the section, so that the deposits may be encouraged at this particular section, where the clearance can be more conveniently effected than it would be if the silt is deposited along a larger line.

The English engineers in India have adopted a rule which governs the proportion of width and depth of the canals, the width being made to vary from thirteen to fifteen times the depth. The slope of the bed is variable, depending on the fall of the country and on the character of the soil. The ruling gradient on the Ganges Canal is 15 inches to the mile; in many canals it is less. For illustration, it may be stated that by the formula a fall of 1 foot per mile will give in a canal 90 feet wide at bottom, 6 feet deep, with side-slopes of 2 base to 1 altitude, a mean velocity of 3 feet per second. If the slope of the bed is less than the fall of the country, it will be necessary to provide a series of falls, which may be arranged with dams giving a direct fall, or by rapids. The slope of the bed and the dimensions of the canal will generally be determined, so as to conform to the fall and character of the land traversed, by assuming the quantities which enter the formula in a succession of trial-cases. In this way a close approximation may be made. The alignment of the canal will be most favorable when it can be placed on the watershed or divide. Such a position gives command of the land on either side, and avoids the passage of the drainage-lines of the country. This advantage, however, is one which can seldom be fully secured. It is generally necessary to cross some of these lines, and certain arrangements result which vary with the circumstances of the case. If the level of the canal at the point of crossing is higher than the stream, an aqueduct will be required to carry the canal-water, and in special cases of low lands adjoining the stream the canal must be embanked at one or at both ends of the aqueduct. Where the canal-level is below that of the stream, the latter may be carried over by an aqueduct, or the canal may be carried under the stream through a tunnel or a siphon. If a small stream crosses the line of the canal at a suitable level, it may be admitted into the canal; but if the stream is torrential in character, it may not be safe to admit its water into the canal. Regulating sluices will be necessary in this case to exclude the torrent from the canal, and a dam will be required to maintain the proper level at times when the stream is not full.

It will readily be understood that these several works may be very expensive in construction. The irrigation-works of Italy and India afford many instances in illustration of this statement. The Solani aqueduct is 920 feet in length, and it carries the Ganges Canal in two channels, each 85 feet in width and 10 feet deep. After crossing the stream the canal is carried in an earthen embankment of 16 feet in depth for three-fourths of a mile across the low lands. At or near the head of the canal a system of sluices or gates admits the water from the river in suitable quantities, and defends the canal from the attacks of the river when it is in flood. In the older canals these constructions are of masonry and of the most substantial character. It is also true that there are canals which have no head-works. In such instances the canal embankments are exposed to great dangers, and there are without these works no means of regulating the supply of water. The position of the head of the canal is a point of great importance. The banks of the river should at this point be of a permanent character, and the regimen of the stream should be well established and not liable to change. If the stream brings down sand or gravel, the bed will in time be filled to the level of the crest of the dam. In such cases it is usual to provide scouring-sluices in the part of the dam adjoining the canal, which may serve to keep a free water-way at the head-works. It is desirable to provide regulating bridges at intervals of a few miles, arranged with



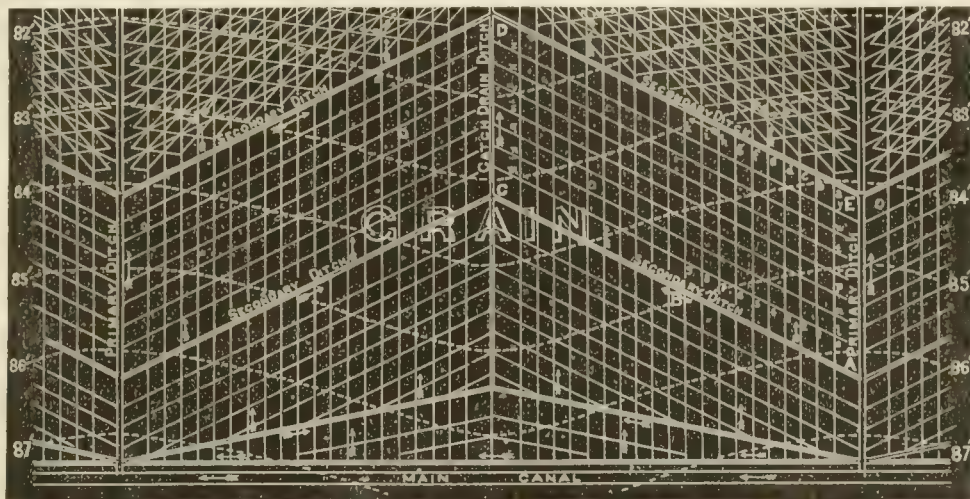
sluices, so that the water may be shut off from the canal in sections for purposes of repairs and for other purposes. At the same intervals escapes should be arranged, by which an excess of water occurring at any time may be thrown into the natural drainage-lines of the country.

The reproach of irrigation is defective drainage. The natural drainage of the country should remain unimpaired. Even when this much is accomplished, stagnant water is very liable to result from irrigating operations. The waste water at the end of the canal or in the minor channels should have free passage into the natural drains, or if none such exist, artificial drainage should be provided. Where

the canal is carried in embankments there is great danger of percolation, and hence stagnant pools may result. The cultivation of rice requires pools of water, and its unhealthfulness is everywhere recognized.

For economy of construction the canal should be partly within and partly above the soil, and for facility of irrigation this arrangement is equally desirable.

This sketch of the principles which must govern in the projection and construction of an irrigating canal brings us to the actual operations of spreading the water over the land. The diagram exhibits the system pursued in irrigating the plains of the San Joaquin Valley in California. It will



Irrigating system for grain, as laid out by the San Joaquin and King's River Irrigation Co., Cal.

be seen that the water passes from the main canal into primary ditches, from which it is delivered into secondary ditches, which in turn pass it into irrigating furrows, which are its immediate dispensers to the land; and finally, having done its duty, it is conveyed away by a drain to irrigate again below, or else it escapes into the natural drainage-lines. The main canal has a fall of 1 foot to the mile, while the fall of the primary ditches is 8 feet, and of the secondary ditches from 3 to 5 feet to the mile. The contour-lines of 1 foot difference of level are shown, and they indicate a surface nearly plane and extremely favorable for irrigation. The primary ditches in this case are one mile apart, and the secondary ditches are one-fourth of a mile apart. The irrigating furrows in the grain-field are parallel to the primary ditches, and the "checks" are represented by lines parallel to the secondary ditches. These checks are 50 yards apart, measured parallel to the primary ditches. The irrigating furrows are 40 yards apart. The primary ditches, when full, will carry 50 feet per second, and one primary ditch will supply three secondary ditches. The water passes from the secondary ditches to the furrows by boxes  $6 \times 10$  inches which pass through the bank. Each box will deliver  $1\frac{1}{2}$  cubic feet per second, and each secondary will supply 10 boxes. Each secondary ditch waters 80 acres, within which area there are about 5 miles of furrows and 4 miles of checks. There is a gate at the junction of each primary with the main canal, and one in each primary for every three secondaries, and one in the middle of each secondary; and each box is fitted with its little gate.

With this description we are prepared to trace the course of an irrigation. A C D E contains 80 acres, sown in grain. The gate in the secondary ditch at B being closed, and that at A being open, the first half of the secondary ditch will begin to be filled with water, which will run into the irrigating furrows 0 to 9, inclusive, and will flow until it encounters the dam made by the check *lm*, when it will rise and overflow the strip of land lying between the secondary ditch and the check *lm*. When this strip is sufficiently watered, the cultivator opens with a hoe a passage through the check *lm* for each furrow, and permits the water to flow in parallel courses until it is again checked at the line *nn* for a time sufficient to water the strip lying between the checks *lm* and *nn*; and this process is continued until the 40 acres lying next the primary ditch are completely irrigated. This done, the little gates 0 to 9 are closed, the gate at B is opened, and the same steps are pursued in irrigating the other half of the tract. In the alfalfa field the furrows are multiplied, to ensure a more equal diffusion of the water. In this case the ground falls 8 feet to the mile, and as the checks are 50 yards apart, the fall for this distance is  $2\frac{1}{10}$  inches. When the water is just even

with the upper line of one of these strips between two consecutive checks, it will be  $2\frac{1}{10}$  inches in depth along the lowest line of the strip. In this way a secondary ditch with a fall of five feet to the mile, and running full, will spread more than 4 inches of water over 80 acres in twenty-four hours.

It is plain that the successful irrigator must use a level to lay out his ditches, and it will be rare when so favorable a field for irrigation will be found as the one just illustrated. The ditches will rarely present so symmetrical an appearance. In the general case the system will prove to be much more complicated. The primaries, for instance, will follow the minor divides of the plain, and they will seldom be parallel or even rectilinear; and having to supply variable areas, the cross-sections will vary in each case. The variability of fall to the ditches, and their varying dimensions in a less favorable field, add so many complications that the work of an irrigator demands the acquirements of an engineer. An irrigation of grain usually consists of two or three inches of water, which is repeated as often as the needs of the crop require.

Irrigation has been little practised in the U. S., but it has had more development in the sections of America which were once under the dominion of Spain. Italy and Spain in Europe, Egypt and India, present extensive operations of this nature. The English have been extending irrigating facilities in India for the past few years on a grand scale. The arrangements of the native inhabitants, which have existed for centuries, are also extensive.\* They practised irrigation by natural flow of water, but they supplemented their supply of water by raising it from wells by means of various appliances. They made extensive use of reservoirs to collect the water when abundant, and to hold it until the season for its application to the land. The Madras provinces are dotted over with reservoirs in such numbers that the face of the country may be likened to the face of a person badly marked by smallpox. These reservoirs are found of all areas, from that of many miles to that of one or of a few acres. Each inequality of the ground which afforded any facility for storage was utilized, and it was surrounded by an earthen embankment. The water-supply was afforded from the natural drainage of the little basin, or, if this was insufficient, a channel was cut to conduct the flood-waters of the rivers to the store-houses. In the northern provinces of India the reservoirs are the fields of snow on the Himalayas.

It is claimed, with a show of reason, that the water derived from rivers is superior for irrigation to that afforded by tanks or reservoirs. When the water is stored in reser-

\*For brief account of which see *Engineering*, vol. xvii, and *Pan-Nestrand's Eng. Mag.*, July 1884.



voirs it deposits the fertilizing particles which it has carried in suspension, while the flowing water bears them, in part at least, to the fields, where they renew the productiveness of the soil. Water is generally sold in terms of the area irrigated and the kind of cultivation. There are many objections to this method. It is unequal, and it is wasteful. It pays a premium for careless irrigation. The absorptive capacity of the soil is not considered. The true plan is to dispose of water by the cubic foot. This plan is followed to a considerable extent in Italy. It requires special arrangements for measurement, and those that have been hitherto used are not entirely satisfactory. The Italian module or measuring apparatus keeps the head always the same by passing the water through a sluiceway into an interior basin, from which it proceeds to the irrigating channels. The gate being capable of adjustment, the water in the basin can always be kept at a constant level, no matter how the level in the channel from which it is derived may vary. As the level of the canal falls, the aperture of the gateway may be enlarged, and conversely a contraction of the orifice ought to follow an increase of head in the canal.

The increase of production which results from irrigation in warm climates, where the rainfall is insufficient to produce a crop, is quite sufficient to justify the large expenditure which is required to put the system into operation. It is estimated that the canals and primary ditches, including dams, head-works, and all necessary arrangements, excepting the secondary and other minor ditches, can be constructed on the plains of California for an expenditure which may vary from \$10 to \$20 per acre. It must be borne in mind, however, that the features of the country are in general extremely favorable, and that the gates, head-works, and other constructions are made of wood, and that they must be replaced from time to time. The minor ditches, it is estimated, may cost from \$5 to \$10 per acre, which makes the total probable outlay to vary between \$15 and \$30 per acre. The simplicity of the irrigating system which is practicable on the plains of California is in strong contrast to the intricacies which have been developed in Italy; but space is wanting for the development of these, and its practical value in our own country is doubtful. Reference is made to the list of authorities appended to the article which precedes this.

G. H. MENDELL.

**Irritants.** In medicine all such agents are called *irritant* as by contact with the animal tissues cause one or more of the following effects: pain, increased flow of blood to the part, inflammation, or active excitation of function, as increase of secretion by a gland, involuntary muscular contraction, etc. Such are, in general, mineral astringents; all substances chemically disorganizing to the tissues, as strong acids, alkalies, and caustic salts, like corrosive sublimate or silver nitrate, and certain vegetable substances, containing generally either an acrid resin or volatile oil, such as mustard, jalap, croton oil, oil of turpentine, squills, etc. Agents which excite the "irritability" of nerve-centres, like strychnine, are also sometimes called irritant. Irritants do not thus form a natural group of medicines, but the word "irritant" expresses a certain general property belonging in different modes to many distinct classes of medicinal agents.

EDWARD CURTIS.

**Ir'tish**, a river of Northern Asia, rises in the Altai Mountains, in lat. 47° N., lon. 89° E., flows in a north-western direction through the Chinese province of Songaria and the Russian governments of Tomsk and Tobolsk till it joins the Obi, after a course of about 1700 miles, 180 N. of the city of Tobolsk. Its upper course flows through the best agricultural districts of Siberia, but its navigation is much impeded by shoals and shifting sandbars. It abounds in fish, both salmon and sturgeon.

**Irvin**, tp. of Howard co., Ind. Pop. 1316.

**Ir'vine**, town of Scotland, in Ayrshire, on both sides of the Irvine, near its entrance in the Frith of Clyde. It has several educational institutions of high reputation, large shipbuilding docks, and some manufactures. Pop. 6866.

**Irvine**, post-v., cap. of Estill co., Ky., 70 miles S. E. of Frankfort, and on the Kentucky River. It has 1 weekly newspaper. Pop. 224.

**Irvine** (WILLIAM), b. at Fermagh, Ireland, Nov. 3, 1741; studied at Dublin University, and became surgeon of a British ship of war during the French war, after which he came to America, and settled at Carlisle, Pa. He was a member of the provincial convention of Pennsylvania in 1774; was appointed colonel of the 6th battalion of the Pennsylvania line in Jan., 1776; was taken prisoner at Three Rivers, Canada, in June of that year, and paroled, but not exchanged until May, 1778. He was a member of the court-martial for the trial of Gen. Charles Lee in July, 1778; appointed brigadier-general in May, 1779;

served in New Jersey and at the battle of Bull's Ferry under Wayne. In 1781 he took command of the defences of the N. W. frontier, with headquarters at Fort Pitt; was State commissioner for the distribution of public lands to the soldiers 1785; member of old Congress 1786-88, and of Federal Congress 1793-95; took part in the campaign against the insurgents in the "Whiskey Insurrection" in 1794; superintendent of military stores at Philadelphia 1801, and president of the State Society of the Cincinnati at the time of his death, which occurred at Philadelphia July 29, 1804.

**Ir'vineton** (IRVINE P. O.), post-v. of Brokenstraw tp., Warren co., Pa., on the Allegheny River, at the junction of the Dunkirk Allegheny Valley and Pittsburg, the Oil Creek and Allegheny River, and the Philadelphia and Erie R. Rs., 51 miles from Oil City. The Brokenstraw Creek affords fine water-power. There is a foundry, a woollen-factory, an oil-refinery, and other manufacturing enterprises, and an excellent sulphur spring.

**Ir'ving**, post-v. and tp. of Montgomery co., Ill., on the Indianapolis and St. Louis R. R., 72 miles N. E. of St. Louis. Pop. 751; of tp. 1591.

**Irving**, post-v. of Marshall co., Kan., on the Central branch of the Union Pacific R. R., 90 miles W. of Atchison. It is finely situated, and is the seat of Wetmore Institute (Presbyterian).

**Irving**, tp. of Barry co., Mich. Pop. 1248.

**Irving**, tp. of Monongalia co., Minn. Pop. 276.

**Irving**, post-v. of Hanover tp., Chautauqua co., N. Y., on the Lake Shore R. R., 29 miles S. W. of Buffalo, and on Cattaraugus Creek near Lake Erie. The mouth of the creek constitutes its harbor. Pop. 355.

**Irving**, post-tp. of Jackson co., Wis. Pop. 828.

**Irving** (EDWARD). See IRVINGITES.

**Irving** (PETER), M. D., b. in New York City Oct. 30, 1771; studied medicine, but never practised; founded in 1802 the *Morning Chronicle*, a Democratic paper which advocated the presidential candidacy of Aaron Burr; travelled in Europe 1806-08; aided his brother Washington in the earliest part of the *Knickerbocker*; resided in Europe 1809-36; published a novel, *Giovanni Shogarro* (New York, 1820), and d. at New York June 27, 1838.

**Irving** (REV. THEODORE), LL.D., nephew of Washington Irving, b. in New York in 1809, and graduated at Columbia College 1837; studied law and literature in Europe; was professor of history and belles lettres in Geneva College 1836-39, and afterwards held a similar professorship in the New York Free Academy; in 1854 took orders in the Protestant Episcopal Church. Author of *The Conquest of Florida* (1835) and *The Fountain of Living Waters* (1854).

**Irving** (WASHINGTON), LL.D., b. in New York City Apr. 3, 1783, was the youngest son of William Irving, merchant, a native of Scotland, who had married an English lady and emigrated to America some twenty years before. His older brothers, William and Peter, were partially occupied with literary pursuits, which naturally inclined him to follow their example. His school education was not protracted beyond his sixteenth year, when he began to study law, but his literary training was acquired by the diligent perusal at home of the older English writers, his favorites being Chaucer and Spenser. In 1802, at the age of nineteen, he made his first literary venture by printing in the columns of the *Morning Chronicle*, then edited by his brother, Dr. Peter Irving, a series of local sketches under the nom-de-plume of "Jonathan Oldstyle." In 1804, being threatened with consumption, he sailed for Europe, landed at Bordeaux, and travelled through France, Italy, Switzerland, Holland, and England, laying up a rich store of materials for future use. Returning to New York in Mar., 1806, he quickly completed his legal studies, and was admitted to the bar, but never practised the profession. Early in 1807 he commenced, in connection with his brother William and James K. Paulding, the amusing serial *Salmaquindi*, which had an immediate success, and not only decided his future career, but long determined the character of his writings. In 1808, with some assistance from his brother Peter, he wrote *Knickerbocker's History of New York*, a serio-comic narrative, and in 1810 a biography of the poet Campbell, prefixed to an American edition of his works. His attention was much absorbed at this time by the interests of a mercantile business in which he engaged with two of his brothers. It was not until 1813-14 that he reappeared in literature as editor of the *Analectic Magazine*, published at Philadelphia, for which his own contribution was a series of biographical sketches of the naval heroes of the then existing war with Great Britain. In the latter year he was appointed aide-de-camp and military secretary of Gov.



Tompkins, with the rank of colonel—a title, however, which he never used. Early in 1810, upon the conclusion of the war with Great Britain, "Colonel" Irving hastened to make another tour in England, Wales, and Scotland, expecting also to visit the Continent; the anticipated pleasure-trip proved to be an absence of seventeen years from America. For two or three years Irving was engaged in rambling through the United Kingdom, without other object than pleasure, making, however, many literary friends, and accumulating that minute acquaintance with English life which he afterwards turned to so good account. About the close of 1817 the commercial house in which Irving was a partner failed, and he was thrown upon his pen for a subsistence. He sent the essays composing the *Sketch-Book* to New York, where they were printed in pamphlets in 1818, over the signature of "Geoffrey Crayon." Some of them were reprinted by Jerdan in the *Literary Gazette* of London, and were so cordially received that, aided by the recommendation of Sir Walter Scott, the publisher Murray brought out the work in good style in 1820. The *Sketch-Book* laid the foundation of the fortune and the permanent fame of Irving; the legends of *Steeple-Hollow* and *Rip Van Winkle* at once took rank as modern classics, while the pictures of English life and customs were so genial, artistic, and withal so faithful, that they fairly took the reading world by storm. A new phenomenon had appeared in the world of letters—the first American author had gained an honorable name in Albemarle street and Paternoster Row. Henceforth the path of Irving was smooth, and his subsequent writings appeared with rapidity. *Bracebridge Hall* was published in 1822; though rapidly written, and decidedly unequal to the standard of the *Sketch-Book*, it was well received, and brought the author £1000. The *Tales of a Traveller*, published in 1824, brought him £1500. Irving had spent three winters on the Continent, chiefly at Paris and Dresden, when in 1825 his attention was called by his friend Alexander H. Everett, American minister to Spain, to Navarrete's collection of documents upon Columbus and the early explorers of America, then appearing at Madrid. He proceeded to that capital, intending to make a translation of the work of Navarrete, but finding it to be rather a rich mine of materials than a readable book, he fortunately changed his plan and produced his *History of the Life and Voyages of Christopher Columbus* (1828), to which was added (1831) its continuation, the *Companion of Columbus*. The former work is Irving's masterpiece in historical composition; though not exhaustive in its use of the materials at hand, nor characterized by any acute appreciation of the mental, moral, and political world in which Columbus was reared, the work has all the charm of a romance combined with the fidelity of a chronicle. Its reception in England may be inferred from the facts that Murray paid £3000 guineas for the copyright, and a gold medal of fifty guineas was awarded him as a prize given by King George IV. for excellence in historical composition. In 1828–29 Irving travelled through the S. of Spain, and spent three months in the ruined Moorish palace of the Alhambra at Granada. In the latter year he published the *Conquest of Granada*, and in 1832 *The Alhambra*, neither of which was quite as successful as his former works. Irving returned in July, 1829, to London, having received the appointment of secretary of legation in England. In 1831 the University of Oxford conferred upon him the degree of LL.D. In 1832, after seventeen years' absence, he returned to his native land, where all his books had of course been republished, and where to his European fame was added the American element of pride in an author who had done honor to his native land. Irving was now fifty years of age, but he plunged at once into a new series of travels and studies with all the eagerness of youth. The same year he accompanied Commissioner Ellsworth in his journey for removing the Indian tribes to the W. of the Mississippi, and narrated his observations in his *Tour on the Prairies* (1835), published in the series called the *Crayon Miscellany*; to which were added in another volume *Abbotsford and Norstead Abbey*. In 1836 he published *Astoria*, a narrative of the exploration of Oregon by American fur-traders; in 1837, the *Adventures of Captain Bonneville*; and in 1839–41 contributed to the *Knickerbocker Magazine* a series of articles afterwards published (1840) in the volume entitled *Wolferen's Raunt*. In 1842, Irving received the appointment of minister to Spain, a post which he filled for four years, during which he discontinued authorship, and it was not until 1849 that he reprinted with large additions a biography of Oliver Goldsmith, furnished some years before to a Paris edition of that author's writings. In 1850 he published *Mahomet and his Successors* (2 vols.). He was thenceforth occupied throughout his life in his magnum opus, the *Life of Washington*, of which the first volume appeared in 1855, and the fifth, concluding the work, in Aug., 1859. In 1848, at the instance of the en-

terprising publisher, Mr. G. P. Putnam, Irving had commenced the reissue of his works, with his final corrections, the edition being completed in 1850 in fifteen volumes. The success of this undertaking was instantaneous, and it gave Irving a new lease of literary existence, not less than 250,000 volumes of the republication having been sold during Irving's life. No one was more surprised at this marvellous renewal of old-time popularity than the author himself, who had become in a measure his own literary descendant and the contemporary of a second generation of writers. Irving resided during the closing years of his life at Sunnyside (Tarrytown) on the Hudson, a quaint pre-Revolutionary edifice, which has become one of the shrines of American pilgrimage; here, surrounded by friends, and enjoying the society of a brother, of nephews, and nieces, he passed an active and honored age until his death, Nov. 28, 1859. Washington Irving was never married; an early bereavement was mourned by him through life, and the memory of his betrothed was present on his deathbed. Of the characteristic excellences of style which made Washington Irving the most popular of American authors it would be superfluous here to speak. Though his literary activity was exercised rather in England than in America, and many of his subjects were European, his deserved success is a matter of pride to his countrymen, who will not allow his graceful productions to fall into oblivion.

PORTER C. BLISS.

**Irving** (WILLIAM, b. in New York City Aug. 15, 1766, was brother of Washington Irving; became an Indian trader, residing at Johnstown and Caughnawaga on the Mohawk from 1787 to 1791. In 1793 he married a sister of James K. Paulding, and settled in New York as a merchant, where his extensive observation of the world, combined with geniality and wit, made his house a centre for the best literary circle of the metropolis. His poetical and other contributions to *Salmagundi* would, if separately published, have given him a distinct place among American humorous writers, but he seemed entirely unambitious of literary fame. He was a member of Congress 1813–19, when he resigned on account of ill health. D. at New York Nov. 9, 1821.

**Irvingites**, members of the communion which is called by its adherents the Catholic Apostolic Church. The name "Irvingites" was first given in 1831 to those who shared the opinions of the Rev. Edward Irving, who was b. at Annan, Dumfriesshire, Aug. 4, 1792, and educated at Edinburgh University for the Scottish Presbyterian ministry. He obtained no church employment until 1819, when he was chosen assistant by the celebrated Dr. Chalmers. Three years later he accepted a call from a Presbyterian congregation in London, where his eloquence, modelled on the writings of Hooker, Bacon, and Jeremy Taylor, attracted crowds of hearers. At that time there was a general religious revival, a remarkable reaction from the religious apathy into which Christendom had gradually fallen after the excitement of the Reformation had died out. Most of the great missionary societies were then founded; ministers of all sects spoke with new earnestness; the Bible was more eagerly read, special attention being given to its prophetic passages. Among students of prophecy Edward Irving was distinguished. In 1825 he published *Babylon and Infidelity Foredoomed*, and in the following year his translation from the Spanish of *The Coming of the Messiah in Glory and Majesty*, written by Manuel Lacunza under the pseudonym of Ben Ezra. In 1828, Irving began to preach the entire humanity of Christ. Our Lord, he declared, took upon himself the body of man as it became after the fall—mortal, corruptible, capable of sin, from which he was kept only by the power of the Holy Spirit dwelling in him. This assertion, which Irving himself regarded not as a new thing, but as the ancient and natural belief of all Christians, provoked many answers and refutations, and caused some stir in the Presbyterian Church. In 1830, Mary Campbell, a young Scotchwoman who had been earnestly praying for the gift of the Holy Ghost, began to prophesy and to speak with fervor in an "unknown tongue." The same phenomenon became manifest in other persons, and in 1831 appeared in some members of Irving's congregation. Irving, at first doubtful as to the origin of these "gifts," soon owned them to be from God, allowed their exercise in his church, and wrote and spoke in their defence. The prophecies, which to us who now dispassionately read them appear nowise remarkable, were in English. The "tongue," which those who uttered it supposed for a while to be the living speech of some far-off country, was pronounced by philologists to be totally unlike any known language. That opinion was speedily adopted even by believers, who came to regard the "tongue" as a supernatural sign of divine power, known in the primitive Church; and spoken of by Paul in his First Epistle to the



Corinthians (xiv. 2). In 1832, Irving, being accused of heresy, was tried by the presbytery of the Scottish Church in London, declared unfit for the ministry, and dismissed from the charge of his congregation. But some of its members still adhered to him, and with them he removed to Newman street, where a room, formerly the studio of Benjamin West, was fitted up as a chapel. There a new ritual was gradually arranged and a new ministry was formed. In 1833, Irving was again tried, this time by the Scottish presbytery at Annan, and was finally cast out from the Presbyterian Church. Shortly afterwards the apostles of the Newman street congregation reordained him as angel or pastor of that church, and there he officiated until a little while before his death at Glasgow Dec. 8, 1854. He was buried in Glasgow cathedral.

The new community continued to prosper. In London alone it soon numbered seven congregations, among which were many persons of wealth and position, and in 1853 the magnificent church in Gordon Square was opened with much religious ceremony. The Catholic Apostolic Church rejects the name "Irvingite," and denies that Irving was its founder, declaring also that it is wrong to call a church after any leader, however excellent. Its special mission, says one of its pastors with whom the writer has corresponded on this subject, is "the gathering and perfecting in one in Christ, the whole body of God's election, living and dead, out of all nations, to reign with Christ in the world to come." It has a fourfold ministry—apostles, prophets, evangelists, and angels or pastors. The apostles, twelve in number, form the chief ruling power, and are appointed to no special churches, but watch over all. They ordain persons called to the ministry, and lay their hands on the people for the purpose of conferring the gifts of the Holy Ghost. Through the prophets God is believed to declare his will to the Church. The evangelists, as the name implies, preach the Gospel of Christ and declare his speedy coming. An angel or pastor is set over each church, and with him are associated elders, prophets, and evangelists, who aid him in governing and ministering to the congregation. There are also deacons, sub-deacons, and deaconesses, chosen by the people. The communion is administered every Lord's day, and also during the week. In large congregations the first and last hours of each day (counting from 6 A. M. to 6 P. M.) are set apart for public worship, and at these services a liturgy is used, taken from the Greek, Roman, and Anglican rituals. But there are also frequent meetings for extempore prayer, when women, and even children, are allowed to speak. Confession, as a means of relieving the mind, is encouraged, but is not obligatory. Sick persons are anointed with oil (James v. 14), but the motive of this ceremony is entirely different from that of "extreme unction," with which some writers have identified it. A lamp, regarded as symbolical of the Divine Presence, is kept always burning before the altar. Incense, candles, and rich vestments are used, also with a symbolical meaning. Each member of the Catholic Apostolic Church devotes to it one-tenth of his income, besides occasional gifts. It has in London seven churches, with several thousand communicants, and others in various parts of the United Kingdom; also in many European countries, the British colonies, and the U. S. The writer has applied to the head of a Catholic Apostolic congregation in London for exact information as to the aggregate number of communicants, but from his reply it appears that no general statistics have been published, though "each angel knows the number of his own flock, and the apostles have full information of everything." (See *The Life of Edward Irving*, by Mrs. Oliphant (2 vols., London, 1862, 8vo); *The Original Constitution of the Church and its Restoration*, by Rev. Jubel Hodges (London, 1864, 8vo); *The Catholic Apostolic Church*, by Rev. W. W. Andrews (London, 1867, 8vo); *Edward Irving and the Catholic Apostolic Church*, by Rev. J. S. Davenport (New York, 1870, 8vo). JANEY TUCKER.

**Ir'vington**, post-tp. of Kossuth co., Ia. Pop. 605.

**Irvington**, post-v. of Clinton tp., Essex co., N. J., on the Passaic Valley and Peapack R. R., 3 miles W. by S. of Newark.

**Irvington**, post-v. of Greenburg tp., Westchester co., N. Y., on the Hudson River and the Hudson River R. R., 22 miles N. of New York, and nearly opposite Piermont. The residence of the late Washington Irving was in the immediate vicinity.

**Ir'win**, county of S. Central Georgia. Area, 700 square miles. It is level and sandy, and chiefly covered with pine forests. Some wool and grain are produced, but only a very small part of the land is under cultivation. Cap. Irwinville. Pop. 1837.

**Irwin**, tp. of Brown co., Kan. Pop. 2300.

**Irwin**, tp. of Venango co., Pa. Pop. 1489.

**Irwin**, a b. of Westmoreland co., Pa., in North Huntingdon tp., on the Pennsylvania R. R. (IRWIN'S STATION P. O.). Pop. 833.

**Irwin** (JARED), b. in Mecklenburg co., N. C., in 1750; moved with his parents when a boy to Burke co., Ga.; took an active part in the cause of independence during the Revolutionary war; was a member of the first legislature of Georgia after independence was achieved; was a member of the State convention which ratified the Constitution of the U. S. of 1787; was governor of the State 1790-98, and again 1806-09. He was president of the State convention that formed the constitution of 1798. It was his honor as governor in 1796 to sign the act abrogating the famous Yazoo fraud, which had been perpetrated by a previous corrupt legislature. D. at Union Hill, Washington co., Ga., Mar. 1, 1818. A monument to his memory stands in the court-house square at Sandersville, Ga.

A. H. STEPHENS.

**Irwin** (JOHN), U. S. N., b. Apr. 15, 1832, in Pennsylvania; entered the navy as a midshipman Sept. 9, 1847; became a passed midshipman in 1853, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866. Served in the U. S. frigate Wabash at the battle of Port Royal, and with a detachment of officers and seamen of that vessel took part in the bombardment and capture of Fort Pulaski. Highly commended for "earnestness and bravery." FOXHALL A. PARKER.

**Ir'winton**, post-v., cap. of Wilkinson co., Ga., 3 miles from McIntyre, a station on the Central R. R. Pop. 211.

**Ir'winville**, post-v., cap. of Irwin co., Ga., 35 miles S. W. from Chauncey (or Easton), a station on the Macon and Brunswick R. R.

**Is** [Gr. *Is*, now *Hit*], an important city of ancient Babylonia, eight days' journey N. of Babylon, on the W. bank of the Euphrates. The name signifies *bitumen*, and that material was carried thence to Babylon for building purposes. The site has been identified by cuneiform inscriptions.

**I'saac** [Heb., "laughter"], the only son of the Hebrew patriarch Abraham by Sarah his wife, b. (2063 B. C.) in the extreme old age of both his parents, in fulfillment of the divine promise. For his sake Ishmael, his half-brother, was thrust out into the wilderness with Hagar, his mother, a bondswoman or slave. Later, the lad Isaac was offered by his father as a sacrifice on Mount Moriah, in obedience to the divine command, but Isaac's life was spared in consequence of a heavenly interposition. When forty years of age Isaac married Rebekah, his kinswoman (2023 B. C.), who bore him twin sons, Esau (or Edom) and Jacob (afterwards called Israel). The former was the first-born and the favorite of his father, but Jacob, by the aid of his mother, obtained the birthright. Isaac d. at Hebron (1883 B. C.), aged 180 years. He was a man of gentle nature, a nomadic herdsman of devout and blameless life.

**Isaac I., Comnenus**, a Byzantine emperor, descended from the family of Comnenus, but was educated by the emperor Basil II., and raised to the throne in 1057 by a conspiracy. Being prostrated by a violent fever, he abdicated in 1059, retired to a monastery, and d. there in 1061.

**Isaac II., Angelus**, a Byzantine emperor, descended from the family of Comnenus, and was raised to the throne by a revolution in 1185. In 1195 his brother, Alexis III., compelled him to abdicate and deprived him of his sight, but in 1203 the crusaders once more placed him on the imperial throne, whence he again was driven in 1204 by Alexis Duca, who put him to death.

**I'saac** (DANIEL), b. at Caythorpe, Lincolnshire, Eng., July 7, 1778; joined the Wesleyan conference in 1800, and d. Mar. 31, 1834. He was noted as a controversialist, being called "the polemic Daniel," and published many volumes, chiefly on theology. His collected works were issued in London in 3 vols., 1828.

**I'saac Levi'ta**, b. at Wetzlar, Germany, in 1515; became one of the most celebrated Jewish rabbis of his time, but with his son joined the Roman Catholic Church in 1546; became professor of Hebrew and Chaldee at Louvain, and in 1551 took the corresponding chair at Cologne. Author of *De locis Veritatis Hebrææ Sacramenta Scripturarum* (1558), *Introduction to the Hebrew Grammar* (1558), *Meditationes Hebrææ in artem grammaticam* (1558), and other excellent grammatical and philological works, besides translations, etc. After conversion he took the name of John Isaac Levi. The time of his death is not known.

**I'sabel**, tp. of Fulton co., Ill. Pop. 715.

**Isabel'la**, port on the N. coast of Santo Domingo, 36 miles W. N. W. of Santiago. It was so called by Columbus, who in 1493 established here the first European settlement in the New World, some ruins of which are still visible.



**Isabel'la**, county of the N. central portion of the southern peninsula of Michigan. Area, 576 square miles. It is generally level and well timbered. Grain and potatoes are staple products. Cap. Mt. Pleasant. Pop. 1113.

**Isabella**, post v., cap. of Worth co., Ga., on the Brunswick and Albany R. R., 18 miles E. of Albany. Pop. 34.

**Isabella**, tp. of Isabella co., Mich. Pop. 66.

**Isabella I.**, the Catholic (Sp. *Isab. I.*), b. at Madrigal, Old Castile, Apr. 22, 1461, daughter of John II., king of Castile, by his second queen, Isabella of Portugal, and sister to Henry IV., who succeeded to the throne in 1461, when she was but three years of age. She was brought up by her mother in the obscure village of Arévalo, receiving an education largely tinged with the ascetic bigotry of the age. The insurrection which broke out in 1464 against Henry, alleging the illegitimacy of his infant daughter Juana, called "la Beltraneja," from the name of her supposed father, and raising to the throne (1465) his brother Alfonso, first gave political importance to the person of Isabella as a not improbable heir to both her rival brothers. On the death of Alfonso in 1468, Henry regained the throne, but experienced armed resistance from the former partisans of Alfonso, who offered to proclaim Isabella queen. She refused the proposal, but consented to allege her claims to the succession against those of the infant princess, and the civil war was terminated, with the sanction of the Cortes, by Henry's promise to repudiate his queen and her offspring, and recognition of Isabella as immediate heir. During this troubled interval intrigues had been rife for the disposal of Isabella's hand, which had first of all been unsuccessfully sought for Ferdinand of Aragon, her destined husband. At the age of eleven she had been betrothed to Prince Carlos of Aragon (brother of Ferdinand), who soon died by poison, and two years later Henry had promised her hand to Alfonso of Portugal. Isabella having energetically refused to sanction this agreement, Henry next endeavored to compel her to marry the marquis of Villena (who d. in 1468), and after the peace of 1468 returned to his earlier project in behalf of the Portuguese prince. While these intrigues were going on overtures had been made directly to Isabella herself by her cousin Ferdinand of Aragon, which she accepted in spite of her brother's threats of imprisonment. The articles of settlement were signed at Cervera (Jan. 7, 1469), guarantying to Isabella the exercise of her sovereign rights in Castile. Henry endeavored to seize upon his sister's person, but she took refuge in Valladolid, under the protection of her staunch and powerful partisans, the admiral of Castile and the archbishop of Toledo, primate of Castile. This prelate, in order to expedite the union, produced a papal dispensation from the impediment of consanguinity (which ultimately proved to have been fabricated by him), and Ferdinand, traversing Northern Castile in disguise, was married to Isabella at Valladolid Oct. 19, 1469. Henry, enraged at this resistance to his mandates, declared that by marrying against his consent Isabella had forfeited her rights, again proclaimed his infant daughter heir to the throne, taking, along with the queen, an oath to her legitimacy, and betrothed the *infanta* to a French prince, the duke of Guienne, brother of Louis XI. The partisans of Isabella in Northern Castile stoutly maintained her claims, and in 1473, Henry again found himself obliged, for his own security, to negotiate with his sister. They were publicly reconciled at Segovia amid great rejoicings, and Henry dying soon after, Isabella was proclaimed queen of Castile Dec. 13, 1474. Most of the nobility at once recognized her, but a few, aided by Alfonso of Portugal, asserted by arms the claims of the *infanta* Juana, now betrothed to that prince. Isabella took an active part in this war, encouraging her troops by her presence and by an unwearied attention to their needs; it was not until 1479 that this source of disquietude was removed by a treaty of peace, in accordance with which Juana, then seventeen years of age, who had retired to Portugal, took the veil at Coimbra, where she survived until 1530. Meanwhile the prince-consort, who had received the honorary title of king of Castile, succeeded to the throne of Aragon as Ferdinand V. in Jan., 1479, thus effecting a virtual union between the two principal states of the Iberian peninsula, which was consolidated in the succeeding reign of Charles V., and laid the foundation of modern Spanish history. One of the earliest acts of the reign of Isabella was the establishment of the Inquisition in Castile (Jan. 2, 1481); in the same year commenced that final warfare with the Moors of Granada which only ended ten years later by the extinction of their sovereignty in 1492. On this occasion Ferdinand and Isabella received from the pope the title of "Catholic sovereigns," by which they are distinctively known in history. The honors of the Moorish war belonged of right chiefly to Isabella, who had personally directed the operations, submitting for years

to all the inconveniences of campaign life. Besides the establishment of the Inquisition, another dark stain rests upon the memory of Isabella—the expulsion of the Jews from Castile; both acts may be palliated, but not justified, by the prevailing bigotry of the times and the pressure of the papal court. Isabella's chief title to fame rests upon the well-known part she took in promoting the great project of Columbus, and in the New World, at least, her memory will be immortal. She was beautiful in person, of pleasing manners and kindly heart, though of inflexible will; ambitious and proud, though devout; had considerable learning and political ability; was a loving wife, and is justly revered by Spaniards as the purest glory of their royal annals. She d. Nov. 26, 1504, at Medina del Campo, and at her own desire was buried in the Franciscan monastery at Granada. She had five children—Isabella, who married Prince Emanuel of Portugal; John (Juan), who d. in 1497, aged 20; Juana, afterwards called *La Loca*, or "the Mad," who married Philip of Austria and was the mother of Charles V.; Maria, who married Emanuel of Portugal after her sister's death; and Catharine (Catalina), known in English history as the unfortunate queen of Henry VIII. and mother of Mary Tudor. (For the voluminous literature relating to the reign of Isabella, see Prescott's masterly *History of the Reign of Ferdinand and Isabella the Catholic*, in which copious bibliographical references may be found.)

FOSTER C. BLISS.

**Isabella II.**, Luisa, of Spain, b. at Madrid Oct. 10, 1830, succeeded her father Ferdinand VII. in 1833, under the guardianship of her mother; but war at once broke out, the followers of Don Carlos asserting that the Salic law, which had been the rule of succession in the Bourbon family in France, also held good for Spain. The first Carlist war lasted till 1840 with varying fortunes. In 1843 she was declared of age; married her cousin, Don Francisco, in 1846, and after a reign disturbed by many violent revolutions she was deposed in 1868, and in 1870 abdicated in favor of her son, who in 1875 succeeded as Alfonso XII., the short reign of Amadeus and the attempted republic having intervened. Isabella was very unpopular in Spain.

**Is'abey** (EUGÈNE LOUIS GABRIEL), b. in Paris July 22, 1804, son of Jean Baptiste Isabey. He has painted *The Hurricane before Diigo*, *The Port of Danckerke*, *The Battle of the Teut*, *View of Boulogne*, *The Alchemist*, *Ceremony in the Church at Delft*, *The Burial of the Stowaway Austria* (1859), *The Temptation of St. Anthony*. He has received three first medals, the decoration of the Legion of Honor, and was elected an officer Jan. 22, 1852.

O. B. FROTHINGHAM.

**Isabey** (JEAN BAPTISTE), b. at Nancy Apr. 11, 1767; d. Apr. 18, 1855; studied under David, but made the painting of portraits a profession; was a favorite of Napoleon I. and court-painter. The marshals, princes, and dignitaries of the First Empire, with the chief personages of Europe, sat to him. At the invitation of the emperor Alexander he visited the Russian court. His pictures had great celebrity. The pieces in which many personages are grouped together, as in the *Tableau des Maréchaux* and the *Conference at Vienna*, almost rise to the dignity of historical painting.

O. B. FROTHINGHAM.

**Isa'us**, b. at Chalcis in Greece, flourished in the first half of the fourth century B. C.; went to Athens while young, composed orations, and founded a school of rhetoric, in which Demosthenes is said to have been a pupil. He was one of the so-called ten Attic orators; 64 orations were ascribed to him, of which 11 are extant, all relating to disputed inheritances; they are given in the *Oratores Attici* of Bekker and others, and separately by Schomann (Greifswald, 1831), and have been translated into English by Sir William Jones (London, 1794).

**Isai'ah** (Heb. *Yeshayah*, "saved by the Lord"), the Esaias of the New Testament, one of the principal or greater prophets of the Hebrews. According to ch. vi. 1, Isaiah received his prophetic calling in the year in which King Uzziah died (7.99). He lived at least until after the invasion of Judah by Sennacherib. This event took place, according to the ordinary chronology, in 714, but Assyrian investigations show that it took place in 701-00. (See Lenormant's *History of the East*, Eng. ed., i. 399.) Thus, his activity extended over sixty years. Tradition even asserted that he was slain among the persecutions under Manasseh (cf. Heb. ii. 37). He was married and had children. During his lifetime he pronounced the word of Jehovah on every important occasion. He was the greatest of all the prophets for the vigor of his eloquence and the strength of his faith. His *Isaiah* chapters being despised, he reduced them to writing, as probably Hosea, Joel, and Amos had already done. Primarily, they were discourses adapted for instruction and popular edification. Prediction appears in them only as a warning of consequences,



a promise of the favor of God and a secure and happy future if, or when, the true kingdom of righteousness should be established in Israel (Messianic prophecies). A question first raised by Koppe about 100 years ago, respecting the unity and integrity of the book, is still in dispute among biblical critics, many affirming the oneness of authorship of the whole book, and many claiming that chaps. xl.-lxvi. must have been written by another person than penned the preceding chapters. The *unanimous* testimony of Jewish and Christian tradition affirms the former view. So also does the use apparently made of the later chapters of the book by Jeremiah (x. 1-16; v. 25; xxv. 31), Ezekiel (xxiii. 40, 41), and Zephaniah (ii. 15; iii. 10). The decree of Cyrus in Ezra i. 2-4 is plainly founded upon Isa. (xlv. 28; xlv. 1, 13), and accredits Josephus's statement (*Ant.*, xi. 1.2) that the Jews showed Cyrus Isaiah's predictions of him. The New Testament also quotes prophecies found in the latter part of the book, and attaches to them Isaiah's name. J. H. SEELYE.

**Isambert'** (FRANÇOIS ANDRÉ), b. at Aunay, France, Nov. 30, 1792; after brilliant classical and legal studies at the Collège de France, became one of the king's counsel in 1818, and gained a great reputation at the bar as the chief defender of the rights of the free people of color of the French West Indies; was a member of the Chamber of Deputies 1830-48; was one of the founders of the French Geographical Society and of the Society for the Abolition of Slavery, of which latter he was long the secretary; edited 1820-27 the annual volume of modern laws; published (with other writers) the vast collection of ancient French legislation (1822 *seq.*, 29 vols.), a *Manual for the Publicist and Statesman* (4 vols., 1826); *The Religious Condition of France and Europe* (1844), a *History of Justinian* (1856); translated the complete works of Flavius Josephus and the *Ecclesiastical History* of Eusebius; and wrote a large work on the *History of the Origin of Christianity*, besides contributing to many periodicals and writing numerous articles for Didot's *Nouvelle Biographie Générale*. D. at Paris Apr. 13, 1857.

**Isan'ti**, county in the E. of Minnesota. Area, about 430 square miles. The surface is diversified. Grain and potatoes are the staple products. Cap. Oxford. Pop. 2035.

**Isanti**, post-tp. of Isanti co., Minn., 12 miles from North Branch, on the Lake Superior and Minnesota R. R. Pop. 458.

**I'sar**, or **I'ser**, a river of Germany, rises in Tyrol, enters Bavaria, and flows after a course of 165 miles into the Danube. Munich is situated on its bank.

**I'satin** [Gr. *isatin*, "wood"], (C<sub>12</sub>H<sub>8</sub>N<sub>2</sub>O<sub>2</sub>), an interesting body formed by the action of nitric or chromic acid on indigo. Several other bodies are obtained from isatin by the action of ammonia, potassic hydrate, etc.

**Isaur'ia**, district of Asia Minor, situated between Phrygia, Lycaonia, Cilicia, and Pisidia, was in ancient times in ill repute for the fierceness and daring rapacity of its inhabitants. In 78 B. C. it was conquered by the Romans, but when in the fourth century A. D. the Isaurians united with the Cilicians, they became a formidable enemy of the Byzantine empire, and two of their race occupied the Byzantine throne—Zeno from 474 to 491, and Leo III. from 717 to 741.

**Is'chia** [Gr. *Pithecula*; Lat. *Ænaria*], a mountainous island of igneous origin, about 24 square miles in extent, and situated in the Mediterranean, near Naples. This island, originally peopled from Asia Minor, is remarkable for the beauty of its scenery, the fertility of its soil, and the variety and excellence of its fruits. Monte Epomeo, the highest point of Ischia, about 2500 feet above the sea, is a volcano surrounded, like Etna, with small craters, and its eruptions have often caused great damage. The island has also suffered severely from earthquakes. The mineral waters of Ischia are very celebrated, and the perfection of the climate is an additional advantage for invalids suffering from rheumatism and other similar affections. Pop. in 1874, 24,000.

**I'schl**, town of Austria, in the province of Upper Austria, at the confluence of the Ischl and the Traun. It is a small town, with only 3000 inhabitants, but its charming situation, its saline and sulphur springs, and the presence during several weeks each summer of the Austrian court and a great number of the Austrian nobility, have made it one of the most elegant and aristocratic bathing-places in Europe.

**Ischu'a**, post-tp. of Cattaraugus co., N. Y. It has valuable quarries of building-stone. Pop. 872.

**I'seghem**, town of Belgium, province of West Flanders, 7 miles N. N. W. of Courtrai, has a large trade in cattle, manufactures of cotton, linen, hats, thread, ribbons, etc., breweries and tanneries. Pop. 7955.

**Ise'o Lake**, in Northern Italy, 15 miles long, 2½ miles broad, is celebrated for its picturesque surroundings. It sends its waters to the Po through the Oglio.

**Isère**, department of South-eastern France, on the Rhone and its affluent, the Isère. Area, 3163 square miles. Pop. 575,784. The northern and western parts are level, but the southern and eastern parts are covered with majestic mountains, of which Mount Olan is 12,664 feet high. The department is rich in minerals. Copper, lead, iron, and coal are mined; gold and silver are found. The wine of these regions is superior. Cap. Grenoble.

**I'serlohn**, town of Prussia, in Westphalia, on the Kalle. It has large manufactures, especially of iron and bronze ware. Pop. 15,763.

**Iser'nia**, town of Southern Italy, in the province of Campobasso. It was a Samnite city, and remains of the polygonal walls, as well as of very ancient temples, sepulchres, etc., still exist. The old aqueduct, hewn for the distance of a mile through solid rock, still supplies the town with water and with water-power. Isernia occupies a commanding position on a mountainous ridge about 24 miles W. of the town of Campobasso, and the population (9066 in 1874) is chiefly occupied in the manufacture of hemp, linen, paper, earthenware, etc., and in dressing parchment and other leathers.

**Ish'im**, or **Ischim**, a large river of Siberia, in the government of Tobolsk, flows N. 700 miles through a sterile region, and enters the Irtysh 120 miles S. E. of Tobolsk. On its banks are the important towns of Ishim and Petropaulovsk.

**Ish'mael**, the son of Abraham and Hagar, the Egyptian handmaid of Sarah, was expelled, together with his mother, from his home when Sarah gave birth to Isaac. The Bedouin tribes of Northern Arabia, occupying the region between the peninsula of Sinai and the Persian Gulf, are said to descend from Ishmael, and possess many Ishmaelitic traditions.

**Ishpem'ing**, tp. and post-v. of Marquette co., Mich. It has a national bank, and extensive iron-mines, or rather iron-quarries, whose ore is of the very best quality. The inhabitants are mostly Scandinavians. The town is on the Marquette Houghton and Ontonagon R. R., 16 miles W. of Marquette. Pop. 6103.

**Is'idore of Charax**, a native of Charax on the Tigris, near the Persian Gulf, was a distinguished geographer of the first century A. D. His *Parthian Itinerary*, portions of which are extant, is an important source of information upon Asiatic geography; it was printed by Höschel (1600), Hudson (1703), and Miller (Paris, 1839) in their collections of the minor Greek geographers.

**Isidore of Seville**, or **Isidorus Hispalensis**, b. at Cartagena between 560 and 570; was appointed bishop of Seville about 600; and d. Apr. 4, 636. By establishing schools, and by harmonizing the moral and doctrinal system of Christianity with the habits and institutions of the various races which at that time composed the Hispano-Gothic kingdom, he became one of the brightest ornaments of the Church of Spain; and his fame and authority were not confined to Spain alone. He presided over the second Council of Seville (619), and over the Council of Toledo (633). His works, which form an encyclopædia of the knowledge of his time, were collected and edited by Perez and Grial (Madrid, 1778), by Arevalo (Rome, 1797-1803), and by the Abbé Migne (Paris, 1862, 8 vols.).

**Isidorian Decretals**. See **DECRETALS**, FALSE.

**I'singlass**, a GELATINE (which see) prepared from the swim-bladder of various sturgeons (*Acipenser*) and other fish, such as the cod, the weak-fish (*Otolithus regalis*), and the hake (*Gadus merluccius*). It is used in preparing jellies, confections, blanc-mange, gum-drops, etc.; in fining wines and liquors; as a test for tannic acid; as an ingredient in court-plaster; as a size for delicate fabrics, etc. The coarser kinds (fish-glues) are used in various cements. "Japanese isinglass" is prepared from a seaweed. Commercial isinglass comes from Russia, Brazil, the U. S., and other countries.

**ISIS**, an Egyptian goddess named Hes, daughter of Seb or Cronos, and Nut or Rhea, sister and wife of Osiris, and locally one of the tetrad of Abydos, which consisted of Osiris, Isis, her sister Nephthys, and Horus. Her worship is not mentioned at the earliest period, but became universal at the time of the eighteenth and later dynasties. Her name is expressed in hieroglyphics by a seat or throne, and in her terrestrial type she is represented with this ornament on her head. She is styled in the inscriptions the mother-goddess, or great mother, mistress of heaven, regent of the gods, and queen of the upper and lower country. In her celestial character she wears on her head the

disk and horns and the modius or cylindrical head-attire surrounded by twelve serpents, emblems of the twelve hours of the day and night. In the monuments she is the constant companion of Osiris, standing behind him, supporting him, or lamenting at his bier, or else as mother of Harpachrat, or "the youthful Horus," nursing and suckling that god on her lap. Isis is rarely if ever seen alone, except in votive figure, and if at a later period she is represented winged, such a type appears to have been introduced from Asiatic sources. The legend of Isis is partly confirmed by the accounts of the monuments and papyri. During the absence of Osiris from his kingdom it is stated that she ruled over the state, and her name appears in a cartouche as one of the gods of the second dynasty who ruled Egypt. After the murder of Osiris by Typhon on the 17th of the month Athor, in the twenty-eighth year of his reign, Isis was informed of the death of Osiris, and cut off one of the locks of her hair. She also searched for Anubis, the god of embalming, the son of Osiris and Nephthys. The chest in which the corpse of Osiris was enclosed was carried to Byblos, and lodged in the branches of a tamarisk tree, in which perched the phoenix (*bennu*), the soul of Osiris. The king of Byblos had made the trunk of the tree into a pillar of his house. Ingratiating herself with the queen's women, whose hair she plaited, and subsequently engaged by the queen as wet-nurse for the king's son, she suckled the boy with her finger, and laid him on burning coals to make him immortal, while she herself, transformed into a swallow, hovered round the pillar, and when her proceedings were discovered, obtained it by request from the monarch. Opening the trunk, she took it with her into the desert, and opening the lid, threw herself in grief on the dead body of her husband; and when the king's son approached her she turned round and killed him with a glance. Returning to her son Horus, she left the chest at the city of Butus in an unfrequented place, where, however, it was discovered by Typhon in the moonlight, who tore the body into fourteen or twenty-six pieces, and scattered them about, apparently in the river. These Isis collected, apparently from the river, upon which she went for the purpose, and found all except one piece, which had been devoured by the oxrhynchus fish. In the war which ensued between Horus and Typhon at Kar (or the Egyptian Babylon) on the 6th of the month Thoth, and which endured for three days and nights, the gods changing during the battle from the human to animal forms, Isis chained both combatants. Subsequently she liberated Set or Typhon from his chains, and Horus, enraged at this act, cut off the head of Isis, which Thoth subsequently replaced by the head of a cow. Another account places this action at Ateh in the oxrhynchite nome, on the 7th of the month Tybi, when the boat of the Sun was moored at Pakhera. A second battle supervened at Anruteh at a later period. She is said to have founded sepulchres of Osiris wherever she found portions of the body. She appears as goddess of the lower world, for Rhampsinitus (Rameses III.) descended to Hades and played at draughts with her, winning a golden napkin, with which he returned to earth. One of the epagomenæ or intercalary days was sacred to her. She was identified with other deities, as Urhek, Bast, Athor, and even Nephthys, and one of the sacred books was entitled her sighs or respirations. Her worship was introduced into Asia Minor and Greece about B.C. 330, and into the Roman empire in the time of Sylla, and although attempted to be banished at different intervals (B.C. 133-129) by different acts of the senate, and repelled by Augustus, was finally established with the worship of Serapis at Rome, and only disappeared with the fall of paganism, which took place A.D. 391 at Alexandria. Isis was supposed to represent nature, the moon, earth, Demeter, and other elements or powers. S. Birch.

**Isis**, the classical Latin name for the river Thames in England (Tham-*esis* = "the broad Isis"), still often employed in the same sense in English poetry and belles-lettres. The principal tributary of the Thames which passes by Oxford is also called Isis.

**Iskanderoon'**, **Scanderoon**, or **Alexandretta**, seaport town of Northern Syria, on the E. coast of the bay of the same name, anciently the Bay of Issus. It is the principal outlet of Central Asiatic Turkey, being the port of Aleppo, and has the best harbor on the Syrian coast. Formerly unhealthy and almost desolate, it has by improved drainage become salubrious, and is destined to acquire great importance whenever a railroad to the Euphrates shall attract to this route a portion of the overland Indian traffic. Several hundred vessels touch here annually. Pop. 2000.

**Is'kelib**, town of Asiatic Turkey, in Asia Minor, near the Mediterranean, has about 9000 inhabitants, all of whom are Mohammedans. Christians are not allowed to reside

there with their families; they can only stop at the khans for a limited time.

**Is'la, de** (José FRANCISCO), b. at Segovia in 1703, entered the order of the Jesuits, was expelled with them in 1767, and d. at Bologna in 1781. His sermons attracted attention as early as 1729, but his fame he principally obtained by his satirical romance, *Historia del famoso predicador Fray Gerundio de Campazas*. The first volume of this work was published in 1758 without the knowledge of the author, but in 1760 its sale was forbidden. The second volume did not appear until 1772, in London and in English, and then in Spanish at Bayonne shortly after. The whole work was published in Madrid in 1813. He also wrote *Cicero*, a satirical poem, of which the manuscript is found in the library of Boston, its publication in Spain having been forbidden.

**Is'la de Leon'**, an island on the S. coast of Spain, in the Atlantic, 10 miles long by 2 broad, on which is the city and port of the same name (also called San Fernando), which was in 1810 the capital of Spain under the regency, and was the scene of the first constitutional movement of 1820. It is strongly fortified, has two hospitals, several convents, and an excellent observatory. Pop. 10,000.

**Is'la de Ne'gros**, one of the Philippine Islands, in Malay Archipelago. Area, 3800 square miles. Pop. 35,000.

**Islam**. See MOHAMMEDANISM.

**Islamabad'**, town of British India, in the presidency of Bengal, the capital of the district of Chittagong, is in lat. 22° 20' N., lon. 91° 54' E., on the Kurramfali, 7 miles from its mouth. It has important shipbuilding and a large trade in rice, salt, cocoanuts, and tortoise-shell. Pop. 12,000.

**Isl'and**, county of Washington Territory, consisting of islands lying in Puget Sound, of which the largest is Whidby Island. Cap. Coveland. Pop. 626.

**Island**, tp. of Desha co., Ark. Pop. 400.

**Island Creek**, tp. of Duplin co., N. C. Pop. 1449.

**Island Creek**, post-tp. of Jefferson co., O., 7½ miles from Steubenville. Pop. 1626.

**Island Falls Plantation**, tp. of Aroostook co., Me. Pop. 183.

**Island Grove**, tp. of Sangamon co., Ill. Pop. 1069.

**Island Pond**, post-v. of Brighton tp., Essex co., Vt., an important station on the Grand Trunk Railway, 149 miles N. W. of Portland, Me., and 143 miles S. E. of Montreal, Canada. It has a custom-house and several manufacturing establishments.

**Islands**, tp. of Accomac co., Va. Pop. 1122.

**Is'lay**, an island of the Inner Hebrides, belonging to the county of Argyre, Scotland. Area, 220 square miles. Pop. 10,332. The northern and eastern parts are hilly, traversed by a ridge which at some places rises to the height of 1500 feet; the rest is level. Good crops of rye are raised, and a considerable distilling industry is carried on.

**Islay**, maritime town of Peru, in the province of Arequipa, distant 50 miles from that city, with which it is connected by a railroad recently constructed. The population is insignificant, but it derives importance from being the seaport of Arequipa and of much of Southern Peru.

**Isle'boro'**, post-tp. of Waldo co., Me., consists of a narrow island of 6000 acres, called Long Island, in Penobscot Bay, 10 miles E. of Belfast. Many of its inhabitants are engaged in maritime pursuits. It has 3 churches. Pop. 1230.

**Isle la Motte**, an island in Lake Champlain, constituting the post-township of Isle la Motte, Grand Isle co., Vt. It is sometimes called the "Vineyard." It is 6 miles long. Pop. 497.

**Isle of France**. See MAURITIUS.

**Isle of Man**. See MAN, ISLE OF.

**Isle of Pines**. See PINES, ISLE OF.

**Isle of Wight**. See WIGHT, ISLE OF.

**Isle of Wight**, county in the S. E. of Virginia, bounded on the N. E. by the James River, and on the W. by the Blackwater. Area, 230 square miles. It contains considerable pine forest, and is generally level. Grain, potatoes, and pork are staple products. It is traversed by Atlantic Mississippi and Ohio R. R. Cap. Smithfield. Pop. 8320.

**Isle Royale**, county of Michigan, comprising Isle Royale and adjacent islands in Lake Superior. Isle Royale is 45 miles long, 12 miles broad, and abounds in copper and other minerals, and has many lakes, one of the largest of which, Siskowit Lake, has no outlet. Siskowit Bay is the principal settlement. It was formed in 1875.

**Isles of Shoals**, a group of eight small islands in the Atlantic, about 10 miles S. E. of Portsmouth, N. H. They are barren and almost without vegetation. The 90 inhab-



itants live mostly by fishing. On White Island is a light-house, and on Appledore and Star Island there are large hotel accommodations for the great number of tourists who visit the islands each summer to enjoy the sea air.

**Is'tip**, tp. and post v. of Suffolk co., N. Y., 40 miles E. of New York City, on Great South Bay and on the South Shore R. R. of Long Island, has 3 churches, 2 academies, 1 weekly newspaper, planing, paper, and flour mills, a marine railway and shipyard, and is the head-quarters of several sporting clubs. Fishing is a leading pursuit, and the rearing of trout and the putting up of canned goods are important interests. The township contains a number of other villages, and has 15 churches. Pop. of tp. 4597.

W. L. COOK, Ed. "LONG ISLAND HERALD."

**Ismacliah.** See ASSASSINS and ISMAILIS.

**Ismail'**, town of European Turkey, in the principality of Moldavia, on the Kilia, a branch of the Danube. It is a strong fortress, has important leather manufactures, and carries on an extensive trade in grain, wool, tallow, etc. Pop. 20,569.

**Ismail Pasha**, or **Ismail I.**, b. at Cairo in 1830, son of Ibrahim Pasha by a Circassian woman. He was educated at Paris; returned to Egypt, and soon after his father's death (Nov. 9, 1848) strongly opposed the new viceroy, Abbas Pasha, who died the next year, and was succeeded by Said Pasha, who placed him at the head of the administration while he himself was on a visit to Europe, and in 1862 made him commander of the army. Said d. Jan. 18, 1863, and was succeeded by Ismail as fifth viceroy of Egypt. He acquired great wealth by the cultivation of cotton during the American civil war, and was a zealous promoter of the Suez Canal project. In 1866 the sultan made the succession direct in his line, in return for which Ismail increased his tribute and aided the sultan with a large army in the Cretan insurrection. In 1867 he received the titles of highness and khedive, with important additions to his authority; but he demanded still more, and threatened, in case his demands were refused, to seize the island of Crete. Foreign powers, however, interposed, and compelled him to abate his demands. In 1868-69 he extended his sway over the Upper and White Nile, increased his army, proposed the neutralization of the Suez Canal, and conducted himself as an independent monarch. The sultan thereupon ordered him to reduce his army to 30,000 men, recall his orders for the construction of iron-clads and the purchase of breech-loaders and the contraction of loans in Europe. The khedive, not succeeding in gaining the support of Russia, yielded for a time to the demands of the sultan, but by bribery in June, 1873, succeeded in obtaining concessions from the Sublime Porte which rendered him virtually independent, the main restrictions relating to his intercourse with foreign powers. Early in 1874 he gained a decided victory over the sultan of Darfur, and is now busily engaged in extending his authority over the barbarous tribes lying around him. He is the absolute owner of all the land in Egypt, which his subjects cultivate on terms prescribed by him. He is also largely engaged in manufacturing enterprises, the whole industry of the country being under his control, the common people being practically his slaves. He has, in an architectural point of view, considerably improved Alexandria, almost rebuilt Cairo, and has constructed immense public works throughout his kingdom.

**Ismail'ia**, town of Lower Egypt, on the N. shore of Lake Timsah, on the railroad leading from Alexandria and Cairo to Suez, and on the Suez Canal. It was founded in 1863 to serve as the central point for the construction of the canal, and was named after the khedive, Ismail Pasha. Its situation gives promise of considerable commercial importance. Pop. about 4000.

**Ismail'is**, a former sect of Mohammedan free-thinkers. They were originally Shiites, but their doctrine spread throughout *Islam*, the Mohammedan world. Their outward practice was very devout, but their esoteric doctrines consisted of various degrees of instruction, finally leading to universal negation, atheism, and indifference. Besides this, their morality was of the worst, though cloaked with pious words and acts. They originated in the ninth century, and especially honored Mohammed ben Ismail, the seventh of their imams or caliphs. There are even now relics of this old sect in existence.

**Ismid'**, or **Iskimid** (the ancient *Nicomedia*), town of Asiatic Turkey, in Asia Minor, on a gulf of the same name, in lat. 40° 47' N., lon. 29° 53' E. Of the brilliant old city very little is left, and the present town is a dirty, miserable place, with some manufactures of silk and earthenware. Pop. 3000.

**Isnard'** (MAXIMIN), b. Feb. 16, 1751, at Grasse, in Provence; entered the National Assembly in Sept., 1791, as a

deputy for the department of Var. He joined the Girondists, though his ideas were more advanced than theirs, and became conspicuous for his passionate, sometimes even inspired, eloquence. When arrested in June, 1793, he succeeded in escaping, and concealed himself until the fall of Robespierre. He was a member of the Council of Five Hundred, but exercised no influence, and during the Empire and the Restoration he lived in retirement, occupied with literary pursuits, in his native city, where he d. in 1830.

**Isocheimal Lines.** See METEOROLOGY.

**Isoc'rates**, the son of Theodorus, a native of Athens, was b. b. c. 436, and d. of voluntary starvation b. c. 338. He was a disciple of Socrates and Theramenes, and subsequently attained considerable popularity as the founder of a school of rhetoric at Athens. Cicero declared him to be the first to perfect the melody of Greek prose. The Alexandrian critics assign him the fourth place in the canon of Greek oratory. His style is ostentatious and elegant, rather than graceful and pleasing. The extant orations are given in the *Oratores Attici* of Bekker, and of Baier and Sauppe, and separately by Lange (Halle, 1803), by Baier and Sauppe (Zurich, 1839), by Benseler (Leipsic, 1851); select orations by Rauchenstein (Berlin, 1855). The *Panegyricus* was edited by Prof. Felton (Cambridge).

**Isochymal Lines.** See METEOROLOGY.

**Isola Bella.** See BORROMEAN ISLANDS.

**I'sola del'la Scala**, town of Italy, in the province of Verona, about 16 miles E. of the city of Verona. This town has a large Gothic church and other good buildings, with an active and laborious population of (in 1874) 5785.

**I'sola del Li'ri**, town of S. Italy, in the province of Caserta. The immense water-power furnished by the Liri and the Fibreno is here utilized for manufacturing on a large scale, paper, linen, woollens, etc., and also for working metals, including the manufacture of chemical products. The town is charmingly situated, and the trout of the Liri are as famous as in the days of Martial and Apian. Pop. in 1874, 5582.

**I'som** (THOMAS DUDLEY), M. D., b. in Maury co., Tenn., Sept. 5, 1816; graduated in Jefferson Medical College 1839, and began practice at Oxford, Miss. He was made surgeon during the war, and assigned to the medical board of Gen. Joseph E. Johnston's army; is (1875) a successful practitioner in Oxford, Miss., and is a trustee of the university of that State. PAUL F. EVE.

**Isom'erism, Polymerism, Allotropism, Amorphism, Dimorphism and Polymorphism, Metamerism, Kenomerism.** These words belong, and are necessary, to the language of chemical science, being of highly convenient, indeed indispensable, application in the arrangement of the vast accumulating masses of compounds into groups, and in exhibiting their relations among each other; thus facilitating their study and investigation in a surprising manner. These terms do not, however, all convey actual natural principles, or generalizations; many of the groupings designated by them being in a great degree artificial, or founded on principles rather of a negative kind; though others of them are unquestionably natural. The term *isomerism* is generally considered as including, broadly speaking, all the others; and isomeric groups, or groups of isomeres, may be defined broadly as such groups as happen to have the same proportional elementary composition, while specifically quite distinct; each member of such a group being distinguishable from the rest by some one or more specific chemical or physical character or relation to other substances.

*General Examples.*—*Diamond* and *graphite*, the first the hardest and most limpid known substance, the last one of the softest and most opaque; both being chemically pure carbon. *Calcite* and *aragonite*, differing fundamentally in crystalline form (the first being hexagonal and the last right rhombic), as well as in hardness and density, while both are simply lime-carbonate,  $\text{CaCO}_3$ . *Quartz*, *tridymite*, and *sulphur selenia*. *Olefiant gas* ( $\text{C}_2\text{H}_4$ ) and *tetracetylene* ( $\text{C}_{20}\text{H}_{10}$ ), each of which contains in 100 parts by weight exactly 12.857 of carbon and 57.143 of hydrogen: the last, instead of being a permanent gas lighter than air, like the first, is a liquid whose boiling-point is higher than that of mercury, and whose vapor is ten times as heavy as olefiant gas, or half as heavy again as mercurial vapor itself. Common *alcohol* and *methyl ether*, a liquid and a gas, each having the empirical formula  $\text{C}_2\text{H}_6\text{O}$ , and the same centesimal composition:

Carbon .....	52.174
Hydrogen .....	13.043
Oxygen .....	34.783
	100.000

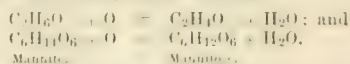
*Dextrose*, or grape-sugar, and *levulose*, or honey-sugar, both  $\text{C}_6\text{H}_{12}\text{O}_6$ , but having precisely opposite actions on

polarized light; the first being also a solid and the last a liquid.

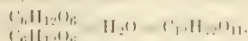
1. *Isomeres*, in the restricted sense (Gr. *isomorphos*, adj., "of equal parts" or "equally divided"). Recent writers propose to apply the term *isomeres* narrowly and specially to such groups as really appear to be more or less natural ones; that is, such as not only have the same composition, but similar origin, with identical molecular weights and volumes; which are usually quite similar in their relation to heat and chemical agents, and furnish similar products of decomposition or transformation by like agents. Such groups are found, so far, only among the immediate products of vegetable and animal life; and while among the commonest substances, still remain, as to their molecular constitution, among the least scrutable; no very satisfactory explanations, except of a hypothetical kind, having yet been presented for these kinds of isomerisms.

*Examples*.—A large, familiar, and interesting group of natural isomeres is that known as the *terpene*, including the volatile oils of turpentine, lemon, orange-peel, bergamot, neroli, Borneo camphor, juniper, copaiba, nutmeg, and a multitude of others. These are all hydrocarbons of the formula  $C_{10}H_{16}$ , which, while differing so greatly in odor, and in some cases in their actions on polarized light, and even, within small limits, in densities and boiling-points, yet are notably similar in their general chemical relations—much more so than is usual among the groups of *polymeres* and *metameres* referred to below. It seems certain, however, that in the course of investigation the true constitution and molecular derivation of these terpenes will be arrived at with precision, in which case they will at once take rank but as metameres, and lose in great part their present mysterious interest. Two of the most common, *terebenthene*, from turpentine-oil, and *citrene*, from lemon-oil, are now under active investigation by skilful chemists, and the results seem to point to the constitution of the former being nearly or exactly *dihyduret of isopropyltoluene* (ulpho-symene), and to that of the latter as comprising the same molecular groups, with different arrangement among each other.

Other important groups of natural isomeres occur among the proximate constituents or products of living tissues, both vegetable and animal. The *mannite* group ( $C_6H_{14}O_6$ ), comprising three or more isomeres—*mannite* (manna or seaweed-sugar), *dulcose* or *dulcite* (a sugar from an unknown plant of Madagascar), and *isodulcite*, an artificial sugar. The theoretical views commonly accepted regarding the constitution of the sugars generally, and hence of a very wide and highly important range of organic products, rest upon the views held regarding mannite. (See below.) The *glucose* group ( $C_6H_{12}O_6$ ), including common *grape-sugar*, which is a product both of vegetable and (as diabetic sugar) of animal life, *levulose*, *inosite* (flesh-sugar), *galactose*, *sorbit*, and several artificial sugars of the same formula. These isomeres are regarded as *aldehydes*, corresponding to certain isomeric (hexatomic) alcohols, of which mannite is one representative. Thus, just as ordinary alcohol may yield ordinary aldehyde by oxidation in contact with platinum-black, mannite yields an artificial sugar isomeric with glucose, called *mannitose*.



Also, it is stated that glucose, by reduction with nascent hydrogen (as with sodium-amalgam), will yield conversely genuine mannite. A further support for this view is derived from the fact that the action of hydriodic acid on mannite produces the hydrocarbon hexylene,  $C_6H_{12}$ . The *saccharose*, or cane-sugar group ( $C_{12}H_{22}O_{11}$ ), which comprises a large class of isomeres, such as *arabitol* (cane-sugar), *melbitose* (clark sugar), *trehalose* (Turkish manna), *majone* (ergot-sugar), *lactose* or milk sugar (as a hydrate naturally), and doubtless a great multitude of other isomeres. To these is to be added *arabane*, the characteristic constituent of gum arabic. These isomeres are formed from the glucoses by the elimination of one equivalent of water from a coupled molecule of the latter group:



They are therefore designated as *diglucosic alcohols*.

Little progress has been made as yet in penetrating the nature of the relations which exist between the several members of the above groups of sugar-isomeres respectively, and no satisfactory reason can be suggested why they are isomeres. The same remark applies to another no less important group, comprising *cellulose*, the *starches*, *inuline*, *glycogen* (animal starch, from livers and testicles, etc.), which are isomeres of the general formula  $nC_6H_{10}O_5$ , closely related to the sugars. Two other isomeric sugars, of another mode of grouping, may also be mentioned. These are *pinite*

and *quercite* (California pine-sugar and acorn-sugar), which are both  $C_6H_{12}O_5$ , and have been rated as probably alcohols of *pentatomic* constitution.

*The Tartaric Acid Group*.—This seems a well-characterized group of natural isomeres, not to be classed, so far as known, with polymeres or metameres; comprising ordinary or *dextro-tartaric acid*, *levo-tartaric acid*, *racemic acid*, and *meso-tartaric acid*; the last three discovered by Pasteur. Action on polarized light and variation of crystalline form are the distinguishing characteristics of these; racemic acid being a compound of dextro- and levo-tartaric acids, and therefore inactive. Their common formula is  $C_4H_6O_6$ .

Still another great and important group of *probable* isomeres occurs in nature, distributed very widely both in animal and vegetable life. These are the *proteine* group, or *proteids*, also called *albuminoids* (for a special account of which see the articles ALBUMEN and ALBUMINOIDS, by Prof. C. F. CHANDLER; also the article ALBUMINARIA). The consideration of the question as to whether this familiar though mysterious group of substances consists really of isomeres, or will ultimately be found to have some other connection, cannot be entered into here. The whole chemical nature of the proteids rests still in obscurity, and the designation of them here as one of the groups of natural isomeres must be admitted as possibly only conjectural.

The narrow acceptance of the term *isomere*, which has been adopted above, can only be regarded as provisional, and likely to be ephemeral. In the due course of chemical research it seems inevitable that the true molecular structure of all these groups will sooner or later be evolved, and they will then, of course—while still remaining isomeres in the broad and general sense—either fall into one or other of the groups below, or become appropriate subjects for new and specific terms, in newer classifications, which will more closely approximate to the true scheme of nature.

2. *Polymeres* (Gr. *polys*, "of many parts"). These have also been called *isomerides*, from *isomorphos*, and *idea*, "form or aspect," signifying that they simulate in form or formula the isomeres above.\* Polymeres constitute groups which owe their similar centesimal composition to the fact that their compound molecules contain the same elemental molecules, condensed or combined in double, triple, or other multiple weights in the same, or in multiple volumes.

2 A. *Organic Polymeres*.—Of these, which are best known, the case above, of *abiant gas* and *tetramylene*, will serve as an excellent example; and it will be useful indeed to cite here the whole beautiful group of hydrocarbon polymeres to which these two belong. (See table on next page.)

A peculiar theoretical interest attaches to this group, in consequence of the fact that it constitutes not only a group of polymeres, but also a series of homologues, being probably the only extended series of compounds capable of holding among each other simultaneously these two relations. (See article HOMOLOGUE.) It is doubtless rather by virtue of their being homologues, and not as polymeres, that they constitute a distinct natural family, being frequently co-existent or congeneric as products of chemical change, and as a series being distinctly *progressive* in their physical and chemical characters and relations. The modes of derivation of some of these polymeres from others are interesting. Amylene is converted into diamylene, from  $C_5H_{10}$  to  $C_{10}H_{20}$ , or twice the number of molecules condensed into the same volume of vapor, by simply dissolving in oil of vitriol. The diamylene soon separates from this solution as an oily layer. Triamylene and tetramylene also, in which a similar condensation to the same vapor-volume of three and four times the weight of matter, are formed by simply heating amylenes with chloride of zinc, which latter takes no part in the change.

There is another small but highly interesting group of hydrocarbon polymeres, consisting of the following members:

Acetylene, or ethine.....	$C_2H_2$
Benzene, or benzole.....	$C_6H_6$
Cinnamene, or styrole.....	$C_9H_8$

The first of these is a gas, the other two—which are perfectly entitled to the names triacetylene and tetraacetylene—are liquids; and cinnamene occurs also as a solid isomere, called *metacinnamene*, formed by simply supercooling the liquid form under pressure. Cinnamene is found also in nature as a constituent of *stearine*. Benzene and cinnamene may be formed by direct synthesis from acetylene, by passing the latter through an ascending tube. These bodies all occur abundantly in the products of the coal-gas retort, and bear the most intimate relation to many others.

\*There is, however, some contradiction of terms here, some writers applying the term *polymer* to a multitude of polymeres and metameres. The terms *polymer* and *metamer* have also been employed, simply as synonyms of polymer and metamer, a complication of terms which seems wholly unnecessary.



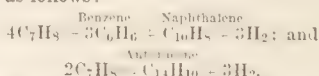
of its products not polymeric with them. Thus, if diphenyl ( $C_{12}H_{10}$ ), a body found associated with anthracene in coal-tar, is passed in vapor form, with olefiant gas, through a red-hot

tube, both benzene and cinna-mene result:  $C_{12}H_{10} + C_2H_4 = C_6H_6 + C_8H_8$ . Naphthalene ( $C_{10}H_8$ ), another most important constituent of coal-tar, and toluene ( $C_7H_8$ ), still another,

*The Known Polymeric Olefines,  $C_nH_{2n}$ .*

Carbon-equivalents, $C = 12$ .	Names.	Formulae.	Centigrade points of fusion.	Centigrade points of ebullition.	Densities of vapors.
1	Methene (unknown).....	$CH_2$	.....	.....	.....
2	Ethene, ethylene, elayl, or olefiant gas.....	$C_2H_4$	.....	$-110^\circ$	0.97
3	Propene, or propylene.....	$C_3H_6$	.....	$-17.8^\circ$	1.45
4	Butene, or butylene.....	$C_4H_8$	.....	$+ 3^\circ$	1.94
5	Quintene, or amylene.....	$C_5H_{10}$	.....	$35^\circ$	2.42
6	Septene, or hexylene.....	$C_6H_{12}$	.....	$69^\circ$	2.91
7	Octene, or heptylene.....	$C_8H_{14}$	.....	$95^\circ$	3.39
8	Nonene, or nonylene.....	$C_9H_{16}$	.....	$119^\circ$	3.87
9	Decene, decatylene, diamylene (or "paramylene" of Balard).....	$C_{10}H_{18}$	.....	$140^\circ$	4.36
10	Undecene, or triamylene.....	$C_{11}H_{20}$	.....	$165^\circ$	4.84
11	Dodecene, octene, or octylene.....	$C_{12}H_{22}$	.....	$248^\circ$	7.60
12	Tridecene, tetramylene (or "metamylene" of Balard).....	$C_{13}H_{24}$	.....	$277^\circ$	7.75
13	Myristene, tetramylene (or "metamylene" of Balard).....	$C_{14}H_{26}$	.....	$355^\circ$	9.70
14	Myristene, tetramylene (or "metamylene" of Balard).....	$C_{14}H_{26}$	$57^\circ$	.....	13.09
15	Trigintene, or melene.....	$C_{30}H_{60}$	$62^\circ$	$375^\circ$	11.80?

are also most intimately related to benzene and anthracene. Thus, vapor of toluene in the red-hot tube may be metamorphosed as follows:



The consideration of these, with a great many other similar transformations among these hydrocarbons, produced by simple contact with incandescent surfaces, which have been observed by Berthelot and others, throw great light upon the processes that occur within the gas-retort.

Connected with the great isomeric group of the terpenes, which have been referred to above, there are believed to be probably some polymeres, among which are the essential oils of cubeba and copaiba,  $C_{25}H_{42}$ . The two important substances *camphene* and *gutta percha* have also been held to be terpene-polymeres, but Berthelot's investigations have cast doubt upon this view. Cyanogen, in its compounds, appears to have a peculiar tendency to form polymeric groups. The most remarkable of these is as follows:

Cyanic acid.....	$CHNO$ .
Fulminic acid.....	$C_2H_2N_2O_2$ .
Cyanuric acid.....	$C_3H_3N_3O_3$ .
Fulminuric acid.....	$C_3H_3N_3O_3$ .

Of these the last, however, is doubtless a metamero of cyanuric acid, as it is bibasic, while the latter is tribasic. From the three strictly polymeric acids above formulated it will be readily understood that there may arise a great number of polymeric groups of salts. Thus, the silver-salts are constituted as follows:

Argentie cyanate.....	$CNAgO$ .
Argentie fulminate.....	$C_2N_2Ag_2O_2$ .
Argentie cyanurate.....	$C_3N_3Ag_3O_3$ .

The second of these is the celebrated *fulminating-silver* compound. Other polymeric cyanogen compounds are the two chlorides:

Gaseous chloride of cyanogen.....	$CNCl$ .
Solid chloride of cyanogen.....	$C_3N_3Cl_3$ .

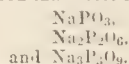
The first of these, at ordinary temperatures, may be converted into a liquid by a pressure of four atmospheres, and when then sealed up passes gradually into the solid compound.

The aldehyde polymeres are highly interesting illustrations. Strong sulphuric acid, gaseous muriatic acid, chloride of zinc, and other agents, by their mere presence, transform ordinary aldehyde, according to the temperature, into one or the other of two solid polymeres, *paraldehyde* (or *elaldehyde*), and *metaldehyde*. The latter, being very unstable and passing readily back to the form of ordinary aldehyde, is not much known, but the other two have the following properties and composition:

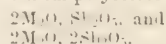
Sp. gr.	Boiling-point.	Vapor-density.	Formulae.
Aldehyde.....0.790	$22^\circ$	1.235	$C_2H_4O$ .
Paraldehyde.....0.993	$124^\circ$	4.516	$C_6H_{12}O_3$ .

There is still another polymere of aldehyde, a liquid called *aldol*, which is considered as containing two molecules of the former condensed into one, but is somewhat unstable, and hence not so well known. Anhydrous chloral ( $C_2HCl_3O$ ), which may be considered as a chlorinated derivative of aldehyde, changes spontaneously from a liquid into an insoluble solid substance, most probably a polymere. One more interesting case of probable polymerism may be noticed, occurring in the case of another familiar body, *oleic acid*, which, by the mere presence of nitrous acid, is changed from a liquid into a solid isomere called *elaidic acid*.

2 B. *Inorganic Polymeres.* There are a few cases known, among compounds of strictly mineral origin, in which well-marked polymerism is recognized. Some of these are as follows: *Peroxide of nitrogen*, or nitrogen tetroxide, which is held by some investigators to be at low temperatures a solid or colorless liquid compound ( $N_2O_4$ ), which by heat is resolved or dissociated into two molecules of a deep-red gas ( $NO_2$ ), having twice the vapor-volume for the same weight. This, however, has been deemed unsettled by some other chemists. *Metaphosphate of Soda*.—When the amorphous glassy metaphosphate obtained by fusing microcosmic salt is cooled slowly, another modification is crystallized out of it; and a third isomere is obtained by the action of an excess of phosphoric acid on sodic sulphate. It has been considered that these are three polymeres:



*Antimonic and Metantimonic Acids, and their Salts.*—Two modifications of antimonie oxide ( $Sb_2O_3$ ) are formed by the action of water on antimonie pentachloride ( $SbCl_5$ ) and by the action of nitric acid on metallic antimony; the last being monobasic antimonie acid, and the first bibasic metantimonic acid. The normal antimonates and acid metantimonates have assigned to them the following general formulae, which make them polymeres:



The crystalline mineral *stibnite*, lead-gray, with high metallic lustre, and in powder grayish-black, and the artificial brick-red antimonious sulphide, formerly called *kermes mineral*, are isomeric, both being empirically  $Sb_2S_3$ , and are readily convertible. The difference of their densities is sufficient (4.15 for the artificial and 4.57 for the natural compound) to suggest polymerism. The differences in density between the three crystallized mineral forms of titanie acid, *octahedrite*, *brookite*, and *rutile*, justifies a belief that they may be polymeres as well as polymorphs. Their densities and hardnesses range as follows:

	Hardness.	Density.
Octahedrite (Arkansite).....	5.5 to 6	3.88
Brookite.....	5.5 to 6	4.06
Rutile.....	6 to 6.5	4.22

*Stannic and metastannic acids* are well-established polymeres:



The first is formed by precipitating a soluble stannate with an acid; the second by the action of nitric acid upon metallic tin. Their salts are, however, not polymeric, being constituted as follows:



The two mineral crystallized zinc-sulphides, *sphalerite*, or blende, and *wurtzite*, have been supposed to be polymeres,  $ZnS$  and  $Zn_3S_3$ , as well as dimorphs. They do not, however, differ much in their densities, these being 4.05 and 3.98. Among mercury compounds there are two cases of probable polymerism—that of the red (cinnabar) and black forms of *mercuric sulphide*, and the red and yellow modifications of *mercuric iodide*. The latter is also a case of dimorphism. One more case that may be mentioned is that of the two mineral crystallized forms of ferric bisulphide, *marcasite* and *pyrite*—right rhombic and cubical in crystallization, and therefore dimorphous—and having differing densities, 4.76 and 5.1. Berzelius pointed out that a great range of substances undergo, at a certain temperature

approaching ignition, a profound change of state, the point being indicated by a sudden evolution of heat producing a sudden incandescent glow that runs over the mass, and changes being produced in density, hardness, color, and solubility in acids. Among these substances are *zirconium*, *titanium*, and *tantalum* acids, *chromic oxide*, *ferrie oxide*, *pyrophosphate of magnesium*, and a great many others. The great changes in properties that occur during this glow would seem to indicate molecular condensations; in other words, polymerism.

3. *Allotropism* (Gr. *αλλότροπος*, adj., "changeable"). This term was initially applied by Berzelius to cases in which an elementary body exhibits two or more forms, distinct in physical and often in chemical characters. As, however, according to our accepted views of the molecular constitution of bodies, no rational explanation of these cases can be assigned except polymeric association of two or more elemental molecules, it follows that this division of our subject is intimately connected with the preceding division. It will be convenient, however, for purposes of classification to retain the term of Berzelius. Some seven or more of the elements are known to assume these allotropic states. *Oxygen*, *sulphur*, *phosphorus*, *carbon*, *silicon*, *boron*, and *zirconium* are accepted cases, and to these we believe might be reasonably added *iron* and *aluminum*. *Oxygen* and *ozone* are familiar allotropes. The density of ozone, as now known from the determinations of different chemists made by different methods, shows that it is formed by the condensation of three volumes of ordinary oxygen gas into two volumes. The remarkable and suggestive fact seems also to have been made out by a recent investigator, Hollmann, that during this condensation heat disappears to the amount of at least 3554 thermal units for weight. Our American chemist, Oscar Loew, has also shown that the products of ordinary free flame, as of coal-gas in air, exhibit ozone reactions. Whenever a thorough discussion and generalization shall be made by some competent chemist of our present knowledge of the relations of these two allotropes to each other and to other bodies, we may expect some important new glimpses into the secret system of nature.

*Sulphur* assumes at least five—some believe six—allotropic forms, two of which are crystalline, crystallizing in different systems, and being therefore dimorphs, and four of which are *amorphous*, or belong also to the next division of our subject. Three of the six forms are soluble in bisulphide of carbon, and the other three are insoluble.

The soluble forms are the right rhombic octahedrons of native sulphur (which crystallize out again in the same form from the solution), and the monoclinic sulphur formed by solidification from fusion; the third soluble sulphur being the substance precipitated as *milk of sulphur* by an acid, from alkaline solutions of sulphur. This last is probably the amorph corresponding to the native crystalline allotrope, as it passes in time into small octahedrons. We find in the two crystalline sulphur-allotropes an illustration of the view thrown out above, that elemental allotropes may be essentially polymeres; for the densities of the two are perceptibly apart, that of prismatic crystals from fusion being about 1.98, while the native transparent crystals are 2.072, nearly 5 per cent. greater. "Flowers" of sulphur (sublimed) consist chiefly of the amorphous soluble modification, passing slowly of course into the crystalline condition.

None of the insoluble modifications are known in crystalline form. One is produced by sudden cooling of melted sulphur, and is transparent, reddish-brown, soft, flexible, and somewhat elastic. In this condition it has a density of 1.96, about the same as the monoclinic soluble crystals, of which it is the amorph, and into which it soon passes. Another is formed by the action of water on the chloride of sulphur,  $S_2Cl_2$ ; a third by the action of ferric solutions on sulphuretted hydrogen when passed through the same.

Another broad and highly important natural distinction between the sulphur-allotropes was discovered by the great chemist Berthelot. He found that when electrolyzed, basic compounds of sulphur, or those with the electro-positive elements (including hydrogen), give *soluble* sulphur at the anode, while acidic compounds, or those with electro-negative elements, yield *insoluble* sulphur at the cathode; the soluble allotropes being therefore the acidic or *electro-negative* sulphurs, and the insoluble allotropes the basic or *electro-positive* sulphurs.

*Phosphorus* forms three beautifully defined known allotropes, almost as well characterized as those of carbon, described below. (a) *Brundt's Phosphorus*, the common commercial form—soft, wax-like, yellowish, and translucent; melts at  $44^\circ C$ , and boils at  $280^\circ$ . Crystallizes in regular dodecahedrons. Kindles in air, but not in oxygen—into spontaneous, slow, luminous combustion. Is one of the deadliest known poisons. Is soluble in bisulphide of carbon, and to some extent in petroleum and fatty oils.

When purified by sublimation may assume the form of transparent, colorless cubes of adamantine lustre (Blondlot). (b) *Schott's Phosphorus*, the red *amorphous* allotrope.—Brown-red, opaque, brittle, infusible; does not shine or change appreciably in air under  $200^\circ C$ . ( $390^\circ F$ ). Insoluble in everything, and not poisonous. (c) *Hittorf's Phosphorus*, the *metalloidal* allotrope.—Violet black rhombohedral crystals, translucent; conducts electricity feebly. The densities of these three allotropes are as follows:

Common phosphorus	.....	about 1.80 or 1.99
Schott's " "	.....	" 2.10
Hittorf's " "	.....	" 2.30

They must be admitted as most probably elementary *polymeres*.

*Carbon*.—Of this element there are two crystalline dimorphous allotropes—*diamond* and *graphite*—both of which are too familiar to need special description. Formerly, it was supposed that there was still a third *amorphous* form, exemplified in charcoal, anthracite, gas-carbon, etc.; but it is now known that these all contain hydrogen, and are in reality composed of hydrocarbons of highly condensed molecules. The densities of graphite and diamond are about 2.16 and 3.54, and they are doubtless polymeric. Some have rated the massive or amorphous graphites, like those of Borrowdale, Wunsiedel, etc., as a third modification, but there is no specific difference in density, and the point is still uncertain.

*Silicon*.—This element is believed to assume three allotropic forms—two crystalline and one amorphous. One of the crystalline forms seems to correspond to the diamond form of carbon, the other to the graphite form. The former is fusible at a high heat, the other infusible.

*Boron* has but two known forms—one crystalline, closely approaching diamond in hardness, lustre, transparency, and refractive power, while in the other form it is a dull, greenish-brown powder.

*Zirconium*.—This element is parallel to silicon in its allotropic forms, which are three in number—adamantoid, graphitoid, and amorphous. The adamantoid form has the color and lustre of antimony, but is very hard, like diamond.

*Iron*.—Some consider the so-called *active* and *passive* states of iron in reference to solvents as indicating two allotropic states.

*Aluminum*.—This metal, which is ordinarily highly indifferent to oxygen, either of air or water, is so profoundly modified in its attitude thereto by mere contact with mercury, that it oxidizes spontaneously in the air, with sufficient rapidity to develop strong heat, with a rapid efflorescence of hydrate of alumina. This was first observed by the present writer in 1867. It is believed by him to indicate an allotropic modification of aluminum.

4. *Amorphism* (Gr. *a*, privative, and *μορφή*, "form," meaning "without crystalline form or structure"). *Crypto-crystallization* (Gr. *κρυπτός*, "hidden," and *κρυσταλλος*) is also a term often used in this same connection, meaning a crystalline internal structure on a scale so infinitesimal or so confused, or both, as to be beyond the power of our microscopes. *Manneite* is another term often applied, particularly to mineral species when crypto-crystalline. Those *inorganic* bodies are called *amorphous* which have never been found to assume geometrical forms externally or to exhibit internal crystalline cleavage. As the evidence of amorphism is usually merely *negative* evidence, there is often much doubt of its reality, and as to whether the amorphous state is not sometimes due to *crypto-crystalline* structure. Internal cleavage is very far from being a constant occurrence in bodies having external crystal forms, and its absence is therefore equally far from being proof of absence of the crystalline condition. It is also known that in numerous cases of bodies which tend to crystallize with ease, the mere presence of some other matter in small proportion may so interfere as to cause an apparent amorphism, which, in some of these cases, may be easily proved to be due only to crypto-crystallization. It is easy to understand that two or more bodies dissolved together in the same menstruum, or dissolved in each other, may possess crystalline forces or tendencies so interfering with, or indeed altogether antagonizing, each other, as to prevent or altogether neutralize that polar disposition of the molecules which constitutes the crystalline structure. Another range of facts having a bearing here is presented by bodies of a *viscous* and *resinous* kind—like ordinary glass, for example—which were early assumed to present a *typical* amorphism, but in a great many of which crystalline structure has been since developed, by slow superficial solution or corrosion, and many of which have also been found to become crystalline when kept for sufficiently long periods at temperatures near fusion.

These considerations, with others, have influenced some students of nature to deny the existence of any really



amorphous solid state of matter, and to maintain that solidity is essentially an effect of crystallization; and hence that all solid matter must be crystalline. A question is here involved of great and fundamental importance to science, whose investigation has been much neglected. Among the main products of organic life are many bodies apparently soluble in water—*starch, gelatine, gum, and albumen* are familiar examples—which have never been obtained in crystalline forms. Among bodies entirely inorganic there are a few similar examples now known, of which the most familiar is *soluble amorphous silica*. The great chemist Graham discovered that these bodies do not really form true solutions in water, but that they could be separated from the water and from other substances really dissolved therein by straining or diffusion through membranous diaphragms. Graham therefore proposed a new natural classification of all bodies into *colloids and crystalline*. So far as we yet know, the colloid bodies of Graham, if no others, would appear to be true amorphs; and until these can be made to assume crystalline structure, the ancient theory of amorphism, and the ancient classification of solids into crystals and amorphs, must still hold; and we must allow that solidity is not solely a consequence of crystalline cohesion or concretion—that is, of polarization of the molecules—but that there exist other cohesive solidifying forces in nature not yet well defined by science—forces, or modes of force, which, when we consider that all organic bodies are substantially based upon colloid or amorphous compounds, would appear to be in the most intimate relations to life, and therefore to call for the most anxious and concentrated study. (See further under the head of *SOLATOLOGY*.)

Some special cases of amorphs are as follows:

(a) *Elements of Amorphs*.—Under the head of *allotropism* most if not all of these have already been referred to. We have, in forms probably, or at least possibly, amorphous, the elements *sulphur, phosphorus, silicon, carbon, and zinc*. Carbon, as amorphous graphite, is doubtful. Some chemists have held the view that the known *pyrophoric* forms that some metals are capable of assuming, such as *iron, nickel, cobalt, lead*, and others, are amorphous forms; also that *platinum black* and *gold* in the black, impalpable form, are amorphs. These views, however, are not yet established.

(b) *Compound Inorganic Amorphs*.—Of these, the opaline or amorphous state of *silica* has already been mentioned, but there are other forms of this compound which should be here referred to. *Silica* assumes two crystalline forms, which, though seemingly of the same crystalline system, are not the same thing, being doubtless polymers, as the common form, *quartz*, has a density of 2.653, or over 18 per cent. higher than *tridymite*, which is but 2.25, like opal. Now, there is still another form of amorphous and soluble silica, which appears to exist, in admixture with quartz, in flint, chalcedony, etc., and which has the higher density of quartz. Prof. Dana has suggested to call this form *jenzschite*, after Jenzsch, the mineralogist who first pointed it out. It appears, therefore, that we must now admit four distinct forms of silica—quartz, with its amorph *jenzschite*, and *tridymite*, a polymer as well as an isomorph of quartz, with its amorph, which is common opaline silica. Another inorganic compound—whose amorph is known to be diffusible throughout water as a perfect transparent colloid or quasi-solution, similar to those of starch, gelatine, etc.—is the *ferric hydrate*. Probably chromic and aluminic hydrates might admit of being handled in the same way. The hydrates of ferric oxide and alumina are moreover found native as minerals which possess crystalline structure. *Arsenious acid*, when fused, has been supposed to solidify to an amorphous mass which is transparent and glassy. It passes spontaneously into an opaque crystalline form, more soluble in water, similar to the crystals which condense on sublimation. Fused *borax* and *boracic acid* and *phosphoric acid* have all been claimed as amorphs. Many crystalline anhydrous mineral silicates which are unacted upon by acids pass when fused, often even when only ignited, with change of density, into what have been supposed to be amorphous states, becoming easily soluble in or decomposable by acids. Among these are some *garnets, raceminate, aciculate, epidotes, pyroxenoids, zoisite, danburite, lepidolite, tourmalines*, and others.

(c) *Organic Amorphs*.—These, as already intimated, are numerous. Excluding the bony portions of animal bodies, with their muscular juices, and certain constituents of the sap of some plants, it may be said that almost the whole bulk of both these kingdoms of nature is built up of amorphous or colloid compounds. In the case of plants, even the mineral matter, *silica*, which seems in many cases to be the analogue of the animal skeleton, is an amorphous body. The crystalline *sugars—sucrose, glucose, etc.*—pass when fused into amorphous forms. Other common organic

amorphs are most *resins, emulphones, gallotannic acid, cellobiose, the proteids generally, mucins, pepsins, keratins, bilirubins, and biliverdins, uric and lactic substances, coaly matters, etc.* etc. Great numbers have not been investigated or isolated, because they are amorphous, and hence cannot be purified by crystallization.

5. *Polymorphism* (including *Dimorphism* and *Trimorphism*). (Gr. *πολυμορφος*, "having many forms"). When an element or compound forms crystals which belong to two different systems of crystallization (on which subject see *CRYSTALLOGRAPHY*) it is called *dimorphous*; when to three different systems, *trimorphous*. The only reasonable explanation of polymorphism is *polymerism*, and several of the known cases have been referred to, therefore, in the preceding paragraphs under that head. The elementary bodies known or believed to be dimorphous are *carbon, sulphur, selenium, phosphorus, boron, silicon, zinc*, *iridium, palladium, lead, tin, copper, arsenic, antimony, and bismuth*. Among compounds some of the more remarkable cases known of dimorphism and trimorphism may be cited as examples: *Dimorphs*.—*Arsenious acid* and *antimonious oxide* ( $As_2O_3$  and  $Sb_2O_3$ ) both crystallize in the regular and trimetric systems, and are therefore *isodimorphous*. *Stannic acid* ( $SnO_2$ ) is said by Dana to crystallize in two of the three forms of *titanic acid* ( $TiO_2$ ), and therefore to be isodimorphous with the latter. *Mercuric iodide* (referred to above). *Sulphide of zinc*, as the minerals *blende* and *wurtzite* (referred to above). *Pyrite* and *marcasite*, yellow and white iron-bisulphide, monometric and orthorhombic. *Sulphate*  $KNO_3$ , hexagonal and trimetric. *Lead protoxide* ( $PbO$ ), monometric and orthorhombic (*Mitscherlich*). *Trimorphs*.—The three forms of *titanic acid* have been explained. Besides the hexagonal and trimetric forms of *calcic carbonate*, *calcite* and *aragonite*, Dana considers that the monoclinic form of *baryto-calcite*, composed of equal equivalents of *calcic* and *baric carbonates*, indicates further a case of trimorphism. Moreover, as *baryto-calcite* is itself dimorphous, having a trimetric form in *bromilite*, like *witherite*, this view is thus strengthened. Crystallized *nickel sulphate* ( $Ni_0.80_3.7H_2O$ ) is stated to crystallize in three systems—dimetric, trimetric, and monoclinic.

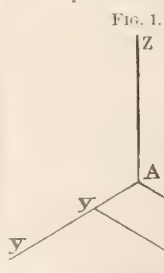
6. *Metamerism*.—(This important branch of the subject will be discussed under a separate head. See, therefore, the word *METAMERISM*.)

HENRY WURTZ.

**Isometrical** [Gr. *ισος*, "equal," and *μετρον*, "measure"]. Isometrical projection is a species of orthographic projection in which but one plane of projection is employed. It is used by engineers and architects in delineating structures whose principal lines are parallel to three rectangular axes. The plane of projection is taken so as to make equal angles with these axes; consequently, the projection of any line parallel to either axis bears a constant ratio to the line itself. The three axes are called co-ordinate axes, and the planes of these axes, taken two and two, are called co-ordinate planes: one of the three planes is usually taken horizontal, and that one is called the *horizontal plane*; a second is taken in front of the point from which the object is viewed, and that is called the *frontal plane*; and the third is taken to the left of the point of view, and that is called the *lateral plane*. The plane of projection is supposed to pass through the point of intersection of the three axes, which point is then called the *centre of projection*. The projections of the co-ordinate axes pass through the centre of projection, and make equal angles—that is, angles of  $120^\circ$ —with each other; these projections are called the *directing lines* of the projection. If we construct a scale of equal parts on either axis, its projection on the corresponding directing line will be a scale of equal parts, which is called the scale of that directing line; the scales of all the directing lines are the same, and may be assumed at pleasure.

To explain the method of projecting points isometrically,

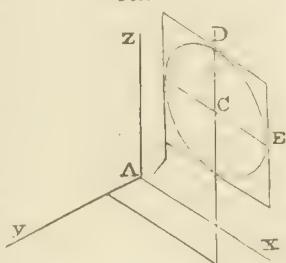
FIG. 1.  
let A be the centre of projection,  $Ax$ ,  $Ay$ , and  $Az$  the directing lines, and suppose  $Az$  to be vertical. Then, to construct the projection of a point whose distance from the frontal plane is 2, whose distance from the lateral plane is 4, and whose distance from the horizontal plane is 5, lay off  $Ay$  equal to 2 from the assumed scale of the directing line; from  $y$  draw  $yz$  parallel to  $Ax$ , and on it lay off  $yz$ , equal to 4; from  $x$  draw  $xz$  parallel to  $Az$ , and make it equal to 5; then will  $z$  be the required projection. In like manner, any point may be projected when we know its distances from the co-ordinate planes. To project a line



which is parallel to one of the axes, construct the projection of one of its extremities as just explained; then from the point thus determined draw a line parallel to the corresponding directing line, and on it lay off, from the scale, the length of the given line. To project a line that is not parallel to any axis, project its extremities, and join the projections by a straight line. To project a curve, project a sufficient number of points, and through their projections draw a curved line. These principles are sufficient to make an isometrical projection of any structure whatever.

In drawings of machinery it is often desirable to project circles whose planes are parallel to one of the planes of projection. Such projections may be made as follows: construct the centre,  $C$ , of the projection in accordance with the rule given for constructing the projection of a given point, and suppose the plane of the given circle to be parallel to the frontal plane; through  $C$  draw  $CT$  parallel to  $Ax$ , and make it equal to the radius of the given circle; also draw  $CD$  parallel to  $Az$ , and make it equal to the radius of the given circle; on  $D$  and  $C$ , as equal semi-conjugate diameters, construct an ellipse, and it will be the projection of the given circle.

FIG. 2.



W. G. PIERCE.

**Isomorphism, Homomorphism, Isoterism and Paralleloterism, Isotomy, Polymeric Isomorphism, Allomerism, Heteromorphism, Hemimorphism.** These terms are all so intimately related to each other in the language of chemistry that they should be explained in connection with each other.

**Isomorphism** (Gr. *isos*, "equal," and *morphe*, "form"). Isomorphs, or isomorphous bodies, are bodies which crystallize in forms belonging to the same system of crystallization, and having crystalline axes that bear the same proportions to each other. (See article on CRYSTALLOGRAPHY, by PROF. THOMAS EDGEMOND.) The Abbé Haüy, the father of crystallography, imagined that every distinct chemical body had a distinct crystal form, specific to itself. Nearly a century since, however, Werner began to throw doubt on this, by demonstrating the precise similarity between the hexagonal prisms of the two native phosphates of lime and lead. Leblanc, Vauquelin, Berthier, Wollaston, and Gay-Lussac followed up the direction thus indicated, until at length Mitscherlich announced, in 1820, as a grand generalization, that correspondence of crystalline form shows parallelism in chemical nature or correspondence in chemical structure, and conversely. The study and development of this principle or general law, and of the perturbations to which it is subject through many influences, has contributed wonderfully to our insight into nature. It may, for example, be said to be the corner-stone of *mineralogy* as a branch of chemical sciences, and without it chemical science in general would be far behind its present position.

Isomorphism, in the narrow sense of the term, as signifying exact equality of form, is found, strictly speaking, only in bodies which crystallize in the regular or isometric system. The term *homomorphism* (Gr. *homoios*, "similar," and *morphe*) is much preferable, as a word of more general application. Among the most familiar illustrations of the principle are those constantly occurring cases in which a complex molecular group has one or several of its elemental molecules substituted, either wholly or partially, by other elements. In this case there will be usually found in all the anisometric systems, or those having unequal axes, that variations will follow in the relative lengths or inclinations of the axes, leading to variations of the angles of the crystal; while in regular crystals such variation of equality of axes or of angles, which would be, in reality, a passage to another system, can never, in the nature of things, occur.

It has been inevitable that in the past the study of the relations of crystalline form and chemical composition, including homomorphism, has been chiefly among crystals found in nature, of which minerals furnish almost all the examples. The generalizations, therefore, of the earlier students of this branch of science were unquestionably far too narrow; and even as early as 1834, Von Kobell presented broader views. Not to enter into the history of the subject, which would require great space, its present condition may be summed up by saying that as a result of uniting the modern views, generalized chiefly from the discoveries in organic chemistry, and known as the theory of *isomorphism* (see article on CHEMISTRY, by PROF. GEO. F.

BARKER), with the facts of homomorphism in the mineral kingdom, our famous American philosopher, James D. Dana of New Haven, has recently adopted theoretical views which appear to reconcile and to cover most of the facts known, and to furnish a basis for the classification of chemical compounds in accordance with both chemical composition and mineral homomorphism. Prof. Dana's generalization may be expressed thus: *The weights of the atoms of other elements which combine with equal and equivalent weights of oxygen, sulphur, or other electro-negative or chlorous element, are those which replace each other isomorphously or homomorphously.* While the ordinary modern views of equivalence and classification are founded on a comparison of, or reduction to, the types of hydrogen-compounds, such as water, ammonia, and marsh-gas, the wider and more comprehensive scheme used by Dana may properly be considered as a theory of physico-chemical correlation of the metallic or basylous elements with oxygen and other acidic elements. Whether the two schemes can be reconciled and made consistent with each other, remains to be seen. Homomorphism among carbo-hydrogen compounds has been studied as yet comparatively little, and we cannot know how it may yet modify the views of organic chemists.

In reference to this question, it may indeed be very suggestively pointed out that our present prevailing theories of molecular relations in organic chemistry, and the systems of nomenclature, notation, and classification that they have, in a manner, forced on the chemical world—arising, as they did originally, from the illustrious Laurent's idea in 1846 of the reduction of alcohols and ethers to the "water-type," followed up by our great American chemist, Sterry Hunt, in 1848, by the reduction of all oxygen-acids theoretically to the same type—are generalized and reasoned exclusively from the phenomena and relations of oxygen and hydrogen to each other and to other elements while in one special condition—the gaseous condition—of matter; a condition of matter as widely separated as possible from the crystal condition; in which latter certain modes of force must act, that in gases are wholly neutralized or latent. Hence, the belief can scarcely be resisted that the generalizations of the organic chemists can be but partial and imperfect ones, and that they must yet be subjected to the test of comparison with the relations which will be found among the crystals of organic compounds.

From Dana's view it follows—or, rather, one of the prominent facts on which the view is based is—that different oxides, chlorides, and sulphides of the same metal may all be isomorphs or homomorphs. For example:  $\text{Fe}_2\text{O}_3$ ,  $\text{Fe}_3\text{O}_4$ , and  $\text{FeS}_2$  are all found in the regular system. Dana formulates these, hypothetically, as follows:  $\text{Fe}_3\text{O}$ ,  $\text{Fe}_2\text{O}$ , and  $\text{Fe}_3\text{S}$ ; the weights  $\text{Fe}_3$ ,  $\text{Fe}_2$ , and  $\text{Fe}_3$  being isomorphous, or actually of the same form in crystals. He expresses the law nearly thus: *The replacing value in crystals equals the combining power (with a chlorous element).* Besides these, iron combines with oxygen in two other proportions,  $\text{FeO}$  and  $\text{FeO}_3$ ; and there are therefore five weights of iron, which are equivalent to each other in crystalline form, and should replace each other without change of crystalline system—namely,  $\text{Fe}$ ,  $\text{Fe}_3$ ,  $\text{Fe}_2$ ,  $\text{Fe}_3$ ,  $\text{Fe}_3$ . Dana calls these (crystallogenically) the states of iron, and designates them by the letters of the Greek alphabet,  $\text{Fe}$  being *alpha* iron,  $\text{Fe}_3$  *beta*-iron,  $\text{Fe}_2$  *gamma*-iron, an intermediate state (not known in case of iron)  $\text{M}_2$  being the metallic *delta*-state,  $\text{Fe}_3$  *epsilon*-iron, and so on. Any metallic oxide of one of these crystal-states should replace any oxide of any other crystal-state of the same metal, or even of any other crystal-state of any other metal, homomorphously. So of sulphides or of chlorides. The enormous breadth thus given to our views of homomorphism may probably be somewhat restricted and modified by future investigations, but known cases appear to justify the above statement quite to its fullest extent. In the further extension of these views to the defining of the basic and acidic relations of oxides, etc., we cannot here follow Prof. Dana, but must refer to his magnificent *System of Mineralogy* (ed. of 1869), and to his published papers in the *American Journal of Science*. It should, however, be pointed out that such replacements follow the simple law that the amount of both basic and acidic oxygen, sulphur, etc. remains always the same, in such replacements without change of crystal system; and the principle is thus made manifest that it is the electro-negative elements of a molecular group that mainly govern the crystalline or molecular structure assumed. Hydrogen, whose combining weight or volume is now made the basis of all classification and speculation in organic chemistry, is on a par with any other electro-positive or basylous element in the illimitable field of inorganic or azote chemistry—so far, at least, as the eminently specific



character of crystal-form is concerned—and may be replaced or displaced, molecularly or crystallogenically, by iron, for example, in three or four different proportions or "states."

**Elemental Isomorphs.**—The following, among the elements, have been observed to crystallize in regular or monometric forms, and as such their molecules are therefore absolute isomorphs: Carbon (as diamond), phosphorus, gold, platinum, palladium, cerium, silver, copper, lead, tin, zinc, cadmium, titanium, potassium, sodium. Probably many more, if not all, will be obtained as monometric crystals: as is readily inferable from many cases of isomorphism of their compounds.

**Other Elemental Homœomorphs.**—In the hexagonal or rhombohedral system we have carbon (as graphite), phosphorus (Hittorf's allotrope), palladium, iridium, osmium, arsenic, antimony, bismuth, and tellurium. The first four of these, being also monometric, are dimorphous. In the trimetric system there are two elemental homœomorphs, iodine and sulphur (in one of its forms).

**Compound Regular Isomorphs.**—Very nearly all the known oxides, chlorides, bromides, iodides, fluorides, sulphides, selenides, and cyanides are isomorphs of Dana's alpha-state; also most three-four oxides, considered by Dana as compounds of alpha and beta-oxides, such as spinels, magnetite, chromite, franklinite, uraninite, limonite, etc.; also two beta-oxides, arsenious and antimonious acids; the gamma-sulphides,  $\text{FeS}_2$ ,  $\text{MnS}_2$ ,  $\text{CoS}_2$ ,  $\text{CuS}$ ,  $\text{NiS}$ ,  $\text{As}_2\text{S}_3$ ; one epsilon-arseniet,  $\text{CoAs}_2$ ; the alums, the garnets, etc. etc.

**Compound Homœomorphs.**—Of these there are multitudes of groups. A few examples may be cited: Hexagonal beta-oxides, alumina, hematite, chromic oxide, ilmenite ( $\text{FeTiO}_3$ ), perovskite ( $\text{CaTiO}_3$ ), tetralpyrite,  $\text{Bi}_2(\text{TeS}_3)_4$ ; also one three-four compound,  $\text{Bi}_3(\text{TeS}_8)_4$ . Hexagonal alpha-oxides, sulphides, etc., or polymers (?), ice, zinc-oxide, the zinc-sulphide wurtzite,  $\text{CdS}$ , argentic iodide (these are by some, with good reason, believed to be polymers in crystal-form, thus,  $\text{H}_2\text{O}$ ,  $\text{ZnO}$ ,  $\text{ZnS}$ , and so on); ( $\text{PbI}_2\text{PbO}$ ), *cinnabar*,  $\text{HgS}$ ,  $\text{NiS}$ ,  $\text{Bi}_2\text{TeS}_3$ ,  $\text{NiAs}$ ,  $\text{MnAs}$ ,  $\text{NiSb}$ ; with one gamma-sulphide molybdenite, and one gamma-oxide, quartz  $\text{SiO}_2$ . Orthorhombic oxides, chlorides, sulphides, and fluorides: here we have mendipite ( $\text{PbCl}_2\text{PbO}$ ), *cinnabar* probably  $\text{PbCl}_2\text{O}_3$ , *chrysoberyl*  $\text{BeOAl}_2\text{O}_3$ , *erythrite* ( $\text{NaF} \cdot \text{AlF}_3$ ),  $\text{As}_2\text{S}_3$ ,  $\text{Sb}_2\text{S}_3$ ,  $\text{Bi}_2\text{S}_3$ ,  $\text{AgS}$ ,  $\text{AgTe}$ , *brookite*  $\text{TiO}_2 \cdot \text{MnO}_2$ , and *marcasite*  $\text{FeS}_2$  (the dimorph of pyrite). Tetragonal,  $\text{SnO}_2$ ,  $\text{TiO}_2$ , as *rutile* and *orthoclade* ( $\text{PbCl}_2\text{PbO}$ ), and one three-four oxide *minium*. Trimetric,  $\text{As}_2\text{O}_3$ ,  $\text{Sb}_2\text{O}_3$ .

Among more complex compounds there are, of the hexagonal forms, many carbonates, soda and potash nitres, tribasic phosphates, several hyposulphates; of the dimetric, Ni and Zn sulphates and selenates with  $7\text{H}_2\text{O}$ , the arsenites and phosphites, *ammonia silver sulphate selenate and chromate*, etc.; of the trimetric, the aragonite group of carbonates, plumbic barite and *etronite* sulphates, *potassic sulphate selenate chromate and manganate*, Mg Zn and Ni sulphates and selenates; of the monoclinic, Mg Zn Co Ni and Fe sulphates and selenates with  $7\text{H}_2\text{O}$ , and another group of the same with  $6\text{H}_2\text{O}$ ; a great group of double sulphates with  $6\text{H}_2\text{O}$ ; a group of sulphates selenates and chromates with  $10\text{H}_2\text{O}$ , etc.; of the triclinic, a group of sulphates and selenates of Mn Zn and Co with  $4\text{H}_2\text{O}$ , and another group with  $5\text{H}_2\text{O}$ .

**Homœomorphic Replacements among Mineral Silicates.**—This is a branch of the subject of the utmost importance in mineralogy and mineral analysis. (Its discussion will be found in the article SILICATES, CHEMISTRY AND CLASSIFICATION.)

**Isosterism, Isotomy, and Parallelosterism** (see under separate heading of ISOSTERISM); **Polymeric Isomorphism and Allomerism** (see under separate heading of POLYMERIC ISOMORPHISM); **Heteromorphism** [Gr. *ἕτερος*, "different," and *μορφή*]. Heteromorphous bodies are those which, while having similar or symmetrical chemical formulæ—except that they may contain different basic or acidic elements—and even sometimes possessing so-called isosteric relations, yet crystallize in distinct systems. The term is convenient for classifying apart these exceptional cases.

HENRY WURTZ.

**Isoperim'etry** [Gr. *ἴσος*, "equal," *μετρί*, "around," and *μετρον*, "measure"], a branch of mathematics that treats of the properties and relations of isoperimetric figures—that is, of surfaces having equal perimeters, and volumes bounded by equal surfaces. It may be shown by elementary geometry that the greatest plane area having a given perimeter is a circle, and that the greatest volume bounded by a given surface is a sphere. Of all triangles having a given perimeter, the equilateral triangle has the greatest area, and in general of all polygons with a given number of sides and a given perimeter, that has the greatest area whose sides are equal. The principles of isoperimetry are best developed by means of the calculus of variations.

W. G. PECK.

**Is'opods** [Gr. *ἴσος*, "equal," *πόδος*, "foot"], an order of tetracephal crustaceans, characterized especially by the presence of branchia to the abdominal segments (although these may be functionally atrophied), and their absence from the bases of the legs, and typically by the approximate conformity in size and functions of their seven pairs of legs. The group embraces numerous small crustaceans, mostly inhabiting salt waters, and is also represented by freshwater and terrestrial forms, the sow-bugs (*Oniscus*) and pill-bugs (*Porcellio* and *Armadillo*) being well-known examples of the latter.

**Isos'terism, Homœosterism, Parallelosterism, Isotomy.** These are terms which denote that branch of chemi-physical science which investigates bodies in relation to their molecular or chemical equivalent volumes. *Isosterism* is derived from the Gr. *ἴσος*, "equal," and *στερῆς* or *στερεός*, "solid, impenetrable;" *isotomy* from *ἴσος* and *τομος*, "indivisible." The molecular or equivalent volume of a body is obtained by simple division of the molecule or equivalent by the specific gravity. *Isosteres* are simply bodies which give, in this way, closely equal numbers. *Parallelosterism* is applied to certain cases in which pairs or series of compounds, which are homœomorphous or analogous, show equal differences of equivalent volumes. Equivalent volumes are necessarily of three kinds, as applied to the three conditions of matter—solid, liquid, and gaseous; and as the equivalent is a constant factor—subject only to those multiple variations dependent on polymerism—and the density varies usually with the condition, it is necessary to complete knowledge to search for numerical relations throughout all three conditions. The simple laws, however, which govern gaseous equivalent volumes have already been explained under the heading CHEMISTRY, by PROF. G. F. BARKER. The term isosterism, in ordinary usage, is not so applied as to include gaseous, but only solid and liquid conditions, though in the widest sense it would cover all. The difficulties in the way of the study of isosterism are very considerable, chiefly from the fact that the cases in which the variable factor, the density, is determinable with certainty and accuracy, and without interfering causes, in liquid and solid bodies, are rather exceptional than otherwise. This drawback is more applicable to solids than to liquids, as in the former case absolute surety is only had when the solid is both chemically pure and homogeneously crystallized. Of real crystalline and chemical homogeneity there can seldom be certainty, for isomeres, polymeres, and metamerer, and even allotropes, may often be, and in some cases are already known to be, also isomorphs; and still oftener, and with far greater likelihood, homœomorphs. (See article ISOMORPHISM.) Such will usually crystallize together in the same crystal, even when differing materially in density; and in numerous such cases a knowledge even of the fact of such cryptic heterogeneity will arrive as the result only of a great accumulation of observations, such as exists yet in but few cases. In the case of liquids, also, metamerer, of differing densities, may not be separable, by reason of approximation of their boiling-points.

Density being variable with temperature, equivalent volume is therefore a function of the temperature; and the question arises whether there is any uniform temperature at which all bodies should be taken in order to discover isosterism? If not, as is almost obvious, could any relative temperatures—for example, points equidistant from the fusing-point or boiling-point in each case—be adopted? This latter is yet without proof. It would appear as if proportional relations might be sought for between the coefficients of expansion of bodies by heat—rather than between the volumes at any given temperature—and the equivalent weights. This, however, does not belong to our present subject.

Though the study of molecular volumes is yet in its infancy, the literature of the subject is nevertheless very voluminous, while at the same time scattered through very numerous scientific journals. In Europe the principal authors and investigators have been H. Kopp, Schroöder, Tschermak, Löwig, Filhol, H. Schiff, Safarik, Jungfleisch, Playfair and Joule; in America, Sterry Hunt, F. W. Clarke, Isidor Walz, and, above all, James D. Dana.

The remark made under ISOMORPHISM, that (outside of the regular system) strict crystalline equality does not exist, we find still more applicable to this closely-related study of volume-equivalents; and, as in the former case, a term expressing approximation only seems preferable—indeed, here almost indispensable. Such a term is *homœosterism*. In tabulating and classifying equivalent volumes, there are several important reasons in favor of adopting, as the unit for comparison, that of the crystal of diamond. Diamond has the smallest known equivalent volume, and its true specific gravity is probably known with greater certainty, in the chemically pure crystalline state, than almost any other elementary body.

**Elemental Homœosteres.**—In a tabulation of the elements, in the order of their equivalent volumes, commencing with diamond as the lowest, and calculated to the diamond-scale, we almost at once encounter a remarkable group of eight elemental homœosteres—Nos. 5 to 12 inclusive, in the second column below:

	Eqvy. Volts.*		Eqvy. Volts.
1. Diamond	1.	5. Uranium	1.92
2. Boron	1.21	6. Glucinum	equiv.
3. Graphite	1.31	7. Cobalt	1.955
4. Glucinum equiv. = 9.3) 1.303		8. Nickel	2.03
		9. Copper	2.117
		10. Chromium	2.118
		11. Iron	2.119
		12. Manganese	2.16

These eight metals form a strongly-marked *natural* group. Immediately following them comes another, larger series of homœosteres:

13. Palladium	2.653	21. Gold	2.98
14. Iridium	2.66	22. Iodine	3.
15. Rhodium	2.71	23. Silver (crystallized)	3.018
16. Platinum	2.73	24. Tungsten	3.075
17. Zinc	2.735	25. Aluminum	3.123
18. Rhenium	2.74	26. Magnesium (?)	3.15
19. Osmium	2.74	27. Molybdenum	3.291
20. Vanadium	2.743	28. Silver (fused)	3.45

The position of magnesium here is founded on density-determinations of Playfair and Joule, which exceed the mean of other chemists by about 30 per cent. These others bring its equivalent volume up to 4.1. This series includes all the so-called "noble metals," bringing in some, such as V, In, W, Al, and Mo, which other classifications separate widely therefrom: though all these clearly have claims to the title. Zn and Mg, however, have no such claims. One other example may be cited, among those elements (and elementoids), which have the most voluminous equivalents, of a small series of homœosteres: *liquid chlorine*, 7.85; *liquid bromine*, 7.9; *solid iodine*, 8.5; *liquid cyanogen*, 8.79.

**Compound Homœosteres.**—The new view above propounded, that there is really no true isoterism, but only a progressive homœoterism, is more remarkably exemplified and demonstrated by series of corresponding compounds than of elements. Some oxides of the form  $M_2O$  give us the following:

	Densities.	Diamond-scale, volume-equiv.
Water	$H_2O$ 1.00	5.3
Iron (mean of 29 determinations)	7.85	5.763
Sodium oxide	$Na_2O$ 2.805	6.21
Cuprous oxide	$Cu_2O$ 5.897	7.13
Argentous "	$Ag_2O$ 7.18	9.5
Mercurous "	$Hg_2O$ 10.69	11.44
Potassic "	$K_2O$ 2.636	11.50
Plumbous "	$Pb_2O$ 9.772	12.94

The oxides of the form  $MO$ , of the first series of elemental homœosteres, tabulated above, so far as the densities are known, give us—

	Equivalents.	Densities.	Diamond-vols.
Uranous oxide	136	10.15	3.941
Cobaltous "	75	5.674	3.888
Nickelous "	75	6.915	3.493
Cupric "	79.5	6.25	3.741
Chromous "	68.5	Unknown.	
Ferrous "	72	"	
Manganous "	71	4.909	4.254

This series furnishes an illustration of the extreme imperfection of many of our data, as yet, for such calculations. The densities of nearly all these most important oxides are imperfectly known, and those on record vary much. For instance, seven figures given for  $NiO$  vary from 5.6 to 6.8. The one adopted above is the mean of the seven.

Some *nequioxides* give the following progressive series of volumes:

Glucina considered as $Be_2O_3$	7.3
Alumina	7.7
Chromic oxide	8.944
Cobaltic "	9.11
Ferric "	9.14
Vanadic "	9.382
Manganic "	10.07
Nicklic "	10.11

A number of other progressive series are readily made out among oxides of other forms. An analogy is strongly suggested in this relation with the *homologues* of organic chemistry (see article *HOMOLOGY*, by Prof. H. WERTZ), in which there is found a similar progressive increment of

equivalent volume. Also among *chlorides* and *sulphides* there are similar serial relations. Of the first elemental homœosteric series the following *monosulphides* are presentable:

CoS	4.9
NiS	5.21
FeS	5.41
MnS	6.40
CuS	6.62

There are apparently no indications of similarity in the order of progression in the several cases of the elements, oxides, sulphides, and chlorides; but the densities of many of the compounds are still so uncertain that we cannot decide that such dissimilarity is general.

The most obvious and striking consequence of arranging the elements in the order of their equivalent volumes is that in very numerous cases individual elements, and groups of such, are thus brought into contiguity or proximity, which are known to be allied to each other, but which, in any other mode of classification, fall far apart. This will be further treated of under the head of **MOLECULAR VOLUMES**.

In chemical textbooks much stress is often laid on cases in which supposed isosteres are also *isomorphs*, generally because found to be alike *isometric*. Almost all the elements may, however, be able to assume isometric forms, and such correspondences therefore do not seem to carry much weight. Attempts, moreover, are made to show numerical relations of equivalent volumes in "simple multiple proportions." (See *Watts's Dictionary*, "Isomorphism," vol. iii. p. 431.) Closer calculations, with better data, are far from bearing out any of these assumed multiple proportions; and indeed it is difficult to see why simple multiple ratios of volume should inhere in any case; a *geometrical* ratio, as that of the cube-roots—if there be any relation, which is yet to be determined—being more in accordance with the nature of the case. It has been held by high authority that perfect and absolute isomorphism must imply isoterism, or *isotony*, as some term it. No *a priori* reason is apparent for this, and facts do not bear it out.  $MnO$  and  $Mn_2O_3$  are mutually replaceable, for instance, in crystals, in proportions representing equal amounts of oxygen; that is,  $MnO$  and  $Mn_2O_3$  of which the equivalent volumes are respectively 4.254 and 3.36. So also  $CoO$  and  $Co_2O_3$  or  $C_2O_3$ , have the respective equivalent volumes, replacing each other crystallogically, of 3.888 and 2.978.

(For some account of important investigations of Prof. James D. Dana upon this subject, see article on **SILICATES, CHEMISTRY AND CLASSIFICATION**: for others of Prof. F. C. Clarke, see **WATER OF CRYSTALLIZATION**; and of Dr. Isidor Walz, see **SOLUTION AND SOLUBILITY**. HENRY WERTZ.

**Isotermal Lines.** See METEOROLOGY.

**Isotropical Lines.** See CLIMATE, by Prof. A. GUYOT, PH. D., LL.D.

**Isotrop'ic** [*isos*, "equal," and *τροπή*, "turning"]. A homogeneous solid is said to be *isotropic* when any equal or similar (in form) portions cut from any relative positions in the body are indistinguishable from one another, or when a spherical portion exhibits uniformity of quality along all its diameters. *Crystalline* substances, *stratified* substances, *fibrous* substances, etc. etc. are not isotropic, inasmuch as their elasticity, tenacity, etc. differ for different directions; and such are called *anotropic*. If we have reference not only to *mechanical* but to all physical properties (e. g. absorption and transmission of light, of heat, etc.), a body may be isotropic in one quality or class of qualities, and anotropic in others. J. G. BARNARD.

**Isfahan'**, city of Persia, the capital of the province of Irak-Ajemi, on the Zendarud, in lat. 32° 39' N. and lon. 51° 41' E. From the fourteenth to the beginning of the eighteenth century it was a flourishing and steadily increasing city, and when, in the seventeenth century, Shah Abbas made it his residence and the capital of Persia, it rapidly rose still higher, and became one of the most magnificent cities of Asia. But in 1722 it was taken and sacked by the Afghans, and although it was retaken in 1729 by Nadir Shah, yet Teheran became the capital of Persia, and Isfahan fell into decay. Among its most splendid monuments are the bridge over the Zendarud, 1000 feet long, resting on 34 arches and bearing arched galleries; the palace of Chahel Sittou ("forty columns"), whose front is formed by a double range of columns 40 feet high each, and with a base formed of the united backs of four lions in white marble; the mosque of Mesjed Shah, whose vast dome rises among a forest of spires, towers, minarets, and open galleries. But these and many other wonderful monuments are rapidly decaying, and they are surrounded by ruins. Miles of streets have no inhabitants. The population is estimated at between 60,000 and 100,000. There are signs, however, which indicate that Isfahan may rise once more. Its

\*The molecular or equivalent volumes given in this and subsequent articles have all been calculated anew, specially for this work, with the aid of the invaluable Smithsonian Tables of Densities by Prof. E. W. Clarke of Cincinnati. The equivalents used are those adopted by Prof. Barker in his article on **CHEMISTRY**.



manufactures of gold, silver, silk, velvet, glass, weapons, and earthenware have maintained their high reputation, and its artisans are esteemed the best in Persia. Its situation on the main commercial route between India and Europe is the same as in olden times, and its surroundings are still exceedingly fertile and well cultivated.

**Is'rael** [Heb. *Yisrael*, "a prince with God"], the name bestowed upon JACOB (which see) when he wrestled with an angel at Peniel (Gen. xxxii. 28), afterward the distinctive name of his descendants, and particularly of the northern kingdom of the ten tribes.

**Israel**, tp. of Preble co., O. Pop. 1751.

**Israelites**. See JEWS, by PROF. FELIX ADLER.

**Issaque'na**, county of Mississippi, having the Mississippi River on the W. and the navigable Yazoo and Sunflower rivers on the E. Area, about 720 square miles. It is partly swampy and covered with dense woods. It is generally level and very fertile. Cotton is the staple product. Cap. Mayersville. Pop. 6887.

**Issoire'**, town of France, in the department of Puy de Dôme, on the Crouse. It has several distilleries. Pop. 6139.

**Issoudun'**, town of France, in the department of Indre, on the Theols. It has extensive manufactures of woollen and linen stuffs. Pop. 14,482.

**Is'sue**, in the law of pleading. This arises when a proposition of fact or a conclusion of law is directly affirmed by one party to the suit and controverted by the other. It is the point in dispute which is presented for decision to the court or jury. Issues are of two kinds—of law and of fact. The former arises upon demurrer, and presents a question of law, which is adjudicated by the court sitting without a jury (see DEMURRER); the latter arises upon a traverse or answer to the allegations of the opposite party, and presents a question of fact, which in a common-law action is determined by a jury, and in an equity case by a judge. In some of the States both classes of issues may by consent of parties be tried by a referee. It is the object of various rules of pleading that the issue shall be upon a point material to the controversy, shall be free from uncertainty or ambiguity, and shall present but a single question for decision upon each separate subject of litigation. (See PLEADING.) There is a form of issue termed technically a "feigned issue," from the peculiar manner in which it originates. Such issues occur in the progress of a cause before a tribunal sitting without a jury, when some question of fact arises upon which the decision of a jury is desired. A fictitious suit is framed involving the point to be determined, and is brought to trial before a jury, and carried on to verdict in the usual way. The verdict rendered is then returned to the court in which the cause first arose for its further action. The application of the term "feigned" to the issue is not appropriate, since the fiction is not in the issue, but in the action which is framed and in the state of facts upon which it is founded. Feigned issues almost invariably arise in the progress of suits in courts of equity, and are ordered by the court to be heard before some tribunal proceeding according to the forms of common law with a jury. Sometimes, however, they arise in courts of law. Feigned issues are abolished in New York, and it is only necessary that an order be made by the court for the trial before a jury of the point to be decided, and such order is the only authority necessary for the trial. (For GENERAL ISSUE see that topic.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Is'sus** [*Issós*], an ancient city of Cilicia, near the mouth of the river of the same name, at the head of what is now the Gulf of Scanderoon. In Xenophon's time it was great and prosperous. Here Alexander (333 B. C.) gained a great victory over Darius, whose family was captured. No remains of the town are believed to exist, and it is probable that its site is covered by the sea.

**Issy'**, town of France, in the department of Seine, on the Seine. It has extensive bleaching-grounds. Pop. 6763.

**Isthmian Games**. See GRECIAN GAMES, by PROF. H. I. SCHMIDT, S. T. D.

**Is'tip**, town of European Turkey, in the eyalet of Uskiup, on the Istip. It is a well-built town, with a large industry and extensive bazaars. Pop. 18,000.

**Is'tria**, county of the Austrian province of the coast districts (Küstenland), consists of a mountainous peninsula projecting into the north-eastern part of the Adriatic, and is bounded by the territory of the city of Trieste and the county of Görz. Pop. 240,000. Cap. Pissino.

**Italian Architecture**. See RENAISSANCE, by C. PETERSEN.

**Italian Language and Literature**. The vernacular speech of the Italian people embraces a great number of provincial dialects, widely differing from each other in articulation, but descended chiefly from a common stock, or, to speak more precisely, from a cognate linguistic group comprising Latin, Umbrian, Oscan, and perhaps Etruscan, as well as other less-known ancient branches of the Italic family of tongues. They all contain more or fewer words of Germanic origin, besides many technical as well as purely local terms derived from other sources; but the proportion of the Italic or indigenous element is everywhere overwhelming, and it is hardly an exaggeration to say that the vocabulary of the Italian language, in all its provincial varieties, is homogeneous. These dialects, except as spoken by the lowest classes in large cities, are not corrupt *patois* confined to the ignorant and the vulgar, but many of them are rich, expressive, and refined, and they are habitually used in familiar intercourse, not only by the middle and inferior ranks, but by persons of social and literary culture, to a very much greater extent than is the case with the provincial dialects of most other European languages. Their diversities of pronunciation, of form, of idiomatic expression, and even of syntactical combination, are such that a stranger who has acquired only Tuscan, or the language of literature and of general Italian society, finds all the vernaculars, including the humble street and household dialect—or what may be called the *cockney*—of Rome, and even of Florence itself, almost wholly unintelligible. Even the native inhabitants of different Italian provinces cannot freely communicate with each other without resorting to Tuscan, which is known by all Italians of the slightest pretensions to education, and is therefore properly characterized as the *lingua comune*, or "common tongue," of the whole kingdom. This dialect, though the common property of the whole Italian people, is the peculiar fireside, field, and market, as well as literary, language of Tuscany and parts of the adjacent provinces; but even within these limits there are in popular use considerable discrepancies both in accent and in vocabulary. The better class of the peasantry in the mountain territory of Pistoja, in the upper Val d'Arno, and in some other localities, speak Tuscan with a beauty of articulation—or, more accurately, of delivery—an elegance of phrase, and a picturesqueness of vocabulary which can hardly be paralleled by the popular discourse, not merely of other parts of Italy, but of any other European country. It is in this perennial "well of language undefiled," not in French or in classical Latin, that Italian literature ought to seek the enrichment and variety of diction, the flexibility and versatility of construction, which the *lingua comune* needs before it can become truly an all-pervading vital medium of national thought and expression.

But though Tuscan may fairly claim to be the sole national medium of exchange of thought, and though the pronunciation of all the provinces tends to assimilate, yet in the different parts of the kingdom there is a wide range of local variation in oral articulation in good social circles, and of literary diction in the dialect of public discussion and of books. The speech of every provincial "bewrayeth" him, not only by his shibboleth, but by his idioms and the general choice and arrangement of his words; and in Parliament the *pace* of every orator is at once recognized by both his accent and his phraseology. The writings of all non-Tuscans are criticised as marked by solecisms, if not by positive *apocromatization*. Manzoni, a Lombard by birth and early training, thought it necessary, after the first publication of his *Promessi Sposi*, to reform his style by most minute and careful study of Tuscan models, or, as he, with more force than good taste or grace of expression, phrased it, "to rinse out his rags in the Arno;" and when that deservedly renowned story had been fifteen years before the world he reissued it in an almost entirely rewritten form. Compare, for example, this paragraph as given in the editions of 1825 and 1840 (*I Promessi Sposi*, cap. xxxiv.):

"Venuto appiè del ponte, voltò senza esitare, a sinistra, nella via detta la strada a San Marco, come a quella che gli parve dover menare verso l'interno della città. E procedendo, cercava cogli occhi intorno, se potessi scoprire qualche creatura umana; ma altra non ne vide che uno sformato cadavere

"Arrivato al ponte, voltò, senza esitare a sinistra, nella strada di San Marco, parendogli, a ragione, che dovesse condurre verso l'interno della città. E andando avanti, guardava in qua e in là, per veder se poteva scoprire qualche creatura umana; ma non ne vide altra che uno sformato cadavere nel pic-

\* *Risciacquare i suoi cenci in Arno*. Our translation does not give the precise effect of the original, for though names of rivers usually take the definite article in Italian, the Tuscans make their river an exception, and personify it. *Arno* is the name of a being, not of a thing.



nel fossatello che corre tra quelle poche case (che allora erano anche meno) e la via, per un tratto di essa. Passato quel tratto, udi certe grida, come chiamate che parvero fatte a lui; e, volto lo sguardo in su a quella parte donde veniva il suono, scorse, poco lontano, a un balcone d'una casupola isolata, una povera donna, con un gruppetto di fanciulli dattorno, la quale, chiamando, tuttavia, gli accennava pur colla mano che si facea vicino."

col fasso che corre tra quelle poche case che allora erano anche meno e un pezzo della strada. Passato quel pezzo, senti gridare: "a quell'uomo!" e guardando da quella parte, vide poco lontano, a un terrazzino d'una casupola isolata, una povera donna, con una nidiatte di bambini intorno; la quale, seguitandola a chiamare, gli fece cesso anche con la mano."

And yet, after all this painstaking, Tuscan purists find Lombardisms in the style of Manzoni. Some eminent native critics think it impossible, and even undesirable, for the whole Italian people to conform to the Tuscan or to any other universal standard of diction, and they advise provincial writers and speakers to adopt the regular grammatical inflexions of the *lingua comune*, but to continue to employ every one his own native vocabulary and idiomatic phraseology. These local expressions, they say, almost universally belong to the Italic word-stock, and would accordingly be intelligible even where not habitually used. By this method, as they suppose, the provincial would enjoy as much freedom of movement as in the use of his vernacular, and would at the same time be even better understood and appreciated than when under the constraint of employing words and constructions not familiar to him.

Most of the Italian provincial dialects have been reduced to writing; some of them, Venetian and Sicilian, for example, were somewhat largely employed in literature and in official communication before, and even for some time after, the supremacy of Tuscan was generally recognized; there still exists among the peasantry a large stock of old unwritten dialectic prose and verse, which is orally transmitted from generation to generation by popular reciters and story-tellers; new dramatic pieces, generally comic, are constantly represented in *dialetto* in all the great cities, and every year gives birth to a considerable amount of popular, humorous, and satirical poetry in the more important provincial speeches. But the language employed in serious literary composition, in religious teaching, in parliamentary and forensic proceedings, in all branches of the public administration, in journalism, in commercial and private correspondence, and in general social circles is exclusively Tuscan. The early predominance of Tuscan is probably due rather to the political importance of the Florentine republic, and especially to the relations of the old Tuscan capital to the internal commerce and the financial interests of the Peninsula, than to greater antiquity or to any special inherent fitness for literary purposes; for the original intrinsic superiority of Tuscan to some of the other Italian dialects is by no means clear. It has now, however, received a culture which has given it a very decided advantage over all its rivals, and the political unification of Italy has strengthened its position as the national tongue, and secured to it a constantly widening sphere of living energy as a popular speech. Hence, it is no longer as true as it was in Byron's time, that "Few Italians speak the right Etruscan;" and, unfortunately, the Florentine pronunciation, which is characterized by an enfeebled or, to borrow an expressive term from a great philologist, a *lazy* articulation of what are elsewhere more masculine and energetic consonantal sounds, is fast spreading. This tendency is aggravated by the predilection of fashionable Italian circles for the habitual use of French, and threatens to become universal.

The critical study of the Italian dialects has until lately been much neglected; and, in fact, the materials for its scientific treatment have hardly yet been brought together. But it possesses great linguistic interest, and it is now zealously prosecuted by able foreign and native philologists. From their researches we may expect important results, but at present we know little of the history and condition of these dialects at any period previous to the thirteenth century. The recorded literature of modern Italy is of later birth than that of Provence and of Northern France. Many of the earliest Italian poets wrote in Provençal, much of the most ancient literature of mediæval Italy was translated from French, and important prose works by Italian authors—the *Tesoro* of Brunetto Latini, the *Chiarissimo* of Canale, and the *Travels* of Marco Polo, for instance—were composed in that language as late as the latter half of the thirteenth century. Down to that period, with these and other exceptions to be noticed hereafter, Latin was the only written tongue employed in Italy, but there is satisfactory evidence that not only at that epoch, but through

the whole historical era, there have been great diversities of speech in the Italian territory. Even after the subjection of the entire Peninsula to Rome, Greek, Celtic, and Etruscan, as well as Oscan, Umbrian, and other now forgotten languages, were long employed in provincial districts. Centuries must have elapsed before the mother-tongues of the conquered tribes could be stamped out by the iron heel of Roman despotism, and Latin substituted, by the combined influence of civil government and religion, as the only recognized medium of social intercourse. In the mean time, the authoritative introduction of the Latin speech into the domain of these other peninsular languages, and the influx of barbarisms brought in by colonized veterans and other foreigners, could not but have produced the same effects that like causes have occasioned elsewhere. Even where the triumph of Latin was most complete, the hereditary orthoepical habits of the population could never have been altogether extirpated, and the provincial articulation of Latin must have been modified everywhere by local influences, as English has been by the Celtic element and other circumstances in Ireland and Scotland. Diez, indeed—and there is no higher authority—affirms that Italian shows no trace of the vocal system of the Oscan, the most important of the Lower Italic dialects. But we may be pardoned for doubting whether our knowledge of the power of the letters of the Oscan alphabet is such as to authorize so absolute a statement; and the great philologist himself admits a considerable influence of other ancient dialects upon the pronunciation, the idiom, and the vocabulary of the modern speech. The development of the modern Italian dialects is not a parallel case to the formation of the Spanish. The old Hispano-Latin, the parent of modern Spanish, grew up in the presence of an indigenous speech of a totally different linguistic stock, too alien, in every characteristic, to admit of much amalgamation between the native and the intruding ingredient. In its later development it encountered the Arabic, also a wholly unrelated tongue, which, though the language of a conquering race, and possessed of much culture, did not sensibly affect the structure of the Spanish, though it enriched its vocabulary with a few words. On the other hand, Celtic and the Gothic languages with which the Romans came in contact in their Northern conquests, though remote from Latin, were still Indo-European, and therefore at least distantly allied speeches. Hence, it is not surprising that their influence should be clearly traceable both in French and in the modern dialects of Northern Italy or Cisalpine Gaul. The old Italic dialects were much more closely cognate with Latin, and consequently still more readily became fused, or rather confused, with it in vernacular provincial forms, determined by local conditions of which we are almost wholly ignorant. The influence of these dialects, then, on the spoken Latin of the provinces is a question merely of degree, and at present we are quite unable to analyze it quantitatively. But we are authorized to conclude that Latin was spoken with great provincial diversity, and there is no evidence to prove, no reason to suppose, that classical Latin ever became the general language of ancient Italy in any higher sense or to a greater extent than Tuscan is the universal tongue of the Italy of modern times. The Roman writers often allude to the *lingua rustica*, or dialect of the provinces, as distinct both from the classical language of Rome and from the vulgar or plebeian speech of the city and its environs; and because they employ the singular form, and do not distinguish the speech of different provinces, it has been hastily assumed that but one *lingua rustica* existed.\* But the Romans were a people of dull ear and of obtuse linguistic perceptions, at least in the appreciation of strange and foreign sounds and idioms. Hence, they would certainly not have discriminated between Latinized Italic dialects sensibly different from the Roman, even if widely descendant from each other; and there is nothing to control the general presumption that every ethnological, if not every geographical and every municipal, district must have developed its own peculiar local speech. These local speeches, we believe, "still live," with more or less vital energy, and in more or less modified forms, in the modern provincial dialects, which are consequently to be regarded as descended not from classical Latin, but from the old rustic jargons which grew out of the clash of more or less conflicting elements. It is proper to observe here that when the primitive Italic tongues ceased to exist as independent languages, and consequently as disturbing forces in the development of the new Latinized dialects, the language of government and religion would naturally acquire a

\* The Romans appear to have used *lingua rustica* precisely as *dialecto* is employed at the present day. An Italian, returning from a theatre at Milan or Bergamo, does not say, definitely, that he saw a play *nel dialetto Milanese*, or *Bergamasco*, but simply a play *in dialetto*.



stronger influence over popular forms of speech, and these latter would of course recover some indigenous linguistic traits which they may have lost in the struggle between the aboriginal and the invading elements. These considerations, we think, authorize us to say that neither the *lingua comune* or Tuscan, nor any other provincial dialect of modern Italy, can be correctly described as legitimately and exclusively descended from the majestic speech of Latium. At the same time, Latin remained always the language of the Church, and has continued to be more or less employed by profane writers, in public inscriptions, and for other special purposes, down to our own times. There exists everywhere in Italy a traditional knowledge of Latin as, in a degree, a living tongue; and there can be no doubt that this general familiarity with the forms and vocabulary of the classical dialect has been a constantly acting force on the spoken, and especially on the written, language of the country. Many locutions in the various dialects which have been explained as ancient corruptions or modifications of the speech of Rome are merely comparatively recent draughts from that perennial fountain; and if Tuscan is the nearest representative of the classical tongue of Rome, it is because, in the long course of its literary culture, it has, in the largest measure, borrowed and appropriated, rather than inherited, the voice and accent of the ancient mistress of the world.

The fact that the *lingua comune* is not the general vernacular of Italy, and the almost universal familiarity of Italian writers with Latin models—for almost every reading Italian knows and reads Latin as an ancient and venerable form of his mother-tongue—have protected literary Tuscan from the revolutions, the corruptions, and the debasement which popular use, in the fervent and energetic national life of our democratic age, tends to introduce into language. No one of the great European tongues has changed so little within the last six centuries as Italian. The old translations of the romances of chivalry and other prose tales are intelligible to all. The *Real di Francia*, described by a late learned editor as at this day the most popular book in the language, is read from the Alps to Sicily in a version somewhat modernized in orthography, but otherwise almost a century older than Chaucer. On the other hand, the very circumstance that to a vast proportion of the people Tuscan has always been a sort of sacred dialect, set apart for elevated and formal uses, combined with the pedantic conservatism of the Della Crusca school, has prevented the enrichment of the vocabulary except in branches in which certain special classes have been interested. As a general rule, agricultural operations, industrial art, and the practical applications of science, descriptive geography, natural history, and physics, commerce, internal improvements, mining, the machinery of representative government, popular institutions, and judicial proceedings have but lately entered deeply into the life and habitual thought of educated Italians, and have scarcely yet exerted a sensible influence on the diction of literature. The literary dialect of Italy, consequently, has not received the breadth of culture and the various wealth of vocabulary which characterize the modern *belles-lettres* productions of the Northern countries of Europe and America. The nomenclatures of many of the arts and knowledge we have enumerated—agriculture and hydraulics, for example—indeed exist in the mouths of the peasantry and of engineers, but they have not been taken up into the language of literature and of refined society by any means as fully as elsewhere. Hence, the dialect of books and of elegant conversation is unpicturesque, or at least un-descriptive. Italian translations of such poems as Keats's *Endymion*, or Crabbe's *Tales*, or Mrs. Browning's *Vision of Poets*, or Voss's *Idyls*, or of prose pictures of rural and village life in England, America, and Germany, would not be practicable without the employment of a diction not yet recognized as classical. A foreigner, listening to a discussion between educated Italians on subjects of homely, material interest, hears generic terms where an Englishman would use specific words; and if he has enjoyed only such opportunities as are usually accessible to strangers in Italy, he finds it excessively difficult—as did the old Roman in the poverty of his native Latin, and as does his Italian descendant of to-day—to learn *propriè communia dicere*, and he is constantly embarrassed for want of equivalents for expressions of thought and fact which in his own country make up much of the staple of discourse in cultivated circles.

The beneficent political—and, above all, moral—revolutions of which Italy has been the theatre during the last five-and-twenty years have brought new and more diversified influences to bear upon her language, and have made greatly enlarged demands upon its capabilities of expression. Hence, the *lingua comune* is naturally, and without any conscious, organized general effort for that purpose,

undergoing changes visible even to a foreigner. To the improvement of the language from these causes there are various hindrances. Besides the hostility of the clergy to all ameliorations in the fields of both mind and matter, we may mention two leading obstacles. The one is inveterate and slow to yield. The removal of the other, which is accidental, is more hopeful. We refer first to the fact that the Italians are a bilingual people—a people whose spoken tongue differs essentially from the written; an evil the magnitude of which only experience or long observation can make apparent. Eminent provincial or non-Tuscan writers have often lamented the necessity of thinking in one dialect and giving their thoughts an outward expression by a mental translation into another. We have space only to allude to this difficulty, and to illustrate it in passing by comparing it to the embarrassment and constraint we all feel in using a foreign tongue, however well understood; and we pass to the other obstacle, which is analogous in character, but, as we have said, accidental, and therefore not invincible. We mean a predilection for a foreign language and a foreign literature, which interferes, to a deplorable extent, with the cultivation and improvement of the national speech and the national letters, as well as with native originality and independence of thought in Italy. French is far too generally the habitual language of fashionable Italian society, even in intercourse among natives; and when a foreigner addresses an Italian in what, if the compliments of his teacher are sincere, is the choicest Tuscan, his interlocutor, pitying his ignorance of Italian, will almost certainly answer him in French, which he fancies to be a universal medium. We are not here objecting to the disproportionate importance given in Italy to the language and literature in question because they are French, but because they are foreign, alien to the national heart, and disturbing to the movement of the national intellect. The causes which have given this undue predominance to French in the education and social training of the higher classes in Italy cannot here be specified; and it must be admitted that the tongue and letters of France have stronger claims on the attention of the Italians than those of any other foreign country. In our times, unhappily, not merely the closet study, but the far more distracting practical use, of foreign modes of thought and speech, is an indispensable element in comprehensive culture. But, though a necessary discipline, or rather instrument, it is a necessary evil. With rare exceptions no man can freely use more than one language as a medium of intellectual or oral discourse, and what we gain in power over a foreign tongue is compensated by a corresponding loss in the mastery of our own. The mighty intellect of Greece was weakened by no dispersion of linguistic culture, for her strongest sons knew no language but Greek; and though the study of the *exemplaria Græca* by the Romans may for a time have improved their taste, it did not help their Latinity, and in the end it crushed their originality in both literature and art. In one respect, indeed, Italians, as well as ourselves and the Germans, may derive great advantage from the study and critical analysis of the best French literary models. We refer to the surpassing excellence of French writers in rhetorical even more conspicuously than in scientific method—in the art, that is, of beginning at the beginning, going straight to the mark, and leaving off at the end, thus avoiding the wordy involution of thought and expression which is the bane of Italian perhaps even more emphatically than of other contemporaneous literatures.

As we have said, every province has still its popular literature, oral and recorded. But there is no provincial Dante, or Petrarca, or Ariosto, or Tasso, or Villani, or Varchi, or Machiavelli, and the tongue through which the Italian states have acted on each other, and Italy on the world, is exclusively the *lingua comune*, or Tuscan, which alone reflects and represents the mind and voice of Italy in the European republic of letters. The provincial literatures of Italy are not, like those of ancient Greece, component parts of a national whole. They are specialized manifestations of intellect and of speech, and therefore in general have only a provincial interest. Their peculiar characteristics cannot be noticed in a brief comprehensive view of Italian literature. We must confine our sketch to that which has been accepted by the Italian people and presented to the world as the authorized expression of the mind and heart of the nation; and the following remarks must be understood as referring only to writings in the Tuscan or *lingua comune*, unless otherwise expressed. The early history of this literature is obscure, for, though there were Italian bards and *cantastorie*, or saga-men, early in the thirteenth, and doubtless in the twelfth century, yet their works are known to us only as disfigured by copyists of later ages, and we can rarely speak with confidence as to their dates, their dialects, or even their original literary



forms. In many cases, as we have seen, they certainly wrote in French or Provençal, and in so close conformity to French and Provençal models that they are entitled to no place in Italian literary history. In other instances, private letters and other documents written in the thirteenth century are suspected to have been first composed in Latin and translated at a later period; and in several most important cases it is matter of grave doubt whether the reputed works of historical authors of the thirteenth and even the fourteenth century are not comparatively modern fabrications. Into questions of this delicate nature, which native tribunals alone are competent to adjudicate, we cannot enter. We shall accordingly give only the commonly received accounts of the literature of the thirteenth century, subject to allowance for all the causes of uncertainty to which we have alluded; and it is only from the epoch fixed by Dante as the date of his great poem, the assumed "middle point" of his life, or the year 1300, that we feel ourselves to be treading on safer ground. There is no doubt that ballad or narrative poetry existed in Italy in an oral and traditional form before any of the modern dialects were reduced to writing, but the earliest Italian poems which have come down to us, even in a modernized shape, are amatory or religious. In some cases it is difficult to say to which of these two classes they belong, for it is not always clear whether the lady celebrated in them was a real person or only a personification of a Christian idea. We know, from the testimony of Dante and from abundant other evidence, that many of the poets usually believed to have lived in the thirteenth century did certainly flourish in that age, and we have many of their works in copies not very much later than the time of their writers. But we can rarely fix the precise date of these productions, and we can seldom be sufficiently sure of the strict conformity of such copies with their originals to authorize us to regard them as positively genuine exemplifications of the grammatical structure of the dialect in which they were composed, or even of the rhetorical combinations and metrical forms employed by their authors. There are also extant certain prose compositions of the same century, and in some few instances either originals or at least contemporaneous copies of these productions still exist. Even where we possess only transcripts of such writings of somewhat more recent date, we may rely upon their accuracy as copies with more confidence than in the case of poetical compositions, because, though poetic forms, once established, are more enduring than those of prose, yet the diction of verse modelled almost wholly after foreign types, as were the first Italian rhymes of which we have any knowledge, could not so soon have acquired a fixed and settled expression. The earliest prose, on the contrary, consisted simply in reducing to writing popular modes of vernacular speech, and there was no external influence, no motive of taste, which could lead to any rapid change in the style of ordinary written communication. Upon the whole, in the few poetical and the comparatively numerous prose manuscripts of the thirteenth century yet remaining, insignificant as they are in bulk, we have sufficient means of pronouncing, with approximate certainty, upon the general grammatical and lexical character of the Tuscan dialect in the latter half of the thirteenth century. The real importance of this century in Italian literary history is not in the merit of its productions, or in any influence exerted by them on the intellectual culture and products of the age, but in the fact that they prove the existence of the *lingua comune* as a written tongue at that period, and furnish evidence also that the literary supremacy of that dialect was—not universally, indeed, but very generally—recognized in Italy before the beginning of the fourteenth century. Dante, indeed, in his *De Vulgari Eloquentia*, denies, with great acerbity of tone, the identity of Tuscan with the *lingua comune* or *vulgaris illuster, cardinalis, anticum, et curiale*; and there are not wanting later critics who maintain that Tuscany did not originate, but only adopted, the *lingua comune*, which, in some way not yet explained nor easily conceivable according to the general laws of language, arose and developed itself independently of local influences. Dante defines the *loquax vulgare*, which, he says, forms the subject of his treatise, as that which is learned, without rule, by imitating the speech of the nurse, and in the dedication of the *Paradiso* to Can Grande della Scala he describes the diction of the *Divina Commedia* as *remission et humilia in qua et audientes communiunt*. This *loquax vulgare* he declares to be more noble than the language taught in the schools, and he affirms that it was not used by Guittone d'Arezzo or Brunetto Latini, but was employed by Guido Cavalcanti, Lapo Gianni, Cino da Pistoja, and "one other," meaning, no doubt, himself. What precise distinction Dante would have drawn between the *vulgare illuster, anticum, et curiale* and the language of Caterina da Siena and other illustrious writers of the thirteenth century, which is unequivocally Tuscan, it is hard to see.

In fact, Dante's observations on the provincial dialects of his time are to Italian as well as to foreign scholars an enigma which has not found its *Œdipus*; and until further research shall reveal to us much more than we now know of the actual history of the language of modern Italy, we must content ourselves with the fact that what is now both the Tuscan local and the Italian common speech did substantially exist and acquire its primacy as a literary tongue before the year 1300. Dante has been said to have been the cunning artisan who forged this new literary instrument. But poets are the conservators, not the creators, of language. Dante, therefore, did not invent his diction. He was neither a coiner nor a borrower of words. He took and wisely used what he found—not always, indeed, in books, but oftener in popular speech. As Giuliani and Tommaseo have well observed, many expressions of Dante's, for which even his authority could not secure admission into the general vocabulary, are still current in the mouths of the Tuscan peasantry, where Dante found them, and the discourse of this humble class serves to explain more than one passage in the *Divina Commedia* which is otherwise unintelligible. In point of antiquity, the first place among the Tuscan poets is usually ascribed to Folcacchiero dei Folcacchieri, alleged to have been born at Siena about the year 1150, and many critics have claimed the poems of Ciullo d'Alcamo, the emperor Frederick II. and his sons, Enzo, Enrico, and Manfredi, Pier delle Vigne, Ranieri, Ruggerone, and Inghilfredi da Palermo, Guido delle Colonne (author of several Italian canzoni, and more famous as the compiler of a Latin history of the Trojan war founded on the works of Dares and Dictys), Jacopo da Lentini, and other Sicilian versifiers of the thirteenth century, as properly belonging to the literature of the *lingua comune*, though the diction of all of them is strongly marked by Sicilian provincialisms. The Bolognese Guido Guinicelli (called by Nannucci "il padre della Italiana letteratura") and Onesto Bolognese are also ranked with Tuscan writers, though not Tuscan by birth. Guittone d'Arezzo, Guido Cavalcanti, Dino Frescobaldi, Dino Compagni, are Tuscan poets of merit. Jacobone of Todi, in the pontifical territory, wrote much in Tuscan verse, and is supposed to be the author, or perhaps only improver, of the world-renowned Latin Church hymn, *Stabat Mater dolorosa*.

The most important Italian prose works of the thirteenth century, admitting their authenticity, which has been disputed, are the chronicles of Matteo Spinello, of the province of Bari, and of Ricordano and Giacotto Malispini, the first Tuscan annalists. The *Moral Treatises* of Albertano da Brescia, the original of Chaucer's *Persones's Tale*, written in Latin about 1250, were translated into Italian by Andrea da Grosseto in 1268, and less than ten years later by Soffredi del Grazia of Pistoja. The former of these translations, published in the *Collezione di Opere Inedite* in 1873, from a manuscript of the fourteenth century, is pronounced by the editor to be, "in respect to antiquity, the most important document of the language in literary prose." The other, printed in 1832, was considered by Ciampi as an authentic specimen of the language of Tuscany as popularly spoken at its date. But it must be remembered that neither edition is taken from the original manuscript, or even from a contemporary copy. The *Norellino*, or *Cento Novelle antiche*, is believed to belong, in a considerable proportion, to the thirteenth century, though we have the work only in later copies. The *Conti di Antichi cavalieri* is affirmed to exist in a manuscript of the thirteenth century. The *Libro di Cato*, the *Fiori di Rettorica* of Guidotto da Bologna, the letters of Guittone d'Arezzo, translations of the romance of the Round Table and of the treatise of Egido Colonna, *Del Governo dei Principi*, Bono Giamboni's translations of the *Tesoro* of Brunetto Latini and of other mediæval Latin works, and various moral treatises and legends of saints, are ascribed to the same period. There are also undoubted municipal statutes, records, and other documents, as well as some private letters, dated about the middle of the century, and of course as old as what some maintain to be the earliest specimen of English, the famous proclamation of Henry III. issued in 1258.

We come now to what the Italians with just pride call the golden age of their literature, the *aurora trecenta*, or, in our chronological notation, the fourteenth century—the age of Dante, Petrarch, and Boccaccio. It was in the course of this century that classical literature, though not then first known to Italians, gradually superseded the influence of Provençal and French as an informing element, and furnished an incitement to all, models to many, for literary effort. The Italian poetry of the fourteenth century, exalted as it is in genius and in literary merit, is far from being copious in amount, while the contemporaneous prose literature is voluminous, and, in point of style at least, of almost unsurpassed perfection. In neither form of com-



sition were the Latin classics of real value, except as a stimulus and a means of culture. Both in form and in substance whatever is excellent in the productions of the *aureo trecento* is, in the highest degree, original and independent. Dante, indeed, ascribes to the study of Virgil "Lo bello stile che mi ha fatto onore;" but if in this expression he referred to the form or diction of his poems, and not to the Latinity of his prose writings, he confounded the *primum mobile*, the first impulse, with the character and direction of the movement, which were controlled and determined by far other agencies. If we remove from the *Divina Commedia* all that can fairly be traced to the influence of the works of Virgil, we shall deprive it of none of its leading characteristics, nothing of its real inspiration. The Muses of Dante are not to be found among the heathen Nine. His highest flights, like Milton's, were prompted and sustained by the spirit of Christian theology as interpreted and understood in his time, and his passion was unhappily in far too great a degree colored by the partialities, rancors, and resentments of his political and civil life. The saving moral influence in Dante's mind was his early love, and when he employs, instead of fierce invective, a tone of milder deprecation, a manner "affettuosamente battagliera," it is because the spirit of Beatrice is pleading for the offender. The Latin works of Petrarch, from which he expected immortality, are deservedly forgotten, and the classic idioms and constructions which Boccaccio thought the chief ornaments of his prose style are not only its greatest defects, but have exerted a very pernicious influence on the diction and manner of later Italian writers. In all incipient literatures, at least, the true bard "singet wie der Vogel singt." Dante's great poem, like all works of high and original genius, shaped itself as it grew, in accordance with the law of his nature, rather than in conformity to principles of conscious art. Its real character and spirit would never be inferred from his own statement of its import in the dedication of the *Paradiso* to Can Grande della Scala. He regarded it as a system of religious philosophy, the motive of which, "literally considered," was "the state of souls after death," the "allegorical subject," "man, as, by good or evil desert in the exercise of free will, he is amenable to retributive justice in the way of reward or punishment." In the whole text of the dedication there is not the remotest trace of the most prominent features of the poem itself—the inspiring passions of life, his pure and ardent love for Beatrice, and his bitter resentment against his political opponents, though he did not disguise this latter feeling in the address of the epistle, where he styles himself "Florentinus natione non moribus." The knowledge of Dante was vast and various for the period, and his influence on the intellect of his age, when he was constantly appealed to as the universal arbiter, the tribunal of last resort on every possible subject, can scarcely be overrated. The prose works of Dante are valuable chiefly as indirectly a commentary on the *Divina Commedia*, and are not otherwise of sufficient interest or importance to require special notice in this place. Dante has been made accessible to English and American readers by Mr. Longfellow in what is undoubtedly the best existing translation of his great poem, and it is only in his works, not in critical treatises, that he can be studied advantageously. The canzoni of Petrarch are too widely known by translations and imitations, and the poems of Boccaccio by the use which Chaucer has made of them, to need to be more than mentioned in what can be little but a list of literary titles. The *Dittamondo* of Fazio degli Uberti, a sort of rhyming chronicle, geography, and natural history, is interesting as a summary of the knowledge of his times, and not altogether without literary merit. Other poets of the fourteenth century are Cecco d'Ascoli, Francesco da Barberino, Cino da Pistoja, and Antonio Pucci. The prose literature of this century deserves a higher reputation than foreign scholars have generally conceded to it. Benvenuto da Imola and other early commentators on Dante have not only furnished explanations and historical illustrations of obscure passages in his works, but they have frequently shown a critical ability rare in that age. The chronicles of Giovanni Villani and his continuators, and the history of Dino Compagni, possibly a later fabrication, are valuable repositories of fact, and important as good specimens of the capabilities of Tuscan for literary purposes, though as histories not on a level with the French, Icelandic, and Catalan chronicles of the thirteenth century, or with Froissart, who flourished at the close of the fourteenth. The saintly legends and romances of chivalry of this period are generally conspicuous for purity and beauty of style. Many of them are included in the *Collezione di Opere Inedite o Rare*, of which more than 30 octavo volumes have already appeared, and the *Scelta di Curiosità Letterarie*, in 16mo, now extending to 140 volumes. Two works of this century, not embraced in these

collections, deserve special mention—the novels of Sacchetti, which are believed to contain very faithful pictures of the manners of the age, and the letters of St. Catharine of Siena, of which the manner and style would of themselves justify the epithet that Italian critics so often attach to that age. In point of style, the *Letters* of Catharine of Siena are not surpassed, if equalled, by any other European prose compositions of the fourteenth century. The writer owed nothing directly to classic culture, for it is doubtful whether her "small Latin" sufficed even for reading the Vulgate, with which she shows great familiarity, but which she is supposed to have known only through the quotations of preaching friars or oral translations by other ecclesiastics. It is remarkable that in an age when the *Divina Commedia* was a theme of public exposition, and even of pulpit discussion, the works of St. Catharine neither mention Dante nor quote his poem. Perhaps she found his sombre tone and severe invective too repulsive for her kindly temper; and Tommaseo is hardly extravagant in saying that though there are resemblances of thought and diction in their works, "the likeness is that of a fair and gentle woman to a proudly austere and sullen man, whose brow is wrinkled by wrath, not by years." The writings of St. Catharine are of great importance, as incontestably proving that in her day the *lingua comune* existed in its most perfect form as the common vernacular of Tuscany, for she probably knew, and certainly thought, in no other tongue. Were other testimony in support of our proposition wanting, confirmatory evidence might be found in the *Fioretti di San Francesco*, which competent judges believe to be the truest possible expression of the simple beauty of the Tuscan familiar speech of the period we are considering. The increasing cultivation of classical literature in the fifteenth century produced much the same effect as in England a hundred years later. It absorbed the intellectual activity of the age, and left comparatively little time or taste for original production. In Italy the study of Greek and Latin was general among the better classes, in all ranks and both sexes, to a degree not paralleled even by the learning of modern Germany. Women who were educated at all were taught Greek and Latin, and Italian ladies filled professorships in both native and foreign universities. To Italy belongs the honor of having first acknowledged—what she has since too often forgotten—the intellectual equality, and therefore the equality in rights as well as in duties, of the sexes. She thus anticipated by four centuries the revelation of a truth which has suddenly dawned again upon the civilization of this generation as a principle, the general acceptance of which constitutes the most beneficent moral revolution that humanity has seen since the promulgation of the Christian religion. In this century Italy acquired an intellectual—unhappily not a moral—culture and refinement which gave her an immense, a widespread, and a long-enduring influence over the mind of the rest of Europe. Traces of this influence are abundantly visible in the literature and history of every European state, but it was scarcely fully appreciated or clearly expounded before the publication of Burckhardt's remarkable *Culture der Renaissance*, which we earnestly recommend to the reader. Still, this century produced great Italian writers in both poetry and prose, as well as great geniuses in politics and art. The most conspicuous poetical works of the age were the *Morgante Maggiore* of Luigi Pulci, the *Orlando Innamorato* of Boiardo, the *Furberia d'Orfeo*, a drama, and other small works of Poliziano, lyrical compositions by Gasparo Visconti, Accolti, and others. In prose are the chronicles of Collenuccio Corio and numerous other valuable sources of historical information, many of which, like the writings of Sabellico and Pius II. (Æneas Silvius Piccolomini), are in Latin; others exist only in manuscript or in the voluminous collections of Muratori and other vast repositories of mediæval lore. To the fifteenth century, too, belong the works of Leon Battista Alberti on architecture, sculpture, and painting, and most of the writings of Leonardo da Vinci. Many of these latter unfortunately remain unpublished, but, not less than his material works, they are unequivocally productions of a genius which in universality, versatility, and power has had no superior among men. In this age, too, lived two of the grandest characters and sublimest geniuses in the records of human history—Columbus and Savonarola—both Italians and both martyrs. The intellect of neither is adequately represented by his literary productions, but, though the life of Columbus remains to be written, Savonarola has found a worthy biographer in Villari, whose life of this remarkable man is one of the noblest historical works of our time.

From about the middle of the thirteenth century to the overthrow of the liberties of Florence in 1530 by the unholy league between the emperor Charles V. and Pope Clement VII., Florence was the city of the world most conspicuous for intellectual and physical achievement. Let-



ters, art, industry, and commerce alike were pursued with a genius in conception, a feverish energy in execution, and a splendor of result probably unexampled in ancient or in modern times. In particular branches of art and literature she may have been excelled by Athens and by Rome, but in the combined exercise of the highest faculties, mental and material, in every field of human effort, no three centuries of Athenian or of Roman annals can be paralleled with those of Florence during the period we have mentioned. Most of the great names we have hitherto cited are those of Tuscans, but the political and the intellectual ascendancy of Florence fell together, and with some brilliant exceptions her genius was clouded, if not quenched, by the final extinction of her liberties. In narrative and in lyric poetry the most celebrated Italian writers of the sixteenth century are Trissino, Luigi Alamanni, Ariosto (whose *Orlando Furioso* excels all other romantic poems), Tasso (whose *Gerusalemme Liberata*, of all modern poetical compositions, comes nearest to the idea of the classic epic), Berni (the reversifier of Bojardo's *Orlando Innamorato*, and who gave his name to a peculiar class of light satirical verse), Firenzuola, Ruccellai, Tansillo, Davanzati, Pietro Aretino, Bembo, Annibale Caro, Michelangelo Buonarroti, Vittoria Colonna, and Folengo, the writer of macaronic verse. It was in the sixteenth century that the drama first acquired a status in Italian literature. Many plays were written in Latin, many of a popular character were sketched in outline and more or less filled up by improvisation by the actors—an art in which the Italians still show great talent. These, of course, are lost to us, and few if any of the more elaborate dramas of that period still hold their place on the stage. The principal comedies are those of Ariosto, Dovizio da Bibbiena, Machiavelli, P. Aretino, Grazzini, Firenzuola, Cecchi, Salvati, and Francesco d'Ambr. Niccolò Correggio Visconti produced a pastoral drama, and the *Pastor Fido* of Guarini still has a high reputation. The foundation of the musical drama was laid in this century by Emilio del Cavaleri, and Rinuccini is regarded as the first author of a regular opera. Cecchi is said to have produced the earliest opera buffa. Tragedies were produced by Del Carretto, Trissino, Ruccellai, Andrea dell'Anguillara, and Pietro Aretino. Numerous novels and romances appeared in this age. The collection of Bandello is well known. Firenzuola, Parabosco, Giraldis, Grazzini, Machiavelli, and De Porta distinguished themselves in fictitious narrative. The didactic dialogue of Baldassare Castiglione, *Il Cortigiano*, was translated into most European languages before the year 1600, and is still not forgotten. The political and historical literature of this age is voluminous and highly celebrated. Machiavelli's fame is universal. Paruta, Guicciardini, Varchi, Segni, Cavalcanti, Bonfadio, Foglietti, and Pietro Bembo acquired great distinction. Vasari's *Lives of the Artists*, though often erroneous, and the works of Borghini and Cellini, are indispensable sources of information respecting the history of Italian art. In philosophy the greatest names are Cardano, and especially Giordano Bruno, both of whom, however, wrote in Latin.

The most eminent Italian poets of the seventeenth century are Boccalini, Marini, Francesco Redi, Graziani, Chiabrera (whose odes are specimens of great elevation of thought and diction), Forteguerra, Tassoni (the author of the mock heroic), La Secchia Rapita, Bracciolini, Lorenz Lippi, and Filicaja (who is best remembered by his patriotic sonnets). But this century is chiefly remarkable for its successful cultivation of physical science. The great names are those of Galileo (who was compelled by an ecclesiastical tribunal to retract his astronomical theories, if not by actual torture, at least, indubitably, by the threat of torture), Torricelli, Borelli, Cassini, Viviani, Castelli, Riccioli, and Grimaldi. Campanella, who wrote chiefly in Latin, was distinguished as a philosopher. The most important historical works of this century are Paolo Sarpi's *History of the Council of Trent* and Pallavicini's refutation of that history, and the historical writings of the Jesuit Bartoli. *The Civil Wars in France* of Davila and Bentivoglio's *Wars in Flanders* had a considerable reputation, but have been superseded by the researches of later inquirers. Nanni wrote a *History of Venice*, and Capececiatro of Naples.

After the recovery of the Church from the first stunning effects of the Reformation, followed the Catholic reaction of the latter half of the sixteenth century, and the influence of Rome has ever since been steadily hostile to all progress, intellectual, moral, and material. This is plainly seen in the *belles-lettres* literature of the seventeenth and eighteenth centuries, though in other fields of intellectual effort there was in the eighteenth century a revived activity, which at least partially restored to Italy her old position as a power in European letters. In poetry and the drama the most eminent writers were Gozzi, Parini, Goldoni,

Maffei, Casti, Metastasio, and Alfieri. The founder of the modern science of historical criticism, Giambattista Vico, the philosophical jurists, Filangieri and Beccaria, and the physicists and naturalists, Volta, Galvani, Scarpa, and Spallanzani, have acquired and deserved the greatest celebrity. The historical writings of Denina and Tiraboschi should also be mentioned. As a means of general culture the Italian literature of the present century has not, for Americans and Englishmen, the importance which special circumstances have given to the contemporaneous productions of German and French intellect, but its deserts are greater than its European reputation. The Italians do not do themselves justice in this as well as in many other respects; and if they have not received justice at foreign hands, it is partly because they have been too modest in claiming it. Another reason why Italian literature is little known and appreciated abroad is that, contrary to the general belief, the literary language, from its great wealth of vocabulary and combination in some fields, its poverty in others, is extremely difficult for foreigners. Manzoni, as we have seen, found it so even for a native. Few strangers ever acquire more than the merest smattering of Italian, or learn enough of it to know how ignorant they remain of its real character and capabilities. Our narrow limits of space permit us to give but a few names in the literature of this century, and in selecting these we must be guided not by the actual merit of the writers, or even by their popularity in Italy, but solely by our view of the interest they may probably possess for those into whose hands this article may fall. Since the year 1800 the Italian press has been fertile in products of perhaps higher average merit than the works of preceding centuries, though in Italy, as elsewhere, comparatively few have risen to such a decided superiority over their contemporaries as to warrant us in predicting for them a lasting place in literary history. With few exceptions, the writers best known abroad have owed their foreign reputation as well as their domestic popularity to the political tendency of their writings, and to the courage they have shown in the avowal of truths unpalatable to their rulers, not less than to the genius by which many of their productions have been distinguished. It is too soon to separate the inherent from the accidental elements of their success, and to assign to them their relative rank as exponents of the national mind and as influential causes in the development of the national consciousness, and consequently as agencies in effecting the astonishing revolutions through which Italy passed in the half century between the years 1820 and 1870. Still, there are unequivocally great names—names which Italy and the world will not “willingly let die”—in the Italian literature of the nineteenth century; and there is abundant room for the hope of continued and even greater literary achievement by the generation which is now coming upon the stage of life and of labor. The Italian writers of this century, in poetry and the drama, best known abroad are Monti (the author of the *Bassvilliana*), Pindemonte, Ugo Foscolo (*I Sepolcri*), Silvio Pellico (*Francesca da Rimini*), Niccolini (*Filippo Strozzi* and *Aracida da Bessina*), Leopardi (*Conti*, poems of true genius), Manzoni (*Conte di Carmagnola*, *Adelchi*, *Iuni Sueri*, and the famous lyric *Il cinque Maggio*), Berchet (lyrics), Grossi (*I Lombardi alla prima Crociata*), Tighi (*Le Selve*), Spolverini (*La Rieseide*), Arici (*La Pastorizia*), Giusti, the genial satirist. Of more purely national reputation, though not always by any means of inferior merit, are the poems of Ricci, Sestini, Bagnoli, Mameli, Alcardi, Prati, Mamiani, Montanelli, Cosenza, Mesdames Savio-Rossi, Colombini, and Fuà-Fusinato, and the *improvisatori* Regaldi and Miss Giannina Milli. Acting plays have been very numerous, but they have met a discouraging competition in translations from the modern French drama. Nota's comedies, though of little power, continue to be represented occasionally. Ferrari and Gherardi della Testa have met with merited success, and at the present day the plays of De Renzis are deservedly very popular, and give promise of much future excellence. Upon the whole, the Italian prose literature of this century is entitled to rank relatively higher than its poetry or its stage plays. Foremost in narrative fiction stands the *Promessi Sposi* of Manzoni. Rosini (*La Monaca di Monza*), Grossi (*Maresca Vincenti*), Azeglio (*Ettore Fieramosca* and *Vespe del Lupi*), Guerrazzi (*Assedio di Firenze*), are successful authors of historical novels of the same school, all which, as well as Botta's *Storia della Guisarda del*, *Leopoldo degli Stati Uniti*, and *Storia d'Italia*; the historical works of Cesare Balbo; Colletta's *Storia del Regno di Napoli*; Farini's *La Stato Romano dal 1815 al 1849*; Brofferio's *Storia del Piemonte*; Gioberti's *Promemoria d'Italia*, *Del Buon governo d'Italia*, and other works; Amari's *I Vespri Siciliani*; Cicognani's *Storia della Scultura*, and the archaeological works of Micali, Inghirami, Canina, and Fabretti—are well known abroad. The Italian prose work



of this century which has had the widest circulation in Europe is *Le Mie Prigioni* of Silvio Pellico, and we believe that in modern times no single volume has produced a more profound impression in Europe or occasioned more important moral and political results than this. It secured for Italy the sympathies of the civilized world; and, though years of misgovernment were still to be endured, though the concurrence of many other causes was necessary to effect the final liberation of the Peninsula from foreign sway, yet it was the *Prisons* of Pellico which gave to Austrian domination the mortal blow. In politics and political economy Minghetti's *Opuscoli Letterari*, especially his remarkable *Lettere sulla Religione Liberta*. To this period also belong the works of Giordani, criticism and correspondence; Botta, history of Italy and of the American Revolution; Micali, ancient history of Italy; Laura Mancini and Madame Ferrucci, in poetry; Mamiani, in philosophy; Pietro Thouat, education and tales; Litta, family history; Balbo, history and political economy; Alcardo Aleardi, poetry; Montanelli, memoirs; Emiliano Giudici, literary history; Ranalli, aesthetics and criticism; Vannucci, history; Bianciardi, Lozzi, Bon Compagni, political literature; Ausonio Franchi, Spaventa, Scialoja, in philosophy; De Sanctis, Settembrini, Pitre, Comparesi, Salvatico, De Gubernatis, in criticism; Boccardo, Maestri, Errera, political economy; Temistocle, Gradi, tales. The works of Romagnosi and of Gioja, all of which appeared before the great revolution of 1859-60, are entitled to special notice. This auspicious event released the Italian intellect and the Italian press, except in the pontifical states, from shackles which had fettered them for many centuries, and there is now great activity in every department of literature. The most fertile and voluminous, as well as popular, historical writer of the present era is Cesare Cantù. Ricotti, La Lumia, Amari *Storia dei Musulmani in Sicilia*, Giudici, Azeglio (*Ricordi e Corrispondenze*), Vannucci (*I Martiri della Libertà*), Bon Compagni (*Chiesa e Stato*), Bianciardi (*Storia dei Papi and Prior Luca*), Zini (*Storia d'Italia*), Cibrario (*Storia della Schiavitù*), Zamboni (*Gli Ezzelini e gli Scelvin*), Pomponio Leto (a fictitious name, *Il Consiglio Vaticano*), are writers of interest and importance. We must here notice the *Spagna* of De Amicio, a volume of travels remarkable for a degree of descriptive talent and easy liveliness of style rare in Italian prose. In political economy the works of Cattaneo, De Rossi (in French), Minghetti *Economia Politica*, Cibrario *Economia Politica del Medio Evo*, Celestino Bianchi (*Storia Diplomatica d'Italia*), Boccardo, Lozzi (*Ozio in Italia*), Solopis (*History of Italian Legislation*), Brofferio (*Storia del Parlamento Subalpino*), and Mazzini are conspicuous. In physical, mathematical, and natural science, Malloni, Plana, Matteucci, Secchi, Schiaparelli, Donati, Menabrea, Sella, Boccardo, Lioy, Parlatore, Delpino, Stoppani, Gastaldi, Capellini, Negri, are distinguished names, though their labors do not belong wholly to the present generation. In theoretical as well as practical engineering, and especially in hydrology, the Italians have long been very eminent, and Europe has had no abler writers in this department than Mangotti, Paleocapa, and Lombardini. In prose fiction Suñer, Bersejo, Barrili, and Caterini Percoto are distinguished. Linguistic science, new everywhere, and emphatically so in Italy, is ably represented by Peyron, Gorresio, Orecuti, Fabretti Amari, De Gubernatis, Arcoli, Flecchia, Teza, Lignani, Caix. Intellectual and moral philosophy has found an able cultivator in Mamiani.

Many of the ablest Italian writers of the present day—we will mention Boughi and Messedaglia as conspicuous examples—are known chiefly through essays in periodicals, occasional academical discourses, and parliamentary reports. The periodical literature of Italy has long been very highly respectable, and the *Antologia*, established by Vieusseux, rose even to the rank of a political power, or at least influence, in Italy. The publication has been resumed, and it is ably supported. The *Politecnico*, long under the direction of Cattaneo, has always been a very important scientific periodical. The *Rivista Europea* is also excellent. A vast amount of most important Italian literary and historical material is accessible only in large miscellaneous collections, such as the *Archivio Storico*, the *Relazioni of the Venetian Ambassadors*, and others to which we have already alluded. An encyclopedic work, historical, descriptive, and typographical, is now publishing under the title *L'Italia*, and will extend to twenty or more large octavos. But no thorough knowledge of Italy, ancient, or modern, can be attained without a constant resort to the labors of foreign scholars. The principal English contributions to our knowledge of Italy are by Roscoe, Napier, Rawdon Browne, and Trollope. The German works of Niebuhr, Mommsen, Ihne, and, for the Middle Ages especially, Burckhardt and Gregorovius (*Geschichte der Stadt Rom*), are indispensable. Recent works useful to

foreigners are the literary histories of De Sanctis and Settembrini, Marc Monnier (*L'Italie est elle la Terre des Morts*), and Amedée Roux. For Sicilian literature the writings and collections of Pitre and Di Giovanni are indispensable. There is thus far no grammar or dictionary of the Italian language which at all satisfies the requirements of modern philological science. Many dictionaries are now in course of publication, among which we notice a series of special vocabularies in preparation under government patronage. That of Canevazzi, embracing the nomenclature of agriculture and the subsidiary knowledges, is published as far as the letter C, and is truly excellent. The amount of controversial discussion on the Italian language, and especially on the relations of the Tuscan dialect to the present and prospective *lingua comune* of Italy, is very great. We have space to notice only the labors of Tommaseo, Giordani, Gradi, Fanfani, Giuliani (*Linguaggio Vivente della Toscana*), and especially Manzoni and Bonghi. A work by the latter (*Parole in Letteratura Italiana non sia popolare in Italia*) is particularly instructive.

GEORGE P. MARSH.

**Italy**, the central of the three great peninsulas of Southern Europe, lies between 35° 30' and 47° 6' N. lat. and between 6° 38' and 18° 32' E. lon., projecting into the Mediterranean, between the Tyrrhene and Adriatic seas, from N. W. to S. E., and united to the continent by the basin of the Po, lying between the northern extremities of these two seas and the vast semicircle of the Alps. Its geographical boundaries, which do not always coincide with its political limits, arc—on the N., the Central Alps, which divide it from the Swiss cantons of Valais, Uri, and the Grisons, as well as from the Austrian Tyrol; on the E., first, the Oriental Alps, which separate it from the Austrian provinces of Carinthia, Carniola, and Croatia, then the river Arsa in Istria, the Gulf of Quarnero, and finally the Adriatic Sea; on the S., the Ionian Sea; on the W., the Tyrrhene and Ligurian seas, the Var, and the Western Alps, the latter of which, together with the lower course of the Var, separate it from France. Politically, the western boundary is not the Var, but the Roja. The northern, the precise outline of which should be indicated by the crest of the Alps, falls much lower on their southern slope at the point where the canton Ticino and a part of the Grisons (Swiss) form the frontier for a distance of about 296 miles, and the Tyrol and the Trentino (Austrian) for 250 miles; to the E. a line of 340 miles separates Italy from Goritz, Trieste, and Istria, which also belong to Austria. Geographical Italy is divided into three great sections: (1) Northern Italy, which includes all the strictly continental portion—that is, Venice, Lombardy, Piedmont, and Liguria, with no islands except the small Venetian group in the Adriatic; (2) Central Italy, including about one-half the Peninsula properly so called, with the ancient Etruscan, Umbrian, and Latin territories, with the island of Corsica (politically French), and with the Tuscan and Circæan archipelagoes (Elba, Capraia, Gorgona, Giglio, Ponza, Ventotena); (3) Southern Italy, or the remaining portion of the Peninsula, including the Samnite, Apulian, and Calabrian districts, the large islands of Sardinia and Sicily, and the smaller, which compose the Parthenopean and Eolian archipelagoes in the Tyrrhene (Ischia, Procida, Capri, Lipari, Vulcano, Stromboli, etc.), the Calipsean Archipelago in the African Sea (Malta, Gozo, etc.), and the Diomedean Archipelago in the Adriatic. The length of the Peninsula is 831 miles; its mean breadth 138 miles. The total superficies of geographical Italy is 129,570, that of political Italy, about 114,300 square miles. The extreme points of the Peninsula, in the direction of its greatest length from N. W. to S. E., are—Mont Blanc in the Pennine Alps, and Cape Spartivento in Calabria; in the properly continental part, from W. to E., the Cottian and the Julian Alps; and, following the curve of the Alpine chain, Monte dello Schiavo on the Mediterranean, and the Bittoray on the Adriatic; and, finally, in the peninsular portion, the greatest breadth is between Monte Argentaro on the Tyrrhene and the promontory of Ancona upon the Adriatic.

*Internal Divisions, their Area and Population.*—The territories geographically Italian are—

	Surface in square miles.	Population.
The kingdom of Italy.....	114,290.85	26,891,154
Trieste, Istria, Goritz.....	3,291.	541,748
Alpine Tyrol.....	6,007.	518,679
Cisalpine Switzerland.....	1,362.	171,256
Nice.....	1,065.	122,762
Corsica.....	3,377.	27,861
Malta.....	144.	136,329
Monaco.....	8.88	7,080
San Marino.....	24.30	7,080
Total.....	129,570.32	28,525,496

The kingdom of Italy is divided into 69 provinces, subdivided into 197 circuits (*circondari*), and 97 districts (in Venetia), which together comprehend 8382 *comunes* or

townships, distributed over the following natural, ethnographical, and historical sections: (1) In Northern Italy—Lombardy, between the Tierno, the Mincio, the Po, and the Alps; Venetia, lying E. of Lombardy, between the Mincio and the Adriatic, the Alps, and the Po; Piedmont, on the W., between the Tierno, the Alps, and the Apennines; Liguria, between the Apennines and the sea; Emilia and Romagna, on the S. of the Po, between Piedmont on the W., the Adriatic on the E. and the Apennines on the S. (2) In Central Italy—Tuscany, between the Apennines and the Tyrrhenic Sea; Latium, S. of Tuscany, in the middle and lower basin of the Tiber; Umbria and the Marches, the first in the upper basin of the Tiber, the second between the Apennines and the Adriatic. (3) In Southern Italy, the ex-Neapolitan states, which comprise all the region S. of the Tronto on the eastern coast, and S. of Terracina on the western. The 69 provinces are grouped into 16 compartments, of which the following table shows the population (according to the two latest censuses) and the superficies:

Compartments	Number of townships.	Population.		Increase per cent. of population years.	Superficies in sq. miles.	Inhabitants to sq. mile.
		1861.	1871.			
Piedmont	1487	2,764,263	2,899,564	4.89	11,300.64	256
Liguria	317	771,473	843,812	9.38	2,055.67	110
Lombardy	1965	3,261,000	3,460,824	6.13	9,083.70	380
Venetia	795	2,340,280	2,642,807	12.93	9,059.34	291
Emilia	323	2,065,834	2,113,828	5.38	7,920.87	266
Umbria	173	513,019	549,601	7.13	3,819.47	140
Marches	219	883,073	915,419	3.66	3,746.59	245
Tuscany	278	1,967,067	2,142,525	8.92	9,286.85	228
Latium	227	750,415	836,704	11.50	4,601.20	160
Abruzzi and Molise	456	1,212,835	1,282,982	5.78	6,675.71	192
Campania	614	2,625,830	2,774,592	4.30	6,810.10	402
Bari	53	551,402	601,540	9.04	2,292.24	263
Foggia	53	312,882	322,758	3.16	2,953.04	109
Lecce	130	447,982	493,594	10.18	3,293.33	149
Apulia	236	1,315,269	1,420,892	8.03	8,538.62	166
Potenza	121	492,959	510,543	3.57	4,121.89	123
Catanzaro	152	381,150	412,262	7.51	2,906.98	178
Cosenza	151	431,292	440,468	1.98	2,400.93	155
Reggio, Calabria	107	324,516	353,608	8.95	1,514.95	233
Calabria	410	1,102,617	1,200,302	5.76	6,662.97	181
Caltanissetta	28	223,178	230,066	3.09	1,455.15	158
Catania	64	450,160	475,415	5.98	1,969.95	251
Girgenti	41	263,580	289,018	9.53	1,491.01	193
Messina	99	304,751	320,499	5.16	1,707.95	238
Palermo	76	584,929	617,678	5.60	1,961.07	314
Syracuse	32	259,613	291,885	12.59	1,427.15	206
Trapani	20	214,981	235,588	9.56	1,214.18	194
Cagliari	360	2,391,802	2,584,099	8.04	11,290.04	229
Sassari	258	372,697	393,208	5.57	5,256.90	74
Sardinia	110	215,967	243,452	12.75	4,141.55	58
Kingdom of Italy	3882	25,023,810	26,801,154	7.10	114,304.59	234

The following is a table of the population according to the last two censuses (1861-71), of the superficies, and of the number of inhabitants to the square mile in the single provinces, with the number of townships comprised in each, and with the proportionate increase of the population in ten years:

Provinces and compartments.	Number of townships.	Population.		Increase per cent. of population years.	Superficies in square miles.	Inhabitants to sq. mile.
		1861.	1871.			
Alexandria	341	645,607	683,361	5.85	1,951.70	350
Como	263	597,279	618,232	3.51	2,755.07	222
Novara	148	579,885	624,985	7.87	2,526.33	247
Turin	112	941,932	972,986	3.29	4,067.52	237
Piedmont	1187	2,764,263	2,899,564	4.89	11,300.62	256
Genoa	210	650,113	716,759	10.25	1,588.58	451
Port Maurizio	107	124,330	127,053	4.72	467.08	271
Liguria	317	771,473	843,812	9.38	2,055.66	410
Bergamo	306	347,235	368,142	6.02	1,087.53	329
Brescia	283	434,219	456,023	5.02	1,643.85	277
Como	148	579,885	624,985	7.87	2,526.33	247
Cremona	135	262,118	300,395	14.31	631.16	183
Mantua	97	262,118	288,912	10.24	900.93	112
Milan	313	948,129	1,009,791	6.48	1,125.58	890
Pavia	207	119,783	148,155	23.82	1,292.74	346
Sondrio	78	100,940	111,241	10.10	1,261.62	88
Lombardy	1965	3,261,000	3,460,824	6.13	9,083.70	380
Belluno	66	167,229	173,282	3.60	1,270.95	147
Padua	143	304,762	361,439	18.58	754.00	482
Rovigo	64	180,447	200,838	11.18	650.23	308
Treviso	96	308,184	352,738	14.48	941.15	371
Udine	180	190,442	211,566	11.09	2,515.33	191
Venice	51	291,410	357,538	22.69	818.66	368
Verona	113	316,193	367,437	16.10	1,060.60	346
Vicenza	123	327,671	363,161	10.83	1,016.36	357
Venetia	795	2,340,280	2,642,807	12.93	9,059.34	291
Bologna	58	197,132	230,242	16.78	1,393.63	315
Forlì	16	129,158	215,499	66.14	1,010.34	213
Ferrara	40	224,463	231,090	2.92	719.96	325
Modena	45	260,591	273,231	4.86	966.82	282
Parma	59	266,039	268,181	0.82	1,200.60	211
Piacenza	48	218,569	235,775	7.89	966.89	234
Ravenna	21	200,548	221,115	10.27	749.57	297
Reggio-Emilia	45	230,044	240,635	4.60	876.11	274
Emilia	324	2,005,834	2,113,828	5.38	7,920.87	266
Perugia	173	513,019	549,601	7.13	3,819.47	140
Ancona	51	251,849	262,349	4.19	736.41	346
Ascoli-Piceno	71	196,030	203,094	3.57	810.25	230
Macerata	54	226,636	236,094	4.19	1,056.61	223
Pesaro and Fano	73	202,568	214,072	5.68	1,114.24	190
Marches	219	883,073	915,419	3.66	3,746.59	245

Provinces and compartments.	Number of townships.	Population.		Increase per cent. of population years.	Superficies in square miles.	Inhabitants to sq. mile.
		1861.	1871.			
Arezzo	41	219,559	234,645	6.87	1,277.60	183
Firenze	78	696,214	766,824	10.14	2,567.56	323
Grosseto	20	100,626	107,457	6.79	1,680.78	165
Livorno	5	116,811	118,811	1.75	108.56	1085
Lucca	22	236,161	280,399	19.46	576.52	486
Massa-Carrara	35	140,733	161,944	15.07	685.22	245
Pisa	40	243,028	265,959	9.44	1,179.95	229
Siena	37	193,935	206,446	6.45	1,465.04	184
Tuscany	278	1,967,067	2,142,525	8.92	9,286.85	228
Latium	227	750,415	836,704	11.50	4,601.20	160
Aquila	127	309,431	332,784	7.54	2,509.65	132
Campobasso	134	346,007	361,208	5.26	1,777.56	205
Chieti	121	327,316	339,986	3.87	1,114.80	305
Teramo	74	230,061	246,091	6.93	1,283.68	192
Abruzzi & Molise	456	1,212,835	1,282,982	5.78	6,675.71	192
Avelino	128	355,621	375,691	5.64	1,408.77	266
Benevento	73	220,506	232,608	5.22	602.22	345
Caserta	145	663,164	697,407	6.72	2,206.86	316
Naples	69	867,953	907,752	4.58	401.41	2261
Salerno	159	528,256	541,738	2.55	2,130.84	254
Campania	614	2,625,830	2,774,592	4.30	6,810.10	402
Bari	53	551,402	601,540	9.04	2,292.24	263
Foggia	53	312,882	322,758	3.16	2,953.04	109
Lecce	130	447,982	493,594	10.18	3,293.33	149
Apulia	236	1,315,269	1,420,892	8.03	8,538.62	166
Potenza	121	492,959	510,543	3.57	4,121.89	123
Catanzaro	152	381,150	412,262	7.51	2,906.98	178
Cosenza	151	431,292	440,468	1.98	2,400.93	155
Reggio, Calabria	107	324,516	353,608	8.95	1,514.95	233
Calabria	410	1,102,617	1,200,302	5.76	6,662.97	181
Caltanissetta	28	223,178	230,066	3.09	1,455.15	158
Catania	64	450,160	475,415	5.98	1,969.95	251
Girgenti	41	263,580	289,018	9.53	1,491.01	193
Messina	99	304,751	320,499	5.16	1,707.95	238
Palermo	76	584,929	617,678	5.60	1,961.07	314
Syracuse	32	259,613	291,885	12.59	1,427.15	206
Trapani	20	214,981	235,588	9.56	1,214.18	194
Cagliari	360	2,391,802	2,584,099	8.04	11,290.04	229
Sassari	258	372,697	393,208	5.57	5,256.90	74
Sardinia	110	215,967	243,452	12.75	4,141.55	58
Sardinia	368	588,064	636,660	8.26	9,398.45	67

PHYSICAL GEOGRAPHY.—A. *Sea and Coasts of Italy.*—That part of the Mediterranean which washes Italy and her islands is divided into five principal arms: (1) The Tyrrhene or Lower Sea, embraced between the Peninsula and the islands of Corsica, Sardinia, and Sicily. This is the greatest expanse of Italian sea, and may almost be regarded as a vast lake nearly everywhere surrounded by Italian soil; (2) The Adriatic or Upper Sea, between Italy and the territory of the Slaves (Illyria, Dalmatia, Albania); (3) The Ionian Sea, between Italy, Sicily, and Greece; (4) The African or Libyan Sea, between Sardinia, Sicily, and Africa; (5) The Ligurian Sea, between Liguria, Corsica, Sardinia, France, and Spain. The greatest depth of the western basin of the Mediterranean is 10,500 feet, between Sicily and Africa. The eastern basin is of much greater depth; according to Capt. Spratt, 15,092 feet between Malta and Crete. The bottom of the Adriatic is a great plain sloping downward from Italy towards the Illyrian, Dalmatian, and Istrian coasts, but the degree of inclination varies greatly, being very slight, almost insensible, near the outlet of the Po, becoming gradually more rapid towards the S. The great Mediterranean current, which carries the waters of the Atlantic from W. to E., creates two minor currents properly Italian: one enters the Adriatic, follows along the coasts of Dalmatia and Istria as far as Trieste, then doubling it sweeps along the Italian coast from Venice to Apulia, and so returns into the great basin from whence it set out; the other, entering through the Straits of Messina, flows into the Tyrrhene Sea, washes the western shore of the Peninsula till it reaches the Ligurian Gulf, then turns towards Provence and Spain in a direction opposite to that of the great current of the Atlantic from the Atlantic to the Mediterranean. Besides these two principal currents, other secondary ones exist in the Italian seas: that which, flowing from N. to S., touches the western coasts of the same islands and finally encounters that before mentioned in the Strait of Bonifacio, which for this reason is dangerous to navigation; that which arises from the change of direction undergone in the African Sea by the general current, which should tend eastward, but, first broken by the Etna, then divided by the western angle of Sicily, separates into two arms, the one directing itself into the channel of Malta, the other, coasting along the promontory of Pachino and the western



shore of Sicily, finally unites with the so-called Ionian current, which enters into the Channel of Faro: the other arm of the Sicilian current diverges from the northern line of the island, barely touching its many gulfs, then bending toward the E., strikes the Eolian Islands, to lose itself in the Tyrrhene shore-current. With regard to the velocity of the Italian currents there are as yet no very positive data. Montanari calculates it at 0.16 of a foot per second. Cialdi estimates it at a mean of half a mile per hour. Minard says that the great Mediterranean current on the coast of Algeria was found to have a velocity of 0.95 foot per second, and in some places even of 1.64 feet per second, but that it diminishes in swiftness during its vast course, and that on the coast of France it is not more than 0.25 foot per second. Marmocchi gives to the proper Italian currents only a velocity from 4 to 6 miles in twenty-four hours; but he observes that in the channels and around the capes it is much greater. In the Ligurian Sea, according to my observations, it is never found to exceed from 1.60 to 2 inches per second; but all the ports on the Tyrrhene coast which open towards the E. have a tendency to shoal up. The number of degrees of longitude included in the Mediterranean is too small to allow this sea to have great tides. They are more sensible in the Straits of Messina (where the flow rises to 26.40 inches), in the Neapolitan waters from 6 to 8 inches, and in the Venetian gulf (5.40 feet). The water of the Mediterranean is reputed to be more salt than that of the Atlantic: the observations of Borrillon la Grange give it double the quantity of saline matter. But near the shore the saltness is, in many places, diminished either by the action of rivers and torrents, or by that of fountains or springs of fresh water which are thrown up from the bed of the sea by natural siphons; and upon the whole it is impossible to estimate the proportion of saline matter in the waters of this sea with any precision. The most celebrated of these submarine springs is that which wells up in the Gulf of Spezia about a mile from the shore, and with such force that the fresh water rises several inches above the surface of the sea, and forms a convex swell about 20 feet in diameter. With regard to the temperature of the Italian seas, Marsiglia has observed that the mean for the months of December, January, February, March, and April is between 50° and 52° F., while in June it does not exceed 44.6°. Thus, the Mediterranean is a powerful compensatory agent in tempering the severity of winter and the heats of summer. The Italian seas have always been renowned for their azure color, and for a transparency which reflects as in a limpid mirror the beautiful hues of the sky. The phosphorescence of the water is remarkable, and according to an ingenious suggestion of Mr. G. P. Marsh, may have increased during the historic period, since the greater destruction of cetaceans and predaceous fish in modern times favors the multiplication of the lower marine organisms upon which the former feed, and whose bodies produce, in part at least, this phenomenon. The coast of the Italian Peninsula has a linear extension of 3237 miles—960 in the Adriatic, 1030 in the Ionian and Libyan seas, 750 in the Tyrrhene, and 495 in the Ligurian. The coast-line of the larger islands measures 923 miles. Setting out from the extreme W. boundary, we come first to the port of Nice (no longer Italian), a small harbor excavated by Charles Emanuel III. and Victor Amadeus. About a mile to the E. follow the gulfs of Villafranca and of Sant' Ospizio, then the little port of Monaco, between which and the town of Mentone rises Cape San Martino. Still continuing eastward, Capes Bordighera and Borghetto follow successively, then the gulf of the Ospitaletti, the road of San Remo, the beaches of Cervo and of Diana, the bays of San Stefano and of San Lorenzo, the landing of Porto Maurizio, the port of Oneglia, the Gulf of Diano Marina. Between Cape delle Mele and the little island of Albenga are the shores of Alasio and Lanquaglia, which afford good anchorage. A vast gulf, at the bottom of which lies Albenga, extends from the island of Gallinara to Cape Noli; then comes the open bay of Finale Marina. To this succeed the excellent roadstead of Vado, the little port of Savona, and from thence to Genoa a line of coast which the industry of the inhabitants has converted into a continuous shipyard in which hundreds of ships are frequently on the stocks at the same time. The spacious artificial harbor of Genoa (about 320 acres, or one-half a square mile of water-surface) has to the E. a coast-line which, as far as the promontory of Portofino, affords neither roadstead nor anchorage except the landing of Camogli. The Gulf of Rapallo, the little bay of Portofino, that of Carlo Alberto, the not easily accessible landing of Chiavari, the coast of Sestri Levante, Cape Manara, Cape Rospo, the landing of Framura, the Cape of Monterosso, the Bay of Bonassol, the beach of Levante, Cape Mesco, the landing of Monterosso, the rugged rocks of Vernazza, Corniglia, Manarola, Riomaggiore, are the principal features until

we reach the magnificent Gulf of Spezia, the great naval arsenal of Italy. To this succeed the Tuscan coasts, with the little port of Viareggio, with the shoals caused by the deposits of the Arno, the shallow roadstead of Leghorn, opposite which on a rock rises the historic tower of the Meloria. We shall further notice Cape Cavallo, the mouth of the Cecina, Port Baratto, the promontory of Popolonia, the harbor of Piombino, the large basin of Grosseto, the marshy coast of Pian d'Alma, the Gulf of Castiglione della Pescaia, the headland of Talamone, the fifty-mile basin of Orbetello, the three picturesque rocks called the "Ants" (*Le Formiche*) of Grosseto, the promontory of Argentario, with the harbors of Santo Stefano and Port' Ercole. Following a monotonous and somewhat treacherous line of coast, we come upon the harbor of Civita Vecchia, then the headland of the Marinella or Cape Lınaro, then Fiumicino and the well-known Roman sea-coast formed by the alluvium of the Tiber, the Cape of Anzo, the harbor of Neptune, the little promontory of Astura, Mt. Circe (which, rising from a low isthmus, looks like an island when seen at a distance). From Terracina the Neapolitan coast commences with the Gulf of Gaeta, Cape della Rocca, and 25 miles farther to the S. the Bay of Naples, the islands of Ischia and Capri, Capes Mesa and Miseno, the Gulf of Baia, the port of Pozzuoli, the rocky headland of Algalone, that of Posilipo, the rock of Castel del Uovo, the harbor of Naples, Castellamare, and Cape Campanella, where the Neapolitan gulf terminates and that of Salerno begins, itself ending at Cape Licosa. Next at the S. E. we meet Cape Palinoro, the promontory of Falconara, the Gulf of Policastro, which terminates at Cape Servero; passing this, we enter the Gulf of Santa Eufemia, in form a horseshoe, the other extremity of which is Cape Vaticano. Then follows the Gulf of Gioia, to the W. of which lie the Lipari or Eolian Islands. This gulf, measured from Cape Vaticano to the promontory of Bagnara, has an opening of 33 miles. The part of the Calabrian coast most nearly approaching Sicily is the Torre del Cavallo. Crossing the strait, we find ourselves in the Ionian Sea, having first passed the famous rocks of Scylla and Charybdis. Then coasting along Reggio, we round the promontory of Pallaro, Cape dell' Armi, and Cape Spartivento; the latter being passed, the shore curves eastward, forming the Gulf of Squillace, which terminates at Cape Rizzuto. With Cape delle Colonne opens the vast Gulf of Taranto, terminated by Cape Santa Maria di Luca, to the E. of which we enter the Adriatic. In this sea, after passing the deep inland harbor of Otranto, the beautiful Bay of Brindisi opens, and, farther on, the roadstead of Barletta and the great promontory of Gargano, which forms the spur of the Italian boot: then the Gulf of Manfredonia, the port of Viesti, the landing of Santa Croce, the rocks of Cocchiara, the mouths of the Pescara and the Tronto; then the harbors of Ancona, of Sinigaglia, Fano, Pesaro, Rimini, Cesenatico, Cervia, Ravenna, Rimaro—all small and shoaled. The valleys of Comacchio, between the mouths of the Po and the territory of Ravenna, form an immense pool, 164 miles in circuit and from 3 to 6 feet in depth, in which the famous lagoon fisheries are carried on. Having passed the many mouths of the numerous arms of the Po, and afterwards of the Adige, we reach the port of Brondolo, the low shore of Chioggia, the dunes of Palestrina, the island and the port of Malamocco, and then several other small harbors, before coming to the mouth of the Tagliamento. From this point, as far as Port Primaro, the coast-line skirts the morasses of Aquileja and of Grado. The inlet of Idoba is the mouth of the Isonzo, N. of which is the port of Alberoni, and S. E. of this lies the city of Trieste. The extreme southern point of Istria, Cape Promontore, directs us into the Gulf of Quarnero and to the town of Fiume. To complete this rapid circumnavigation of the Italian coast should be added the most noteworthy peculiarities of the coasts of the three principal islands: (1st.) *Sicily*. The three angles of the Sicilian triangle are terminated by the same number of capes—that is, on the W. by Cape Boco or Lilibeo; on the S. by Cape Passero or Pachino; on the E. by Cape Faro or Peloro. The most important gulfs are those of Milazzo, Tindari, Termini, Palermo, Castellamare, Agosta, and Catania. (2d.) *Sardinia*. Capes St. Elias, Pula, Tavolara, Argentaria, Asinara are noticeable; the gulfs are those of Cagliari, Palmas, Oristano, Alghero, the Aranci; the Strait of Bonifacio separates it from Corsica. (3d.) *Corsica*. Capes Corso, Cannella, Garbo or Calvi, Sanguinara or Ajaccio, Negro, Chizza, and Brogolino: the gulfs of Calvi and Ajaccio.

*B and C. Mountains, Valleys, and Plains.*—The mountains of Italy are co-ordinated into three distinct systems: I. *The System of the Alps*. This forms, beginning near Nice on the Ligurian Sea, and terminating at Fiume on the Quarnero, an uninterrupted line of about 760 geographical miles. It is divided into three main groups and nine sections. 1st Group: the Western Alps, from S. to N. and



N. to E., from the Col di Tenda to Mont Blanc, and comprising (Sec. 1st) the Maritime Alps, which, beginning near the sources of the Tanaro, extend, in a course of about 94 miles, to Monte Viso (12,567 feet). The pass of the Col di Tenda is 5890 feet. Sec. 2d, the Cottian Alps, which extend for a line of 82 miles to Mont Cenis (11,457 feet). The Col of Monginevra is 6119 feet. Sec. 3d, the Graian or Grecian Alps, for a length of 62 miles to the Col du Bon Homme on the Little St. Bernard (7185 feet); the pass of Mont Cenis is 6772 feet. The triangular knot of lofty peaks known as the Grand Paradis group, or the Cogne Mountains, lying between the valley of the Orco, the Val Savarinche, and the pass of the Col della Nuova, may be regarded as an offshoot from the Graian Alps. It contains the two highest summits lying wholly in Italy—the Grand Paradis (13,300 feet) and the Grivola or Corne de Cogne (13,028 feet), one of the most picturesque and beautiful peaks in the whole range of the Alps. 2d Group: the Central Alps, from the pass of the Bon Homme to the peak of the Tre Signori or Drei-Herren-Spitze; they comprise (Sec. 4th) the Pennine Alps, which include the loftiest summits in Europe, Mont Blanc (15,798 feet), Monte Rosa, (15,210 feet), Mont Cervin, or the Matterhorn (14,833). Along their course of 62 miles open the passes of the Great St. Bernard (8169 feet) and the Simplon (6575 feet). Sec. 5th, the Helvetic or Lepontine Alps, extending from Monte Rosa, for a distance of 55 miles, to the St. Bernardino, with the pass of the same name (7011 feet); that of the St. Gothard (6804 feet); that of the Splügen (6942 feet); and the Maloja, overhung by a peak, 11,476 feet in height. Sec. 6th, the Rhetico-Trentine Alps, which from the St. Bernardino run to the Piceo dei Tre Signori (10,118 feet), to the E. of the valley of the Adige, through a course of about 187 miles, including the passes of the Brenner (4659 feet) and of the Stelvio (9095 feet). 3d Group: the Eastern Alps, comprising (Sec. 7th) the Norian Alps, which extend for 35 miles from the Drei-Herren-Spitze to the Gross-Glockner (12,769 feet), but separating from the first of these mountains they turn towards Austria and Hungary, and no longer belong to Italy; the pass of the Sommering is 4287 feet. Sec. 8th, the Carnian Alps, about 70 miles in length, beginning E. of Trent and terminating at the Col di Tarvis. Sec. 9th, the Julian Alps, for a course of about 105 miles, terminating at Fiume. The declivities of the Alps, while they descend gently on the N. side, are rocky and precipitous towards Italy, so that while the Rhone has a fall of 5250 feet in a course of 92 miles, the Po makes an equal descent in 22 miles. From Mont Blanc to the Tyrol 400 glaciers are counted, and the whole of the vast chain abounds in them. There are some not less than from 6 to 15 miles in length and from  $1\frac{1}{2}$  miles to  $2\frac{1}{2}$  miles in width, with a mass of ice 1640 feet deep. The valleys of Aosta and the Valtellina only have a longitudinal direction. All the other Italian Alpine valleys are normal to the chain. There are 36 of these valleys, through which flow primary rivers or their affluents. II. *The System of the Apennines.* This system separates itself from the Maritime Alps at the pass of Cadibona; then, after following a line from W. to E., turns S. and S. E., dividing the Peninsula into two great slopes, the eastern and the western. The Apennines are composed of three groups: 1st, the Northern Apennines, 182 miles in length, which, beginning at Cadibona, skirt the Gulf of Genoa, describing an arc; they are steep and rocky towards the sea, but decline gently towards the N. on the side of the valley of the Po, and extend as far as Mont Cimone. Between the sea and the Tuscan Apennines, and between the Magra and the Serchio, N. of the Arno, rises an isolated group of mountains, higher than the principal chain, which are called the Apuan or Panian Alps. The loftiest crests of this section are Monte Corsaglia (6930 feet), and Monte Cimone (6890 feet). 2d, the Central Apennines. These begin at the Cimone and end at the Velino, dividing Tuscany from the Emilia, and crossing Umbria, the Abruzzi, and the Samnite territory, with a precipitous descent towards the Adriatic, but a gentle inclination towards the Tyrrhene, and throwing out two sub-Apennine spurs, the Tuscan and the Roman. The highest peaks are the Gran Sasso d'Italia, or Monte Corno, the loftiest of the Apennines (9312 feet), Mont Amaro or Maiella (9131 feet), Monte Velino (8180 feet). 3d, the Southern Apennines, which extend from Monte Velino to the extremity of Italy, dividing themselves into two branches, the western and the eastern. Their highest summits are Monte Meta (7835 feet), Monte Pollino (7070 feet). These mountains are prolonged through Sicily to Capes Lilibeo, Passero, and Peloro. III. *The Sardo-Corsican System.*—This chain, parallel with the Apennines, culminates in the island of Sardinia at Monte Brunia di Spina (6190 feet), and in Corsica at Monte Cinto (9240 feet). Italy has but a single great plain, enclosed within the southern slope of the Alps and the northern slope of the Apennines, and determined

by the course of the Po and of the other rivers which flow into the Adriatic. In fertility of soil, in facility of communication, in wealth, in civilization, and in density of population this plain has no rival in the world. The secondary plains of the Peninsula are the Tuscan, the Roman, the Campanian (Terra di Lavoro), and the Tavoliere of Apulia.

D. *Lakes.*—The lakes are divided into two groups—the Alpine and the Apennine lakes: I. *The Alpine Lakes.*—Supplied by the perpetual snows, the glaciers, and the torrents or rivers of the great chain of the Alps, these long and tortuous basins, if they have not the grandiose and solemn character of the Swiss and Scotch lakes, present a degree of beauty and grace which is not to be met with elsewhere. They are—1st, Lake Verbano or Lake Maggiore, which receives the waters of the Tosa, of the Lake of Orta, of the Maggia, of the Ticino, of the Tresa (which issues from Lakes Ceresio and Lugano), and the small streams of Bardesio and Acquaneira, which are the outlets of the lakes of Varese, etc. It is 36 miles in length and of variable width, being in many places 7 or 8 miles broad. Its greatest known depth is 2624 feet, and as its surface is 640 feet above the sea-level, its bed is 1984 feet below that level. Its abundant waters find their outlet through the Ticino, the richest tributary of the Po. The famous Borromean Islands are in this lake. 2d, Lake Lario or Lake Como: this lake receives through the Adda the waters of the Valtellina, together with those of the Mese and of the Liro, collected in the little Lake of Mezzola, which once formed a part of the Lario until separated from it by the deposits of the Adda. It has the form of a Y, with the tail turned toward the Alps; its length is 30 miles, with a maximum width of  $3\frac{1}{2}$  miles. 3d, The Benaco or Lake di Garda: this lake receives the waters of the Sarca and other small streams; is 45 miles long and from  $4\frac{1}{2}$  to 16 broad. The Mincio flows out of it. 4th, The smaller lakes: the Margozzo and the Lake of Orta, those of St. Bernard and of Cenis, that of Varese, the lakelets of Biandrone, Monate, and Comabbio; the Sebino or Lake of Iseo, that of Idro, etc. II. *The Apennine Lakes.*—These are almost all craters of extinct volcanoes, and may be subdivided into, 1st, the upper or central Italian lakes, which are those of Massaciucoli, Bientina, Chiusi, Montepulciano, and the larger ones of Trasimeno or Perugia, of Bolsena, and of Bracciano. 2d, the lower or southern Italian lakes. These are the Lake of Fondi in the Terra di Lavoro, of Celano or Fucino in the Abruzzi (which Prince Torlonia is now draining), Verano or Lesina, Lucrino, Agnano, Averno, Fusaro, etc.

E. *Rivers.*—The rivers of continental Italy are divided into three distinct groups: I. *Tributaries of the Adriatic.*—In the upper basin of this sea we find the Isonzo, which marks the extreme E. boundary between Upper Italy and Istria; the Corno (a name common also to several rivers flowing from the Carnian Alps, and emptying between the Isonzo and the Tagliamento), which, issuing from Monte Piettino, flows seaward from N. to S.; the Lemene and the Livenza, small streams between the Tagliamento and the Piave, the latter of which also rises in the Carnian Alps; the Brenta and the Bacchiglione, which rise in the Trentino and traverse the Venetian lagoons; the Adige, formed by the union of the emissaries of three small lakes at the pass of Finisterre (Reschen), and of many rivulets which descend from the Rhetian, Norian, and Carnian Alps. The Tyrolese call it the Etsch, and it does not take its Italian name until below Botzen, after its confluence with the Isarco (Eisack). The Adige has a course of about 220 miles. The Po (Padus or Eridanus) is the chief of the Italian rivers: its length in a straight line from its source to its mouth is 262 miles, and, including its windings, 330 miles. It takes its rise on Monte Viso at a height of 6560 feet above the level of the sea; it crosses Piedmont, divides Lombardy from Parma, Modena, and Ferrara, then enters Venetia; at Serravalle it divides into two branches: the principal arm (Po Maestro) falls into the Adriatic 28 miles S. of Venice; the other (Po di Goro) enters the sea 15 miles farther to the S. S. W. The two arms are about 20 miles in length, forming a delta furrowed by secondary channels (Po della Tolle, Po Donzella, etc.). By means of some of these streams the Po communicates on the N. with the Canal Bianco, which in its northern part takes the name of Po di Levante, and to the S. with the Po di Volano and with the Po di Primaro. At Turin the Po is still inferior in size to several of its lower affluents, but after its confluence with the Dora Baltea, which brings to it the waters of Mont Blanc, it assumes imposing dimensions. Having received the Sesia, which brings with it the waters of Monte Rosa, the Po begins to spread itself over its own alluvium, branching out between many islands; above Valenza it unites again in a single winding bed, but only to ramify anew and to form new islands after receiving the tribute



of the Tanaro; it again collects itself near the mouth of the Ticino; from the confluence of the Tidone till its junction with the Adda it once more divides into separate channels; below the Oglio its waters are re-collected within narrower limits, and thus it continues its course to the sea. Under ordinary conditions, between the Dora and the Ticino the inclination is from 19 to 32 inches per mile; between the Ticino and the Adda, from 16 to 19 inches; between the Adda and the Oglio, from 10 to 16 inches. Near the mouth of the Panaro it is reduced to 7 inches, and in its extreme lower course from 7 to 3½ inches per mile. At its highest flood the water rises near the mouth of the Ticino 24 feet above extreme low-water mark; near Piacenza, 26 feet; at Cremona, 20 feet; at Casal Maggiore, 21 feet; at Dosolo, 27 feet; at Ostiglia, 31 feet; at Ponte Lagoscuro, 28 feet; and at Polesella, 27½ feet. The width of the Po between the confluence of the Ticino and the Oglio is, at extreme low water, from 328 to 656 feet; in the ordinary state of the water, from 650 to 1300 feet; at the highest flood, from 2600 feet to 9850 feet. In its lower course the width, at low water, is from 328 to 656 feet; in the ordinary state of the water, from 656 to 984 feet; at the highest flood, from 984 to 4920 feet. Between the Ticino and the Oglio the Po is never fordable, the depth of the principal current being, at low water, little less than 5 feet. Below the Oglio the depth of the main current, even at extreme low water, is never less than 5 feet 10 inches. From Turin to Casale the river is navigable for boats of 8 metric quintals burden: from Casale to the Ticino, for those of 20 quintals; from the Ticino to Quatrele (160 miles), for vessels of 1300 quintals; from Quatrele to the sea (64 miles), for vessels of 900 quintals. The waters of the Po are always turbid from the great quantity of earth which they transport—an effect especially due to the clearing of the forests and the breaking up of the soil. This earth forms 1/10th of the flowing mass. The quantity of alluvial deposit at its mouth is an annual volume of 33,000,000 cubic metres, extending the delta at a mean of 230 feet, and forming a flat which, in the progress of centuries, will fill up that part of the sea. The tributaries of the Po are, on the left, in Piedmont—the Ghidone, Rivocecco, Chisone, Chisola, Sangone, Dora Riparia, Stura, Orco, Dora Baltea, Sesia, Agogna; in Lombardy—the Ticino, Olona, Lambro, Adda, Oglio, Mincio; on the right, in Piedmont—the Bronda, Rivortorto, Vraita, Macra, Stellone, Tanaro, Scrivia, Carone, Staffora; in the Parmesan territory—the Tidone, Trebbia, Nure, Arda, Ongina, Taro, Parma, and Enza; in the Modenese—the Crostolo, Secchia, Panaro; in the ex-pontifical provinces—the Reno, Idice, Sillaro, Lanterno, Senio. Other smaller tributaries of the Adriatic are—the Lamone, Montone, Ronco, Savio, Rubicone, Marecchia, Marano, Conca, Foglia, Metauro, Cesano, Misa, Esino, Musone, Potenza, Chienti, Tena, Tesino, Tronto, Vomano, Pescara, Sangro, Biferno, Fortore, Ofanto. II. *Tributaries of the Ionian Sea.*—These are the small streams of the ancient Lucania, the Bradano, the Vassento, the Salandrella, the Agri, and the Sinnò; and of Calabria, the Crati and the Neto. III. *Tributaries of the Mediterranean.*—Beginning from the W., the Var (swollen by the Tinca and by the Vesubia), the Paglione, the Roja, the Nervia, the Taggia, the Impero, the Andora, the Letimbro, the Polcevera, the Bisagno, the Entella, the Magra, the Serchio, the Arno (swollen by the Chiana, by the Sieve, by the Greve, by the Ombrone of Pistoja, by the Nievale, by the Pesa, by the Elsa, and by the Era), the Cecina, the Ombrone of Siena, the Tiber, the Liri or Garigliano, the Volturno, and other smaller ones. The rivers of the islands are—in Sicily, the Alcantara, Giaretta, Salso, Platani, Belice, Termini, Fiumegrande, Pollina; in Sardinia—the Tirso, Coghinas, Flumendosa, Mannu; in Corsica—the Golo, Tavignano, Lamone, Gravono, Valinco.

*Geology and Mineralogy.*—Few countries in the world present such interest and variety to the student of geology as Italy. The centre of the Alpine region is generally of granite rock, often intermixed with schisto-micaceous, talcose, and amphibolical formations, or with calcareous formations, most frequently saccharoidal, with straws or flakes of mica. The slopes are covered with Tertiary strata. The Apennines, as far as Calabria, are a huge mass of calcareous and serpentine rock and of graywacke, upon which lie deposits, of considerable thickness, from the Jurassic period, composed of gypsum, with beds of sulphur. Farther from the central axis of the chain, upon the opposite slopes, rest vast Tertiary deposits containing many fossil shells, some of which are identical or similar to those now living in the Italian seas. The more southern of the Apennines are composed of granite rock, covered with secondary deposits. The most noteworthy geological feature of Italy is its volcanic system. In the eastern part of the plain of the Po, between the Adige and the Brenta, rises the group of the Euganean hills which, at Monte

Berici, reunites itself to one of the principal spurs of the Alps; its highest peak is Monte Venda, 1920 feet. In the S. of Tuscany is the group of Santa Fiorenza; then that of Viterbo and of Rome; afterwards those of Sant'Agata, of Rocca Morfina, and of Naples. Here towers Vesuvius with its Campi Flegrei (Phlegrean Fields), the only active volcano on the European continent. But the giant of the Italian volcanoes is Etna in Sicily, 10,830 feet in height, with a base 112 miles in circumference. The Lipari or Eolian Islands are also volcanic; among these Stromboli is in perpetual eruption, intermitting once in fifteen minutes. Ancient craters are found throughout the whole chain of the Apennines, and the territories of Arezzo, Perugia, Spoleto, etc. form one of the most notable examples of broken surface which volcanic action has impressed upon the face of our planet. Gaseous, saline, and limous eruptions also abound in Italy, as well as thermal springs. The calcareous and metamorphic rocks of the Alps and Apennines furnish the most beautiful marbles; among these we may mention those of the Vicentino, the sea-green of the Bocchetta, the gold-veined of Porto Venere, the statuary marble of Carrara, the jasper of Barga, the green marbles of Tuscany, the black of Pistoja, the lapis-lazuli and the giallo of Siena, and the broccatello of Piombino. We should notice also the alabaster of Volterra, the porphyries and rock-crystals of Aosta, the agates and chalcedonies of Tuscany, the lavas and basalts of the volcanic districts, the sulphur and the alum. Unfortunately, the best qualities of fossil combustibles are wanting, but lignite and peat are abundant. Pozzolana is found in great quantities near Rome and Naples; iron also in many places, and especially in the island of Elba; lead and galena in Sardinia; fossil salt in various places; also thin veins of gold, silver, mercury, zinc, antimony, etc.

*Climate.*—Local conditions with regard to altitude, position, and proximity to the sea have more influence than latitude in determining the annual isothermal lines and the range of the monthly means of temperature in Italy. In general, the coldest month is January—the thermometer sometimes falling to 3.2° above zero of Fahrenheit at Moncalieri near Turin, and to zero F. at that city, to 14° above zero at Urbino, to 15.8° at Perugia, to 26.6° at Catanzaro—and the warmest month is July, the thermometer rising to 97° F. at Lugano, to 96° at Moncalieri, to 92° at Urbino, and to 93° at Catanzaro. In Northern Italy the mean temperature of the month of April is a little above the annual mean, and in October a little below, while in Central and Southern Italy the case is reversed—that is, the mean of October is a little above, and the mean of April a little below, the annual mean. If we compare certain extreme points, we shall find at Udine (lat. 46° 3') the annual mean is about 56° F.; at Syracuse (lat. 39° 3'), about 65°. Observing certain middle stations, we find at Genoa (lat. 44° 25'), as annual mean, 61°; at Florence (lat. 43° 16'), annual mean, 59°; at Bologna (lat. 44° 30'), annual mean, 58°. At intermediate stations between the means and the extremes we have, at Milan (lat. 45° 28'), an annual mean of 56.6°; at Venice (lat. 45° 25'), an annual mean of 56°; at Rome (lat. 41° 53'), annual mean, 60°; at Naples (lat. 40° 52'), annual mean, 61.5°. The isochimical lines of those stations which, like Alexandria, Turin, Pavia, Milan, Gustalla, and Modena, are situated near the longitudinal axis, and at the bottom of the valley of the Po, are much more depressed than the more northern but better sheltered positions of Aosta, Biella, Lugano, and Udine. Although differing widely in latitude, there is a close approximation in the mean winter temperature between Chioggia and Urbino, between Rome and Leghorn, Genoa and Naples, San Remo and Catanzaro. The isothermal lines of the above-mentioned places, lying along the axis of the valley of the Po, are more elevated than those of the maritime districts of Liguria and Tuscany; Genoa has the summer mean of Naples, Palermo that of Ancona. The barometric pressure is in direct ratio with the latitude. It is at its maximum in winter, at its minimum in the spring, being in summer a little below the annual mean, and in the autumn above it. The maximum of the mean monthly pressure falls in February, and the minimum suddenly follows in March. Except in cases of violent perturbations the pressure continues to diminish from nine in the morning till three in the afternoon; the difference is less in winter than in summer, less in the N. than in the S., less near the sea than inland. The quantity of water falling in the form of rain and snow is greatest in the Præalpine districts—Biella, 41.41 inches; Lugano, 63.2 inches; Udine, 50.78 inches. At the more elevated stations—Urbino, 39.8 inches; Perugia, 39 inches; Mondovì, 34.9 inches; and in some of the bays formed by the lofty chains, where the sea-winds meet and discharge themselves of their vapors—Genoa, 52.8; Florence, 49.2; at Naples, 34.7. The most rainy season is the autumn, espe-



cially October. The driest months are, in winter, January and February; in summer, July. In the N. and in the interior it rains more in the summer than in the winter; the reverse is true on the sea-coast and in the S. In the mountainous regions during October and November heavy rains sometimes fall in the course of a few days, producing disastrous inundations. In Oct., 1872, there was a rainfall at Domodossola of 34.2 inches; at Biella, of 25.5 inches; at Genoa, 28 inches; at Florence, 16 inches. In January, and in the winter generally, the sky is somewhat more covered than in the other months, especially in the valley of the Po and in most of the Apennine valleys. The prevailing direction of the wind, although very variable, is from the seashores toward the interior of the Peninsula. In July, and in the summer generally, the sky is clearer than during the rest of the year; the prevailing winds, always changeable, blow from inland toward the sea-coasts. In April the clearness of the sky is somewhat less than the annual mean, and is still less in the month of October, especially in the great valley of the Po. The direction of the wind is most variable in the spring and in the autumn.

**PUBLIC ECONOMY. A. Agriculture.**—There are three great distinctive agricultural districts in Italy: (1) The plain of the Po—very fertile, with regular and systematic cultivation; (2) the declivities and valleys of the Apennines, on the two slopes of the Peninsula—the region of the olive; (3) the pasture-lands, which, in their turn, are subdivided into alpine pastures and the pastures of the plains; in the latter the grass-lands are often interspersed with rice-fields and marshes, the malaria from which depopulates the country. This is especially true of the rich lands of Lombardy, of the Roman Campagna, the Pontine Marshes, and of Sardinia. The productivity of the soil might be greatly increased if the agricultural methods and tools employed were less antiquated, and if the whole country would keep pace with the progress already made in Lombardy and Piedmont. Of the 71,630,000 acres which form the kingdom of Italy, 59,280,000 are classed as productive, the rest as barren. Two-fifths, or 27,170,000 acres, consist of arable land, with or without the vine; 3,408,000 of natural or artificial meadow; 426,000 of rice-lands; 1,235,000 of the olive; 1,235,000 of the chestnut; 12,350,000 of forest; and more than 12,350,000 of pasture-ground. The annual produce of cereals is about 210,160,000 bushels—wheat, 106,784,000; maize, 49,700,000; rye, 7,952,000; barley and oats, 23,004,000; rice, 4,144,000. In abundant years the supply exceeds the consumption, in average years it is hardly equal to it, and in years of scarcity falls short by about one-tenth. To this, however, should be added 15,336,000 bushels of chestnuts, 27,224,000 bushels of potatoes, and 11,928,000 bushels of vegetables. The products which have the most commercial importance are—silk, valued at about \$26,000,000; wine, amounting to about 780,000,000 gallons (in Sicily to 208,000,000; in Emilia, 130,000,000; in Piedmont, 130,000,000; in Venice, 52,000,000; in Umbria, 52,000,000; in Naples, 52,000,000; in Lombardy and the Marches, 65,000,000; in Tuscany, 39,000,000; in the Romagna, 26,000,000; in Sardinia, 26,000,000); oil amounting to more than 30,560,000 gallons (12,224,000 in S. continental Italy; in Sicily, 6,112,000; in Liguria, 5,348,000; in Tuscany, 3,056,000; in the Emilia and the Marches, 1,528,000; in Lombardy, 1,146,000; in Sardinia, 1,146,000). The hemp produced amounts to about 50,000 tons. During the American war of secession the high price of cotton led to its cultivation, and about 325,000 metric quintals were annually produced, but it proved an unsuccessful speculation. Tobacco, cultivated in Sardinia, Sicily, the Marches, and in the neighborhood of Vicenza, yields about 150,000 metric quintals. Oranges, lemons, citrons, and other fruits, both dried and fresh, are exported. Among the animal products, besides the silkworm, the butter and cheese are valued at not less than \$15,000,000. Cattle do not abound in Italy. The sheep and goats are reckoned at 12,000,000; the black cattle or oxen at 3,700,000; horses, mules, etc., at 1,400,000; and the swine at 4,000,000.

**B. Manufactures.**—In Northern Italy noteworthy progress has been made in manufactures during the last twenty-five years. The great industries are—(1) silk, which represents a production of \$26,000,000 for spun silk alone, independently of tissues, among which velvet is conspicuous, that of Genoa being very celebrated; (2) woollen manufactures, of which there are important establishments in Piedmont (especially at Biella) and in Venetian Lombardy (chiefly at Schio) to an annual amount of \$13,200,000; (3) cotton manufactures, very flourishing in Liguria, Piedmont, Lombardy, and Friuli, producing spun cotton to the amount of \$7,000,000, and cotton cloth to the amount of \$10,000,000. The straw industry (chiefly straw hats) is very prosperous in Tuscany. The agricultural manufactures, the wines above all, admit of much further improvement. The artistic or æsthetic manufactures are those for which Italy is espe-

cially distinguished abroad—the filigree of Genoa, the glass and beads of Venice, the coral of Naples and of Leghorn, the wrought marbles of Carrara and of Lucca, the perfumery of Tuscany, paper, hats, gloves, etc. One of the most flourishing industries is that of naval construction, particularly in Liguria, where the traditional skill of the shipbuilders is now aided and improved by good special schools, and above all by the Technical and Nautical Institute of Genoa and the excellent high school of the same city. The number of ships launched in 1860 was 198; in 1870, 803; in 1872, 724; and the average tonnage, which was 99 in 1860, rose to 142 in 1872. There are now (1874-75) in process of construction at 15 shipyards in Liguria 103 large vessels—some for English, French, and Norwegian traders—of a total tonnage of 107,900, the average per ship being 1057 tons.

**C. Commerce and Navigation.**—The balance of trade in Italy, though improving, is not yet what it may and ought to be. With an importation of \$187,200,000 in 1869, the exportation was only \$174,800,000. Increasing gradually, the exports in 1872 (the date of the latest official statistics) had risen to \$281,220,223, but the importation amounted to \$237,802,265. The commercial marine in 1868 consisted of 17,845 sailing vessels of all dimensions, with a tonnage of 859,387; 101 steamboats of 23,437 tonnage—total tonnage, 884,814, of which one-half was the property of Liguria. Now (1874-75) Italy numbers 4220 sailing vessels, averaging more than 50 tons each, with a total of 1,126,032 tons, and occupying in this respect the fourth rank, being surpassed only by England, the U. S., and Norway, and being superior to France, whose sailing tonnage is only 868,659. Italy has at present 103 steamers (85,045 tons), occupying the sixth rank.

**D. Canals and Roads.**—The canals of Italy, navigable as well as for irrigation, have been her boast from ancient times. The principal of these are in the valley of the Po. The total length of the navigable canals is 435 miles. The most important are—the Canal Cavour, in Piedmont, which, supplied from the Po, begins at Chivasso and terminates at Turbigo, a distance of 52 miles; in Lombardy, the Grand Canal, supplied from the Ticino near Tornavento, and passing through Abbiategrasso; the canal of Pavia, also supplied from the Ticino, and passing through Binasco; the canal of Martesana, which, from Milan through Gorgonzola, lends to Cassano on the Adda. The province of Polesina in Venice, and that of Padua, have an excellent canal system. The Emilia, too, is well supplied with them. The canal of Pescaia, that of Pisa, and the canal of Ombrone are in Tuscany. In Southern Italy the emissary, executed by Prince Torlonia, for draining the Lake Fucino or Celano, and thus restoring to cultivation 42,000 acres of land, is most noteworthy. (See article FUCINO.) The communal high-roads have a total length of 61,221 miles; the provincial roads, 12,373 miles; the national roads, 3970 miles. The total length is 77,590 miles.

**Railways.**—In 1873 there were in operation 4154 miles of railroad, thus divided:

Piedmont, Liguria, Lombardy, and Venice.....	1556 miles.
Tuscany, Emilia, the Marches, Umbria, and the Roman provinces.....	1332 "
Neapolitan provinces.....	963 "
Sicily.....	206 "
Sardinia.....	82 "

In the year 1874 the number of miles of railway had increased to 4372.

**Post-Offices and Telegraphs.**—Postal activity, a convincing evidence of advance in public instruction, is constantly on the increase. It has more than doubled in ten years. In 1862 the correspondence which circulated in the country amounted to 111,733,319 letters; in 1872, to 232,242,672, an increase of 120,509,358. In the first nine months of the year 1874 the telegraphic despatches numbered 14,605,660.

**Government and Public Institutions.**—The government of Italy is a constitutional monarchy, with a senate appointed for life, and a chamber of 508 deputies, elected by a free and broad suffrage. The most entire freedom of the press and the right of association is secured. The prefects or governors of the provinces, and the syndics or mayors of the towns, are government appointees; otherwise the elective system generally prevails in all the institutions of the administrative hierarchy, communal as well as provincial. The only hindrance to the perfect working of the political organization has been, thus far, the financial deficit produced by the vicissitudes of the revolution, by military expenses, and by the construction of the railways. But, thanks to the praiseworthy efforts of the government and the country, even this evil is in the way of a speedy cure, and the deficit, which had already amounted to more than \$92,000,000, is reduced in the balance for 1875 to about \$6,000,000.

**Administration of Justice.**—At the foot of the Italian



magistracy stand the conciliatory judges, who perform the double office of conciliating litigants and of deciding small disputes involving an amount not exceeding  $\text{₤}6$ . In 1872 they settled more than 700,000 controversies. The prætors, 1811 in number, have jurisdiction of offences punishable with imprisonment not exceeding three months and by fines not exceeding  $\text{₤}60$ . In 1872 they tried 299,212 individuals. The prætors also decide civil questions not involving more than  $\text{₤}300$ , and in 1872 they gave 160,619 judgments of this kind. The tribunals take cognizance, on appeal, of questions civil, commercial, and penal decided by the prætors, and they have original jurisdiction of all matters not belonging to the conciliatory judges and to the prætors (they have, however, no authority in commercial questions in those towns where there is a proper tribunal of commerce), and they also decide questions of correctional police. There are 162 tribunals, which in 1872 pronounced 2146 judgments. From the sentence of the tribunals appeal may be made to the courts of appeal, and from these, when it is a question of law, to the courts of cassation. The system of juries before the courts of assize has not thus far given satisfactory results.

**Education and Instruction.**—The ministry of public instruction appropriates, for the expenses of the central administration, for university education, for secondary, classical, and technical instruction, for normal schools, and as subsidy for the elementary instruction about  $\text{₤}3,500,000$ ; the communes provide for the primary teaching, the ministry of agriculture and commerce for the higher technical instruction, and the various bureaux for special instruction. The municipal elementary day schools are 34,213 in number (18,243 for boys, 12,732 for girls, 3238 mixed). Adding 9167 private schools, we have a total of 43,380, or of one school to 620 inhabitants. But though that is the general mean, the distribution of the schools is very unequal, they being much more numerous in the N. than in the S. Thus, in the province of Turin there is one school for every 355 inhabitants; in Calabria, only one for 1400. Elementary instruction is obligatory and gratuitous. The pupils inscribed were—in 1861-62, 1,008,674; 1863-64, 1,178,743; 1865-66, 1,217,870; 1867-68, 1,329,367; 1869-70, 1,577,654; 1871-72, 1,745,467, or 6.06 per 100 inhabitants. To these numbers should be added 375,947 attendants on the night schools, and 153,522 on holidays. The proportion of the population, without distinction of age, who could not read, was in 1861, 78.29; at the last census (1871) the proportion was 73.29. The normal schools train, in a course of three years, the masters and mistresses; they are frequented by more than 6000 pupils. The large towns have female high schools, not gratuitous, for the superior education of girls. National boarding colleges, several female conservatories, many private, and not a few clerical establishments, receive boarding pupils. The preparatory classical instruction is given in gymnasiums and lyceums. There are 104 national gymnasiums, with 8268 students; 79 royal lyceums, with 3773 students; besides various communal and private gymnasiums. The government technical schools, in which preparatory professional instruction is given, are 63, with 6188 pupils. Technical instruction of the second grade is acquired in 72 technical institutes, with 4471 pupils. In these, after a biennial course of general culture, there are four sections—the physico-mathematical, the commercial, the agromonomical, and the industrial. There are also schools for the arts and trades (designed for the operatives and overseers in manufactories), 10 royal mercantile marine institutes (in which ship-captains, naval constructors, and steam-engineers are trained), and 14 nautical schools. Five high schools—a naval school at Genoa, very flourishing; a commercial school at Venice; an industrial school at Turin; and two agricultural schools, one at Milan and one at Portici—complete the technical instruction. There are 17 universities (not including three free universities), with 6423 students; 3 superior practical institutions for engineers, and 2 for other branches of literary and scientific culture. Besides many town collections, there are 33 public libraries, the most valuable of which is the Magliabecchiana at Florence, with 280,000 printed volumes and 14,000 manuscripts. We have not space to speak of the archives, of the musical institutes, of the academies and galleries of art, so justly celebrated throughout the world.

**Charitable Institutions.**—There are in Italy 20,123 charitable institutions, representing a total annual expenditure of  $\text{₤}17,175,688$ . Among these are 955 hospitals, which receive 499,000 persons, at an annual expense of  $\text{₤}5,954,169$ . The other charitable institutions are—asylums and poor-houses, expending  $\text{₤}5,762,945$ ; loaning institutions, advancing  $\text{₤}831,655$ ; other modes of relief require an annual outlay of  $\text{₤}2,804,882$ . For religious worship, etc.,  $\text{₤}1,822,037$ .

**Army and Navy.**—The Italian army, according to the official tables, is composed of 679,877 men, and is thus divided:

(1) The standing army:	
Line infantry.....	199,886
District militia.....	188,774
Bersaglieri.....	30,758
Cavalry.....	24,355
Artillery.....	49,867
Engineers.....	6,280
Carabinieri.....	20,071
Special corps and organizations.....	9,484
Officers in active service.....	11,481
“ stationary “.....	2,680
“ waiting orders or retired.....	419—543,432
(2) Provincial militia:	
District militia.....	131,121
Bersaglieri.....	3,551
Engineers.....	1,073
Officers.....	740—136,445
Total.....	679,877

The navy is in process of transformation, and the present able minister, Saint Bon, has made a proposal to Parliament (which will be probably acceded to) to sell a large number of ships of war now become unserviceable. The navy at present consists of 14 iron-clads, 8 of which are small vessels, altogether of 200 guns and 5700 horsepower; 22 screw steamers; 25 side-wheel steamers; 8 sailing ships and other smaller vessels; the total number being 91, with an armament of 1139 guns. According to the new plan, the naval force will be regulated as follows:

Ships { 12 large iron-clads to serve to form squadrons; of { 6 iron-clad steamers for coast defence; war. { 12 screw gunboats.	
Vessels for the protec- { 10 station corvettes (also screw); tion of trade and { 4 cruising vessels; other services. { > smaller vessels.	
Accessories. { 7 lookout and despatch steamers; { 6 transport-steamers; { 8 tugs.	

**HISTORY.**—Of all histories, that of Italy is perhaps the most difficult to compress, every city having its own special and illustrious story, and the histories of all the nations of Europe converging into that of this peninsula. It may be divided into four great periods: I. *Conquest and Feudalism*.—The barbarians, having passed the confines of the empire, had entered into Italy; under Alaric they had sacked Rome; under Attila they had destroyed Aquileia, the fugitives from which founded Venice; under Odoacer they had put an end to the empire (476), but Theodoric, king of the Ostrogoths, came from the Danube (489), vanquished Odoacer in the Isonzo, then at Verona, slew him at Ravenna, and founded (493) a glorious monarchy, although it was stained by the blood of Boetius and Symmachus, and soon broken up by the Greeks under Belisarius and Narsetes (553). Under Alboin the Lombards descended from Pannonia (Hungary), and established the most lasting government which had existed in Italy (568-774). But coming in contact with papal pride, they in vain sought to appease it by concession and largess. Summoned first by Gregory III., then by Stephen II., the French came into Italy under Pepin, who founded the State of the Church (754); then, invited by Adrian I., Charlemagne made war upon the Lombards under Desiderius, and put an end to their kingdom (774). In 800, Charlemagne was elected emperor of the Romans and crowned by the pope. But this restoration of the Roman empire was only apparent, as the vitality of the new Caesarism was not Roman, but German and theocratic, and, to use the expression of Gregorovius, the Church was the real “kingdom of God upon earth”—the empire was but the civil form; that was the soul, this but the Catholic body. It was no longer Roman laws, but the institutions of the Church, which formed the solid structure and the bond of union between the Western nations, and which constituted them into so many Christian communities, at the head of which there was one mind—that of a single pope; and one sword—that of a single emperor. The idea could not be realized, because the two elements which were to carry it out soon fell into discord. Charlemagne being dead (814), his weak successors were unable to restrain the nobles and the clergy, and the feudal system was allowed to develop itself. Italy was first under the rule of Bernard, nephew of the great emperor, then of Louis, then of Lothair, then of Louis II., then of Charles II. the Bald, then of Carloman, and finally of Charles the Fat (879-883). On the dethronement of this last sovereign five or six Italian feudal lords laid claim to the power, but Berengarius I., marquis of Friuli, prevailed over the rest (894). Under his reign, that of Hugh, duke of Provence (926), and that of Berengarius II., lord of Ivrea, Italy passed through one of the most unhappy periods of her history, being desolated by civil wars, by invasions from Hungary and from the Saracens, by corruption, and by barbarism. II. *The Communes and the Republics*.—Ottho I. came to the throne (962) with three great ideas, all favorable to Italy: to reduce the number and the authority of



the vassal nobles; to favor the growth of the cities, the towns, and the municipal authority: to diminish the papal power—not, indeed, as unhappily, the later Lombards had done), by usurping the territory, but by undermining its moral influence, and by taking part himself in the pontifical elections. The communes profited by this disposition, and first of all the maritime towns (Amalfi, Pisa, Genoa, Venice), to organize a free government. The bitter conflicts between the papacy and the empire having reached their height under Gregory VII. and Henry IV. (1073-85), brought upon Italy the curse of the Guelph and Ghibelline factions, the White and the Black, etc.: as a last consequence, however, they proved favorable to the development of that republican spirit which the two principal rivals could not succeed in dominating. Among other powerful causes of the aggrandizement of the free communes were the Crusades, which, unsuccessful as religious and political enterprises, excited immense maritime and commercial activity. Representing the imperial principle against republicanism, Frederick Barbarossa descended into Italy (1154), besieged and took Tortona, was crowned king of Italy in Pavia, assisted Pope Adrian to crush Arnold of Brescia, received in reward the imperial crown, and returned into Germany. But the pope soon broke away from the imperial alliance, and Frederick crossed the Alps again (1158), took Brescia, besieged Milan for the first time, established his authority under the name of *poderst* in every province, treated Crema with great severity, and besieged Milan anew and razed it to the ground (1162). Against this barbarity the Guelph cities solemnly concluded, at Pontida, the Lombard League. Frederick, returning, assaulted Alexandria, and met the confederates at Lignano, where the Italians (chiefly through the valor of the Milanese, headed by their *carroccio*, or great war-chariot) defeated the imperial host in a great battle. The peace of Constance (June 25, 1183) confirmed the triumph of the free cities, which were thereafter governed by two consuls, who were to receive their investiture from the emperor, and render him feudal homage. But in Southern Italy the republican spirit was overshadowed, first by the Norman monarchy founded by the brave Roger, and then by the Swabian. An illustrious and heroic descendant of this latter house, Frederick II., with the help of Pope Innocent III., wrenched the imperial crown from Otto IV.; but the ambitious pontiff, the founder of the Holy Inquisition, soon after turned against him. At Cartanova, Frederick defeated the new Lombard League formed against him at the instigation of the pope (1239). Frederick dying in 1250, the papal hatred followed his race, and was never appeased until Charles of Anjou, at the invitation of Pope Urban IV., by the battles of Benevento and Tagliacozza, and by the death of Manfred and of Conradine, put an end to the Swabian dominion in Italy (1266-68). The new French rule, however, was of short duration, and was overthrown partly by an insurrection headed by John of Procida, and yet more by the insolence of the soldiers of Charles, who provoked at Palermo the revolution of the Sicilian Vespers (1282). Meanwhile, internal discords were bringing ruin upon the republics in other parts of Italy: and the houses of the Della Torre, and afterwards of the Visconti of Milan, of the Ezzelini at Padua, of the Scaligeri at Verona, of the Pallavicini in other parts of Lombardy, had acquired great power. At Florence, the Brondelmonti and the Anziani, at Bologna the Geremei and the Lambertazzi, at Genoa the Grimaldi and the Fieschi on one side, the Doria and the Spinola on the other, were in continual quarrels, and rivalled each other in their efforts to destroy the liberty of their fellow-citizens. The maritime towns, in their disputes for the dominion of the sea and for commercial superiority, ruined each other by turns. Pisa wasted Amalfi, and in her turn, after the battle of Meloria (1284), was crushed by Genoa; but Genoa atoned for it by her long struggle with Venice, until the war of Chioggia (1369-71) left the two republics completely exhausted. Florence, always torn by factions, was imperilled by the revolution of the Ciompi, headed by the wool-comber Michael di Lando, the precursor of modern Socialism (1378). Everything, in short, was on the decline in Italy; the papacy, which had transferred its seat from Rome to Avignon (1307), the Ghibelline party, headed at first by Matteo Visconti, and then by Castruccio Castracani, was losing its power. Scourged, now by the troops of Philip the Fair, now by those of Louis of Bavaria, Italy had become the battlefield in which foreign ambition exercised its worst passions. In vain Cola da Rienzi struggled for a moment (1347) to rekindle the spirit of a dying civilization. III. *The Descent*.—The cause and at the same time the consequence of the civil debasement of Italy was the lack of a military spirit in her people, so that she was completely at the mercy of domestic and foreign ambition. Hence the origin of the companies which overran and plundered the country with impunity

under the banners of Ladrasio Visconti, of Fra Moriale, of Raimondo da Cordova, of Sir John Hawkwood, of Anichino Baumgarten, of Braccio da Montone, of Giovanni d'Oleggio, of Carmagnola, of Piccinino, of Sforza, etc. The house of Savoy alone, in the midst of all this corruption, maintained itself uncontaminated, and by the valorous enterprises of Amadeus VI. (il Conte Verde) and by those of Amadeus VIII. foreshadowed the glorious days of Emmanuel Philibert and the three glorious Charles Emmanuels, worthy precursors of that monarchy which in our day has redeemed Italy. It was also a great misfortune that while the Western and Northern nations were shaking off the yoke of the Romish Church by a great reformation, Italy being not yet prepared, suffered the great movement of Savonarola and that of Burlamachi to fail, thus postponing for three centuries that moral regeneration which is the basis of political progress. The most cultivated people in Italy, the Florentines, preferred the splendor of the court of Lorenzo the Magnificent to the austere doctrines of the Reformers, and they allowed the merchant-monarchy of the Medici—vainly threatened for a moment by the conspiracy of the Pazzi—to take root and thrive until it extinguished in their souls even the very desire of liberty. The old Cosimo assumed the title of "father of his country" (1429). In the mean time, the power of the Turks was increasing in the East, to the injury not only of Italy, but of the civilization of all Europe. Amurat I. threatened Constantinople (1360); Bajazet would have taken it had he not been arrested by the wild meteor Tamerlane and his army (1402). But Amurat II., and then Mahomet II., returned with renewed energy to the enterprise, and the fall of Byzantium (1453) sealed the ruin of the colonial power of the Italians. Not long after, the discovery of the New World, made by the Genoese Columbus (1492), and that of the East India passage round the Cape of Good Hope by the Portuguese Vasco da Gama (1497), then the conquests of Cortez, Pizarro, Almagro, Vasco, Nuñez de Balboa, of Cabot, Verazzani, and of Vespucci in America, together with those of Almeyda and of Albuquerque in India, diverted commerce from its old channels, depriving Italian navigators of the palm, and bestowing it upon more Western nations. Nothing now remained to Italy but the glory of letters, of arts, and of science, but in these she shone without a rival. Meanwhile, the crooked policy of Ludovico il Moro again brought a foreign power into Italy. Charles VIII., king of France, overran the Peninsula from one end to the other (1495). The French under Louis XII., and the Spanish under Ferdinand the Catholic, disputed the dominion of Italy. The papal throne was made infamous by Alexander VI., and Caesar Borgia, his son, was the complete personification of that base policy which Machiavelli systematized in *Il Principe*. Almost all Europe united in the League of Cambray against the republic of Venice (1508), whose forces were defeated in the battle of Ghiara d'Adda (1509), and Julius II., who had been the soul of the League, turned against the foreigners with the cry, *Fuori i Barbari!* and formed the Holy League in order to drive out the French (1511), who, in spite of the prowess and the ferocity of Gaston de Foix and the valor of his Bayards, La Tremouille and Trivulzi, were obliged to abandon Italy. But soon after Francis I. descended the Alps, was victorious at Marignano (1515), was defeated and taken prisoner at Pavia (1525). Then followed the great conflicts between this king and Charles V., of which Italy unfortunately was the principal theatre: the pontificates of Leo X. and of Clement VII., the siege of Florence, the valorous enterprises of Giovanni dalle Bande Nere, the exploits and the death of Francesco Ferruccio, the siege and sack of Rome by the imperialists under the constable de Bourbon, who there lost his life (1527); the expedition against Algeria, conducted by Andrea Doria; the Peace of Crespy (1544); then that of Cateau Cambresis, which established despotism rather than peace in Italy and in all Europe (1559); the glorious enterprise of Emmanuel Philibert: the battle of Lepanto (1571), in which the Italian navy shone brilliantly for the last time, and by which the final blow was given to Turkish power. During the seventeenth century, while all the ancient states of Italy were fallen to the lowest point, the house of Savoy arose with new splendor through the deeds of her three Charles Emmanuels and of Victor Amadeus. IV. *The Republics*.—To these crowned heroes, as well as to the popular heroes Pietro Micca and Piosasso (called Battifarra, who in the wars of succession, and especially in that of the Austrian succession, sustained nobly the honor of Italy, before the boast of having given the signal for the uprising of a nation which so many centuries of misfortune had made abject. But a long and stormy period was still to be passed through—the wars of the republic and of the first French empire (the battle of Montenotte (1796), the Treaty of Cerasio,



the battles of Caldiera and of Arcole, the Treaty of Tolentino, the fall of Venice (1797), the battle of Novi, the blockade of Genoa, the battle of Marengo (1800), etc.), and then the Peace of Vienna (1815), which sacrificed Italy to the Holy Alliance. Frequent insurrections, and especially those of 1821 and of 1831, were the forerunners of that great and happy revolution which, begun in 1848, when King Charles Albert granted the constitution, was completed in 1870, when united Italy made Rome the capital of the kingdom. (C. BOCARDO.)

**Italy**, tp. of Yates co., N. Y. It has 6 churches. P. 1341.

**Itamarati'** [Brazilian, "white rock"], a celebrated cascade near Petropolis, the summer capital of Brazil, about 60 miles N. W. from Rio Janeiro. Its height is variously calculated, but is not less than 250 feet, nearly perpendicular.

**Itard'** JEAN MARIE GASPARD, b. at Oraison in the S. of France in 1775; after studying at Riez and Marseilles entered a banking-house in the latter place, where he remained until 1793, when he eluded the requisition for military service by representing himself as a medical student, though in fact he had never given the least attention to medicine. Nevertheless, he was assigned by the revolutionary committee to a military hospital as assistant surgeon, and by dint of careful observation and study soon became so skilful an operator that he obtained an appointment by competitive examination in the Val-de-Grace Hospital at Paris. Three years later he was appointed physician to the deaf-mutes' institution, where he made a specialty of diseases affecting the organs of hearing, in which department he speedily acquired a European reputation. His experiments in the education of "the wild man of Aveyron," a boy twelve years old captured in the woods, were described by him in two works published in 1807, which excited great interest. Itard wrote an important work on *Diseases of the Ear and the Organs of Hearing* (1821). D. at Paris July 5, 1838, leaving large bequests to the institution for deaf mutes and the Academy of Medicine.

**Itasca',** an unorganized county of Minnesota, bounded on the N. by the Rainy Lake and Rainy Lake River, which separate it from Canada. Area, about 5200 square miles. It is in part reserved for the Indians. It contains much pine and larch timber, and many lakes and marshes, producing wild rice (*Zizania aquatica*), the seed of which is employed as food by the Indians. Pop. 96.

**Itasca Lake**, in Beltrami and Cass cos., Minn., is regarded as the source of the Mississippi. It receives, however, several streams, one of which is several miles in length. Its elevation is 1575 feet. It is surrounded with pine-clad hills some 100 feet higher than the lake, which is very beautiful. The Mississippi leaves the lake with a breadth of some 12 feet, and is ordinarily less than 2 feet deep at this point.

**Itawam'ba**, county of N. E. Mississippi, bounded on the E. by Alabama. Area, about 500 square miles. It is a level limestone region, with a rich soil, and not much timber. Corn and cotton are staple products. Cap. Fulton. Pop. 7812.

**Itch.** See SCABIES, by E. DARWIN HUDSON, JR., M. D. REVISED BY WILLARD PARKER, M. D.

**Ith'aca**, or **Thea'ki**, one of the smallest of the Ionian Islands. Area, 44 square miles. Pop. 11,940. It is mountainous, but fertile, producing olive oil, wine, and currants of a superior kind. It is famous as the dominion and home of Ulysses, and contains some cyclopean ruins, which still are called the castle of Ulysses. The principal town is Vathi, with a good harbor and 2500 inhabitants.

**Ithaca**, post-v., cap. of Gratiot co., Mich., handsomely situated at the geographical centre of the county, in a fine agricultural region; has a foundry, furniture-factory, saw-mill, planing-mill, a weekly newspaper, 4 churches, 2 hotels, etc. Principal business, farming.

ROBERT SMITH, ED. "GRATIOT CO. JOURNAL."

**Ithaca**, tp. and post-v., cap. of Tompkins co., N. Y., near the head of Cayuga Lake, on the Delaware Lackawanna and Western, the Ithaca and Athens, the Ithaca and Cortland, the Ithaca and Geneva, and the Cayuga Lake R. Rs. It is an important centre of the Pennsylvania anthracite coal-trade; has 9 churches, 1 daily and 3 weekly newspapers, 2 national and 1 savings bank (aggregate capital and deposits, \$750,000), and large manufacturing interests. Calendar clocks, horse-rakes, spokes and hubs, paper, glass, leather, and machinery are manufactured. Ithaca is the seat of CORNELL UNIVERSITY (which see) and of Sage College for ladies. Ithaca has gas and water works, and a public library costing, with its building, \$66,000, the gift of Mr. Ezra Cornell. The scenery here is very fine. Pop. 8462; of tp. 10,107.

J. H. SELKREG, ED. "ITHACA JOURNAL."

**Ithaca**, post-v. of Twin tp., Darke co., O., 3 miles from Gordon, a station on the Dayton and Union R. R. Pop. 150.

**Ith'ica**, post-tp. of Richland co., Wis. Pop. 1266.

**Itho'me**, a mountain-fortress in Messenia, memorable for the defence there made for many years against the Spartans in the first Messenian war. It was afterward the citadel of Messene when that city was founded by Epaminondas.—There is another town of Ithome in Histiaeotis, Thessaly, described by Homer as the "rocky Ithome," and placed by Strabo within a quadrangle formed by the four cities of Triceæ, Metropolis, Pelinnaum, and Gomphi. It probably occupied the site of the castle which stands on the summit above Fanari.

**It'ius Por'tus**, the port on the present French coast, nearly opposite Dover, from which Caesar sailed on his second expedition to Britain. Its position has been a matter of much controversy; the majority of geographers, however, identify it with Wissant.

**I'tri**, town of Southern Italy, in the province of Caserta, near Gaeta. Very interesting antiquities abound in the neighborhood. A modern sanctuary on a high point commands a superb view of the sea. Pop. in 1874, 6582.

**Itti'ri**, town of Southern Italy, in the province of Sassari. Pop. in 1874, 3055.

**Itu.** See ILYR'.

**Ituræ'a** [Gr. *Ἰτρούα*], a small district in the N. E. of Palestine, which in the time of Christ formed, along with Trachonitis, the tetrarchy or government of Philip, son of Herod the Great, and brother of Herod, tetrarch of Galilee (Luke iii. 1). The name is supposed to have been derived from Jetur, one of the sons of Ishmael. It was N. of Bashan, and adjoined Auranitis, the modern Hauran, with which it has often been confounded. It is now called *Jedur*, and contains 38 towns and villages. (See Porter's *Five Years in Damascus* and Robinson's *Biblical Researches*.)

**Iturbide, de** (AGUSTIN), b. at Valladolid (now Morelia), Mexico, Sept. 27, 1783; took a distinguished part as an officer of the Spanish army in the war against the Mexican revolutionists of 1810 and subsequent years, rising to the rank of colonel; but in 1820, in consequence of the constitutional revolution which took place in Spain in that year, he decided to make an attempt for the independence of Mexico under a monarchy. Obtaining command of the Spanish forces in the S. of the province of Mexico, he promulgated Feb. 24, 1821, the "Plan of Iguala" at the town of the same name. The essential features of this celebrated plan were known as the "three guaranties"—i. e. the maintenance of the Catholic religion; union of Mexicans and Spaniards; independence with a monarchy under a prince of the Spanish Bourbon dynasty. The plan of Iguala had immediate success; it was accepted with enthusiasm not only by the native Mexicans, but by the greater part of the Spanish forces in the country. After several months of nominal hostilities, Iturbide concluded a treaty at Córdoba (Aug. 24, 1821) with the new Spanish viceroy, O'Donoghue, by which his "plan" was virtually accepted, and he thereupon made a triumphal entry into the city of Mexico Sept. 27 of the same year. A *junta of government*, and afterwards a regency, was established under the presidency of Iturbide, a constituent assembly was chosen, and negotiations were at once begun with Spain for obtaining a prince who should be crowned emperor of Mexico. Through the fatuity of Ferdinand VII., the treaty of Córdoba was rejected by the Spanish government, and the successful movement for independence was treated as rebellion. After some vacillation and quarrels with the constituent assembly he had convoked, Iturbide, favored by his army, was proclaimed emperor May 18, 1822, and was reluctantly recognized by the assembly. He was crowned July 21, but experienced great opposition, being compelled soon after to dissolve the assembly and imprison fifteen of the deputies. In December, Gen. Santa Anna, then a very young man, and lately a warm partisan of Iturbide, proclaimed the republic in Vera Cruz, and by Apr., 1823, the situation had become so hopeless that Iturbide resigned the crown and made terms with the restored assembly, by which he was allowed to embark for Europe and enjoy a pension of \$23,000. He sailed for Italy May 11, resided several months in Leghorn, thence went to England, and in May, 1824, chartered a vessel in which he returned to Mexico, ostensibly to tender his services as general against an anticipated invasion by Spanish forces, but doubtless with the expectation of recovering his throne. Meanwhile, a republican government had been formed in Mexico, which, thrown into alarm by a rumor of Iturbide's intended return, issued a decree that he should be treated as an outlaw should he set foot within the territory of the re-



public. Ignorant of this decree, Iturbide secretly landed at Soto la Marina July 14, was recognized and taken before the state legislature, by whose orders he was shot at Padilla, Tamaulipas, July 19, 1824. His family established itself at Philadelphia, where the ex-empress d. Mar. 2, 1861. Several of the sons of Iturbide were afterwards honored with diplomatic or military posts by the Mexican government, and during the ephemeral empire of Maximilian the survivors were recognized as princes. The elder, Angel de Iturbide, d. in the city of Mexico July 21, 1872; the younger, Agustin, d. in Paris in May, 1873. Prince Agustin, son of Angel, recognized by Maximilian as heir presumptive, was b. in 1864, and now (1875) resides with his mother, an American lady, at Georgetown, D. C.

PORTER C. BLISS.

**Itza'** Indians of Central America are of undoubted Maya stock, and by their own traditions must have left Yucatan in the fifteenth century. They were visited in 1525 by Cortez, whom they treated kindly. They valiantly maintained their independence until 1698. They had previously attained some degree of civilization. They are chiefly found in the vicinity and on the islands of Lake Itza, on the boundary between Guatemala and Mexico. They are in name, at least, of the Roman Catholic faith.

**Itzehoe**, town of Prussia, in the duchy of Holstein, on the Stör. It has distilleries, sugar-refineries, manufactures of chicory and tobacco, and carries on a considerable general trade. Pop. 9111.

**Iu'ka**, post-v., cap. of Tishomingo co., Miss., on the Memphis and Charleston R. R., 115 miles from Memphis, Tenn., and 8 miles from Tennessee River; has a female institute, a male academy, a planing-mill, a weekly newspaper, and valuable mineral springs. J. S. DAVIS, Ed. "HERALD."

**Ivan' the Terrible**, the fourth grand duke of Russia having the name Ivan (John), and the first czar of that country (though reckoned as Ivan IV.), b. in 1529; succeeded his father Basil in 1533; put to death in 1543 the triumvirate of regents, and soon after assumed the title of czar; published a new code 1550; carried on wars with the Tartars, capturing Astrakhan, Kasan, and parts of Siberia, but in 1568 acknowledged the sovereignty of Jediguer the Tartar; carried on long and undecided wars with the Poles and Swedes; introduced civilization and the art of printing in Russia, but ruled with great cruelty and harshness. D. Mar. 19, 1584.

**Ivano'vo**, town of Russia, in the government of Vladimir, has important cotton spinning and weaving factories and manufactures of chemicals. Its cotton manufactures employ a considerable part of the population of the vicinity and are steadily increasing. Pop. 8000.

**I'verson** (ALFRED), b. in Burke co., Ga., Dec. 3, 1798; graduated at Princeton in 1820; was admitted to the bar and attained distinction in his profession; was three years member of the House in the State legislature, and one year of the Senate; was elevated to the bench of his judicial circuit, which he filled for seven years; was one of the electors at large for the State on the Democratic ticket in the Presidential election in 1844; was a member of Congress 1847-49, and U. S. Senator from Georgia 1855-61. This position he resigned on the passage of the ordinance of secession by the State convention in Jan., 1861, which measure he ardently advocated. He raised a regiment for the Confederate army, and became colonel and brigadier-general. D. in Macon, Ga., Mar. 4, 1873. A. H. STEPHENS.

**Ives** (DWIGHT), D. D., b. at Holyoke, Mass., Sept. 20, 1805; graduated at Brown University 1825; was ordained to the Baptist ministry in 1826, and preached in Lower Alton, Ill.; supposed to have been the first Baptist preacher in the State who gave his entire services to one church, receiving from them a salary competent for support. He was settled also at Suffield, Conn., being both secretary and president of the board of trustees in the Connecticut Literary Institution (Baptist) in that place. D. Dec. 22, 1875.

**Ives** (ELI), M. D., b. at New Haven, Conn., Feb. 7, 1779; graduated at Yale 1799; studied medicine with his father, Dr. Levi Ives; and with Prof. B. Silliman founded in 1813 the medical department of Yale College, in which he was professor of materia medica until 1829, and then until 1853 professor of the theory and practice of medicine. He was at one time president of the National Medical Association; was an advocate of temperance, education, and the abolition of slavery. D. at New Haven Oct. 8, 1861.

**Ives** (RE. REV. LEVI SILLIMAN), D. D., LL.D., b. at Meriden, Conn., Sept. 16, 1797; worked on his father's farm at Turin, N. Y.; served a year in the war with Great Britain 1812-15, and was educated at Lowville Academy and Hamilton College. He was at first a Presbyterian. In 1822 he received deacon's orders in the Protestant Episcopal Church, and in 1825 married a daughter of Bishop

Hobart. He held pastoral charges in Philadelphia, in Lancaster, Pa., and in New York, and in 1831 was consecrated bishop of North Carolina. In his diocese he labored much for the good of the slaves and for the cause of education. In 1852, his diocese being alienated from him on account of differing views in regard to questions of doctrine and church polity, he visited Rome, where he joined the Roman Catholic Church. He was afterwards professor in the theological seminary at Fordham, N. Y. He afterwards devoted much attention to the founding of an asylum for destitute children at Manhattanville, New York City, where he d. Oct. 13, 1867. He wrote *Trials of a Mind in its Progress to Catholicism* (1854), and several devotional and other works.

**Ivi'za, or Ivi'ca**, the smallest and westernmost of the Balearic Islands, in the Mediterranean, and belonging to Spain. It is 23 miles long, 12 miles broad, and has 11,000 inhabitants. It is mountainous, but has several fertile valleys producing good wine and olive oil. Timber and salt are the main exports. The principal towns are Iviza and San Antonio.

**I'vory** [old Eng. *ivorie*, from the French *ivoire*; Middle Lat. *chor*; Lat. *chore*]. The derivation of the Latin from *barrus*, an elephant, so-called from *bapis*, "heavy," on account of its great weight, is very doubtful, since there is in Sanscrit *ibha*, in Coptic *abhe*, a "tooth," and in ancient Egyptian *ebou*. Perhaps, says Larousse, this latter had a common origin with the Semitic *habhim*. Ivory has generally been defined as simply the tooth of the elephant, but it is in reality a substance between bone and horn from the teeth or tusks of many animals. Its chemical composition is—

Phosphate of lime.....	64.00
Organic matter.....	24.00
Water.....	11.35
Carbonate of lime.....	0.10

Ivory is for the most part, however, the material of the tusks of the elephant. The teeth of the hippopotamus give a finer and harder variety, but owing to their hollowness they can only be employed for small objects. The large marine animals, such as the walrus, narwhal, and spermaceti whale, also yield varieties of ivory. That of the walrus was formerly much used by the old Norsemen for making pieces for the game of draughts; several of these, beautifully carved, are in the British Museum. The material is extremely hard, of a dead pearly white, which becomes black, not yellow, with age. The fossil ivory of Siberia, dug from the ground, consists of the tusks of mammoths and elephants of extinct species. It is found in the Laichovian Isles and by the Frozen Sea. The elephant ivory of the present time comes from Africa and Asia; the latter being, with the exception of the small tusks from Ceylon, much inferior to the former, its faults being a tendency to split, an inferior color, and the more rapid deterioration towards yellow. Ivory is difficult to cut, requiring extremely sharp and very hard tools, but yields readily to the saw, lathe, and rasping tools or files, a great variety of which are used to reduce the block to form. Owing to the value of ivory, which is so rapidly increasing that it now ranks as a precious substance—the greatest care is taken to avoid waste, the division into pieces or veneers being effected with thin saws. When finished it is polished with different powders. Its natural whiteness is exquisitely delicate, bearing a great resemblance to the brightest tint of the human skin, which latter presents the most beautiful hue in nature. But it soon assumes a yellow tone. Spangler, a celebrated workman in ivory at Copenhagen, discovered that ivory kept from the air, but not from the light, under a glass, will retain its whiteness for an indefinite time. The yellow tint of old ivory may be removed with finely levigated pumice-stone. It should then be put while wet under a glass and exposed every day to the sun. Ivory is used for piano-keys, knife-handles, billiard-balls, book-covers, combs, and for an indefinite variety of ornaments and works of art, its "fashionableness" and the variety of its application having increased of late years with its value. The drying up and crumbling of ivory is owing to the exhaustion of its gelatine. When the works of ivory dug by Mr. Layard from Nineveh were brought to England, and found to be in a state of rapid decomposition, Prof. Owen suggested that they should be boiled in a solution of gelatine. Under this process they became hard and firm. Elephant ivory in plates presents delicate lines resembling what is called in drawing cross-hatching or cross-hatching; and thus, which disqualifies it for making artificial teeth, adapts it for miniature painting, and in fact increases the beauty of its tone in all works of art.

Ivory was extensively used by Egyptians, Assyrians, and ancient Greeks. Solomon had a throne of ivory inlaid with gold, and the thronest of Benkepe is described as of ivory and silver. The later Greeks carried this work in



gold and ivory to a degree of splendor which seems incredible. From their extended traffic with Persia and Egypt they obtained immense quantities of both Asiatic and African ivory. Diopene and Scyllis, Cretan artists established at Sicione, were the first to make statues of gold and ivory. The temple of Juno at Olympia contained, among many great works in ivory, the coffer of Cypselus, the table of ivory and gold of the Olympic games, the bed of Hippodamia, the discus of Iphitus, and statues of Juno, the Hours, the Hesperides, and Minerva. Under the influence of Phidias the toreutic or *chryselephantine*, or gold-and-ivory sculpture, became, as befitting its name, colossal. The Minerva of the Parthenon and the Olympic Jupiter evidently surpassed any works of the kind known to the moderns, as may be inferred from this, that the Minerva bore in her hand a Victory 2 metres in height. The scholars of Phidias made a great number of these gigantic images, in which the nude portions of the human figure were in ivory and the drapery of gold. But the quantity of ivory used in Rome was prodigious. The gates of the temple of Apollo, built by Augustus as a votive offering for the victory of Actium, were of this costly material. It is said that the Romans knew how to soften ivory and mould it as horn is now manipulated. According to Dioscorides, this was effected by boiling in the juice of mandragora-roots; according to Plutarch, in fermented barley. This is now done by immersing articles of ivory in a solution of pure phosphoric acid of specific gravity 1.130, and leaving them there till they lose their opacity. Byzantine art, however, went even beyond Roman in the profuse use of ivory, and there is not a museum of Europe which does not contain diptychs and triptychs (folding tablets with religious images), cups, reliquaries, crucifixes, and arms of this era. Magnificent coffers, many of great size, also abounded. Charlemagne had two *gates* in ivory of Byzantine execution. The episcopal chair of St. Vitalis, a work of the sixth century, now in Ravenna, is a fine specimen of this style. Ivory becoming very scarce in the twelfth century, caskets were made of segments of bone, carved. During the Middle Ages it became again plentiful, and with the Renaissance the art of carving it reached perfection. Florence at first, and subsequently Flanders and Germany, were the great centres of the manufacture. Benvenuto Cellini, Michael Angelo, Dürer, John of Bologna, and Algardi distinguished themselves by their work. In the seventeenth century the most eminent *ivorists* were Copé, Zeller, Augermayer, Duquesnoy, Van Obstal, Kem of Nuremberg, Faidherbe of Mechlin, Bossint, Zich, Berger of Norway, and Troyer. Many others, however, had as great a reputation. Monks in cloisters not unfrequently devoted a life to carving a crucifix; one of the best of these is now preserved at Avignon. Ivory was extensively used in the preparation of arms. Dieppe is regarded at the present day as the most extensive ivory-factory in Europe, but work quite as artistic as any produced in this city is made in Germany, not a little of it consisting of imitations of old goblets, oliphants (or hunting-horns), etc., which are sold as antique. Ivory is imitated by combinations of gelatine and baryta, and it is stated that billiard-balls are made of paper-pulp and gelatine which exactly resemble the ordinary kind, and which may be used to play with. Plaster of Paris in powder, combined with chrome, cast and boiled in milk, stearine, oil, or wax, will in time, if occasionally polished, exactly resemble yellowish ivory. The artificial meerschaum, made of egg-shell and gypsum, with probably some intermixture of magnesia, bears at times a great resemblance to ivory, but is brittle. Considering the near approach which has been made by art to imitating ivory, it does not seem incredible that at some future day it may supply a comparatively perfect substitute for what we are now indebted to nature. In a few years the African supply, and in fact all others, will be exhausted, as every traveller in the country bears witness that the elephants are constantly disappearing before the hunter. It is supposed that at present at least 20,000 cwt. of ivory of different kinds are made up annually in Europe. (See VICTUABLE IVORY.) CHAS. G. LELAND.

**Ivory** (JAMES), F. R. S., b. at Dundee, Scotland, in 1765; educated at the University of St. Andrew's, along with Sir John Leslie. For many years he superintended a flax-spinning factory, and in 1804 was appointed professor of mathematics in the Royal Military College of Marlow (now at Sandhurst). He was a self-taught mathematician, and spent much of his time in retirement, fathoming the profoundest writings of the most learned continental mathematicians, and adding to their value by original analytical contributions. His most celebrated paper, in which he completely and definitively resolved the problem of attraction for every class of ellipsoidal bodies, was published in the *Philosophical Transactions* for 1809. Besides this paper, Mr. Ivory contributed many others on the subject of the

attraction of spheroids and the theory of the figure of the earth, during a period of nearly thirty years; one of the last subjects which occupied his attention was the possible equilibrium of a spheroid with three unequal axes, which Jacobi had discovered. Next to the theory of attractions, that of atmospheric refraction most seriously engaged his attention, its great importance in astronomy, and the curious mathematical difficulties which it presents, rendering it of great interest to analysts. D. Sept. 21, 1842.

**Ivory Black.** See BONE BLACK, by PROF. C. F. CHANDLER, PH. D., M. D., LL.D.

**Ivory Coast**, a part of the coast of Upper Guinea, West Africa, between the so-called Grain Coast and Gold Coast. It extends from Cape Palmas to the river Assinie, and has several towns along the coast, which traffic in ivory, gold-dust, and palm oil.

**Ivrea**, town of N. Italy, in the province of Turin, picturesquely situated at the mouth of the beautiful valley of Aosta, on the right bank of the Dora Baltea. It was a Roman possession as early as 90 B. C., and many vestiges of that period, such as foundations of theatres and portions of aqueducts, still exist. Ivrea played no inconsiderable part in the mediæval history of Northern Italy, and a castle of the thirteenth century is now used as a penitentiary. The Carnival festivities of Ivrea still commemorate a popular uprising of the city against the marquis of Monferrato in the thirteenth century. The cathedral is reported to have been an ancient temple of Apollo, consecrated for Christian worship early in the fifth century. This town has some manufactories, but the great water-power of the Dora Baltea is but partially employed. Pop. in 1874, 9125.

**Ivry**, town of France, in the department of Seine-sur-Seine, 4½ miles from Paris. It has manufactures of iron and glass, and a considerable trade in wine. Pop. 7056.

**Ivry-la-Bataille**, a v. of France, 40 miles W. of Paris, on the river Eure. Pop. about 1200. It is noted for the decisive victory gained here by Henry IV. of Navarre (Mar. 14, 1590) against the forces of the League under the duke of Mayenne. An obelisk to commemorate this victory was removed during the French Revolution, but renewed by Napoleon in 1809.

**Ivy** [*A. S. *īpa*], the *Hedera helix*, a climbing, shrubby Old-World plant, sparingly cultivated in the U. S., where it nowhere thrives as in Europe, being impatient of the cold of winter and the dryness and heat of summer. It succeeds best in the Middle Atlantic States. It belongs to the order Araliaceæ. It abounds in Europe, growing upon houses, churches, walls, castles, and trees. There are several varieties. The so-called "German ivy," common in house culture, is not an ivy at all, but a *Senecio* from South Africa. (For the "poison ivy" of the U. S. see RHUS.)*

**Iwakura Tomomi.** See APPENDIX.

**Ixcaquixtla**, town in the southern part of the state of Puebla, Mexico, 50 miles S. E. of the city of Puebla. Pop. about 5000. It is the chief town of the Popoloca or Chuchon Indians, who occupy the table-land between Tepéji de la Seda and the frontier of Oaxaca, an indigenous race which formerly extended over much of Southern Mexico, but was conquered and driven into fastnesses, first by the Mixtecas, and afterwards by the Aztecs, remnants of them being found under distinct names in the states of Guerrero, Oaxaca, and Vera Cruz, as well as in Guatemala. Ixcaquixtla is noted in Mexican history as the scene of a sharp battle fought Jan. 1, 1817, between Mexican insurgents under Gen. Mier of Teran and Spanish troops under La Madrid. Within a space of two or three leagues around Ixcaquixtla there still exist hundreds of artificial mounds, mostly of earth, but some of small squared stones, the latter of pyramidal form; they are still used by the Indians, though nominally Christians, as altars on which offerings are placed to the deified Montezuma.

**Ixi'ón**, a mythical character, supposed to have been a Thessalian prince and king of the Lapithæ. He was espoused to Din, daughter of Hecioneus (or Deioneus), but on his bridal day treacherously murdered his father-in-law, in order to avoid the performance of his contract. Jupiter (or Zeus), however, magnanimously forgave him, but Ixi'ón rewarded his clemency by attempting to seduce Here (or Juno), which attempt was frustrated by Jupiter's substitution of a phantom resembling her, and resulted in Ixi'ón becoming the father of the Centaurs. He was ultimately condemned, as a punishment for his treachery, to be chained to a fiery wheel perpetually revolving and consisting of four spokes in the form of a cross.

**Ixmiquilpan**, town and district in the state of Hidalgo, Mexico, about 80 miles N. of the city of Mexico, on the river Montezuma. Pop. about 10,000. In its vicinity are several silver-mines, owned by English companies. It was for some months in 1861 the head-quarters



of Gen. Zuloaga, who claimed to be President of the republic; he had with him two or three cabinet officers and some of the ordinary machinery of a government. The people of the district are mostly Indians of the Otomi race.

**Ixo'nia**, post-tp. of Jefferson co., Wis., on the Milwaukee and St. Paul R. R., 37 miles W. of Milwaukee. P. 1777.

**Ixtacci'huatl** [Mexican, *ixtac*, "white," and *cihuatl*, "woman"], a mountain in Mexico, once a volcano, 15,705 feet high, adjoining that of Popocatepetl, from which its summit is distant about 15 miles N. It forms part of the mountain range separating the valleys of Mexico and Puebla, from both of which cities it is visible. It is covered with perpetual snow, and derives its name from the resemblance of its summit to the reclining figure of a woman.

**Ixtapala'pa**, town in Mexico, 10 miles S. E. of the capital, within the federal district. Pop. about 5000. At the time of the conquest of Mexico it was a large city on the canal between lakes Texcoco and Chalco, celebrated for its splendid gardens, which belonged to the Aztec emperors. It was the residence of a powerful vassal chieftain, a brother of Montezuma, and was the scene of many of the important incidents of the siege of the capital. Few traces of its former importance now remain. A hill adjoining Ixtapala to the S. W., called the *Cerro de la Estrella*, or Star Hill, was the most sacred spot known to the Aztecs. At the expiration of each century of 52 years all the fires throughout the empire were extinguished, and the new fire was obtained by the chief priest by friction of pieces of wood over the body of a human victim placed upon the altar on the summit of this hill. All the Aztec priests and magnates set out from Tenochtitlan (Mexico) at midnight, going in procession to the sacred hill, which they reached before daybreak, and the new fire was carried in every direction throughout the empire by hundreds of swift messengers. Some remains of the ancient altar and temple may still be traced on the summit of the hill.

FOSTER C. BLISS.

**Ixtlahua'ca**, town and district in Mexico, near the N. W. extremity of the state of the same name, 60 miles from the federal capital. There are in the district several silver-mines, most of which, however, have been abandoned in consequence of revolutions or lack of capital to introduce proper machinery for reducing the ores. This region was that inhabited by the Mazahua race of Indians, once so numerous as to have had grammars and catechisms printed in their language in the sixteenth and seventeenth centuries. The language is now fast expiring, but is still spoken in a few villages of the district.

**Ixtlan**, town and district in Mexico, state of Oaxaca, 40 miles N. E. of the state capital. It is rich in silver-mines; the inhabitants are Indians of the Zapoteco race. One mile from Ixtlan is the village of San Pablo Guelatona, memorable as the birthplace of Benito Juarez, President of Mexico from 1858 to his death in 1872.

**Ixtlixo'chitl** FERNANDO DE ALVARO, b. in Mexico or Texcoco about 1568, was a lineal descendant of the ancient emperors of Texcoco, and devoted himself to the collection and translation of hieroglyphical records concerning his ancestors. Scarcely anything is known of his personal history, except that he was interpreter to several viceroys, and in 1602 received from the Spanish king a grant of lands as representative of the former Aztec dynasty. He left numerous writings, which are preserved in the national archives in Mexico, only a portion of which have been printed, though copies were used by Mr. Prescott in his *History of Mexico*. His *History of the Chichimecs* was published by Lord Kingborough in his *Mexican Antiquities*, vol. ix. D. in 1648.

**Izabal'**, a seaport of Guatemala, on the Gulf, Dulce, 122 miles N. N. E. from the capital. It is the only Atlantic port of that republic, and is accessible only to vessels of light draught, for which reason large vessels unladen at Belize and ship their cargo to Izabal by coasting-vessels. Pop. about 1000.

**Izal'co, Isalco, or Ysalco**, town of Central America, state of San Salvador, and situate about 19 miles W. by S. of the city of that name, and at the base of the celebrated volcano from which it takes its name. It is chiefly inhabited by Indians, the population numbering between 1000 and 5000; it is possessed of a fertile and plentifully watered soil, but since the earthquake of 1859 has materially diminished in commercial importance and prosperity.

**Izalco, Mount**, called the "Cuchumatlan of San Salvador," a volcano which burst forth Feb. 23, 1770, in what is now the republic of San Salvador, Central America. It stands very near a large group of extinct volcanoes, and has an eruption every sixteen minutes. It burst out in the midst of a cattle-estate during a great earthquake, and has since

grown to a height exceeding 1000 feet. Its height is variable at sea. It is near lat. 15° 15' N., lon. 89° 44' W.

**Izamal'**, city in Yucatan, Mexico, 40 miles E. of Mérida, notable for the ruins of an ancient city, which are fully described by Stephens in his *Travels in Yucatan*. The celebrated bishop of Yucatan, Fray Diego de Landa, built a church and a vast convent in 1553 upon the summit of an artificial pyramid on which was an idol temple; an image of the Virgin Mother was brought from Guatemala, and for its miracles acquired a great celebrity throughout Yucatan, which it still retains.

**Izard**, county of the N. of Arkansas. Area, 864 square miles. It is traversed by the White River. It is partly mountainous, but is in general fertile and well timbered. Tobacco, cotton, and live-stock are staple products. Lead and other minerals are found. Cap. Mount Olive. Pop. 6806.

**Izard** (GEORGE), b. in South Carolina in 1777; appointed lieutenant of engineers June 2, 1794; visited Europe and was lieutenant in the French engineers 1796-97; in charge of fortifications in Charleston harbor 1798; promoted to be captain 1799, and served as aide to Gen. Hamilton; resigned 1803; on the outbreak of war with Great Britain he was appointed colonel of artillery; brigadier-general 1813, and major-general 1814; disbanded 1815. In 1825 he was appointed governor of Arkansas territory, which position he held till his death, Nov. 22, 1828.

**Izard** (RALPH), b. near Charleston, S. C., in 1742, and graduated at the University of Cambridge, Eng. He was a wealthy planter, and after the outbreak of the Revolution was appointed by Congress as commissioner to Tuscany, but he fixed his residence at Paris, where he opposed the policy of Franklin and Silas Dean and favored that of Arthur Lee. He pledged his estate to purchase ships of war; was delegate to Congress 1781-83, and U. S. Senator 1789-95. D. May 30, 1804.

**Izcoatl**, fourth king of Mexico, and by his superior military and political talents substantially the founder of the Aztec empire. A natural brother of his predecessor, he reigned from 1425 to 1436, during which he conquered many neighboring states and embellished and fortified the capital. It was he who built the temple to the god Huitzilopochtli and the goddess Cihuacoatl; he also framed a constitution that materially changed and improved the political system.

THOMAS JORDAN.

**Izdubar'**, a mythical or semi-mythical king and hero of the earliest Babylonian annals, who is placed nearly upon the division-line which separates the age of romance from the historical period. His name has become widely known and celebrated since the discovery, made in 1872 by Mr. George Smith of the British Museum, of some fragments of the Chaldean traditional account of the Deluge, embodied in one of a series of twelve "Legends of Izdubar," so-called from the hero who plays the principal part in them all. By Sir Henry Rawlinson, and the numerous school of comparative mythologists who take their cue from Prof. Max Müller and Mr. G. W. Cox, the Izdubar legends were at once set down as a magnificent specimen of the solar myths—as being, in fact, the prototype of the twelve labors of Hercules. Mr. G. Smith, the discoverer and chief interpreter of these legends, strongly objects to this view, and argues for the historical existence of Izdubar as a Chaldean monarch whom he identifies with the biblical Nimrod, his best evidence being the occurrence of the name in a fragmentary canon of the early Babylonian kings, which he believes to be a copy of one of the original authorities used by Berosus. Izdubar appears in the cycle of legends as a giant residing in the country of Acend, a subduer of great animals in the times after the Deluge, a mighty conqueror who acquired the sovereignty, which he exercised in the city of Erech or Uruk, the earliest capital of Babylon. He was deified after his death, as is shown by the existence in one of the tablets of a form of prayer addressed to him; and in another, relating to witchcraft, he appears as a guardian who watches over the country. (See articles NIMROD, NOAH, and CATHARTIC INCURSIONS; and for the text and translations of the Izdubar legends, G. Smith's *Assyrian Discoveries*, 1871, and *Transactions of the Society of Biblical Archaeology*, vol. iii., London, 1874.)

FOSTER C. BLISS.

**Izu'car, or Matamo'ros Izucar**, city and district of the state of Puebla, Mexico, about 20 miles S. E. of the federal capital. It is situated near the base of the volcano of Popocatepetl, and is the center of a large sugar-cane region extending along the valley to the other Puebla. It is a well built and prosperous city of about 12,000 inhabitants, and is the southern terminus of a railroad now (1876) being constructed which will connect it with Puebla. It derives its official name from one of the Matamoros, one of the heroes of Mexican independence, who gained here (Feb. 21, 1812) a great victory over the Spaniards.



## J.

**J**, a consonant, another form of *I*, with which it was once interchangeable. *I*, originally and properly a vowel, came in time to stand sometimes for the half-vowel, half-consonant sound of initial *Y*, as now in German. Afterwards it acquired the *zh* sound it possesses in French, and eventually the power it ordinarily possesses in English. In Spanish it is a guttural aspirate, interchangeable with *X*.

**Jaafar**, one of the BARMECIDES (which see), grandson of the vizier Khaled, son of the vizier Yahya, and himself a favorite of the caliph Haroun-al-Raschid, who gave him his sister Abbasa in marriage, on condition that the connection should be merely nominal. Abbasa having borne a son to Jaafar, the caliph put both him and his father to death, about A. D. 802. It is probable that this account is derived rather from poetry than authentic history.

**Jabirú** [Brazilian], the name of several birds of the stork family, and of the genus *Mycteria*, found in Australia, Africa, and South America. The species are few. *M. Australis* is the best known. These birds, unlike the storks, have an upturned bill, and one species found in South America has the head and neck bare; those of the Old World have these parts of the body clothed with feathers.



Jabirú.

**Jablon'ski** (DANIEL ERNST), D. D., b. near Dantzic Nov. 26, 1660; was educated at the University of Frankfort-on-the-Oder, where he distinguished himself in philosophy, theology, and Oriental languages. In 1680 he visited the universities and libraries of Holland and England, remaining a year or two at Oxford. On his return to Germany he soon became famous as a pulpit-orator, and was ultimately appointed court-preacher—at first at Königsberg, and afterwards at Berlin. By request of King Frederick I. he labored earnestly for a union of all the Protestant churches. Dr. Jablon'ski became a bishop among the Moravians in 1698. In 1733 he was elected president of the Royal Academy of Sciences at Berlin. Among his numerous literary labors he translated into Latin some of the English works of R. Bentley, and published editions of the Talmud and of the Hebrew Bible (1699), the latter being especially valuable for its critical apparatus. D. at Berlin May 25, 1741.

**Jablonski** (PAUL ERNST), son of the above, b. at Berlin in 1693. He was still more distinguished than his father for his knowledge of Oriental languages, in which he surpassed all the German scholars of his time, his numerous philological works being still quoted with respect. In Oriental history, mythology, and antiquities his writings are equally esteemed, especially the treatises on the gods Remphon (1735) and Memnon (1753). The two most valuable of Jablonski's writings are undoubtedly an Egyptian glossary, not printed until the present century (Leyden, 1804), and the *Pantheon Egyptiorum sive de diis eorum commentarius*, etc. (Berlin, 1750-52, 3 vols.). The complete works of Jablonski number about fifty. He was long a professor of theology at the University of Frankfort-on-the-Oder, at which place he d. in Sept. (or Dec.), 1757.

**Jaborandi** [Brazilian Guarani], a drug recently introduced into medicinal use, consists of the leaves and twigs of *Pilocarpus pinnatus*, a tree (?) of Brazil, and of the order Rutaceæ. Four or five grammes of the bruised drug are infused in boiling water. Soon after this is swallowed, whether warm or cold, a most powerful sialagogue and diaphoretic effect is produced. Streams of perspiration flow from the patient, and so much saliva and mucus are produced in the mouth and air-passages that speech is difficult. It is reported to be useful in the treatment of several diseases.

**Ja'ca**, or **Xaca**, town of Spain, province of Aragon, at the foot of the Pyrenees. It is situated in a fertile valley, is strongly fortified, and contains a cathedral, a castle, and several convents. The inhabitants are employed in agriculture and woollen weaving; the soil is highly productive of grain, but too cold for the fruits peculiar to Southern Europe. During the Roman empire Jaca was a place of some importance, capital of the *regio Jacatania*. P. 3500.

**Jacamar'** [Braz. *jacamaricá*], a name applied to a

number of South American and West Indian birds, of the genera *Galbula*, *Jacamaralegus*, and *Jacamerops*, and approximating the character of the trogons and the bee-eaters. They are small, and mostly of bright and quaint but not very handsome plumage. The red-tailed jacamar (*Galbula ruficauda*) is found in Trinidad, W. I.

**Jacaná**, the *Parra jacaná*, an abundant South American bird of the rail family, is remarkable for its very long toes, which enable it to walk with ease upon floating water-plants. Other species are found in Asia, Africa, and Australia.

**Jacaré**, a genus of South American loricate reptiles, resembling the alligator and cayman. The *Jacaré eslerops* (spectacled cayman, common jacaré) is one of the largest of American Crocodilidae, but though very voracious he rarely attacks man. Four or five other species are reported.

**Jach'mann** (EDUARD KARL EMANUEL), b. at Dantzic Mar. 2, 1822. He made his first trip as cabin-boy and sailor 1839-44; served four years on board the corvette *Amazon*; was created a marine lieutenant in 1845; appointed commander of a gunboat squadron in 1849; made in 1853-54, as first lieutenant on board the *Gefion*, a trip to the West Indies, South and North America; was for three years director of the wharves of Dantzic; became captain in 1855, and made in 1859-62 an important expedition, as commander of the frigate *Thetis*, to Eastern Asia and China, in order to establish commercial connections between Germany and those regions. On his return received the command of the Prussian fleet in the Baltic, fought, in the war with Denmark, off the island of Rügen Mar. 17, 1864, and was created rear-admiral the next day. In 1864-67 was chief of the naval station of Kiel. In 1867 was appointed president of the naval department, and in 1868 was made vice-admiral. In the war with France was commander-in-chief of the whole naval force. As president of the naval department he has accomplished much, and in many directions, for the development of the German navy. Retired from this office in 1872. AUGUST NIEMANN.

**Jacitara' Palm** [Brazilian], a South American rattan-palm of the lower Amazon Valley, *Desmoncus macracanthus*, a slender climber, armed with strong thorns. It is used to some extent as the true rattans are used. It is often seventy feet long.

**Jack**, county of N. Texas. Area, 870 square miles. It is heavily timbered, and contains a great variety of land, chiefly adapted to pasturage. The valleys are very fertile. Cap. Jacksborough. Pop. 694.

**Jack'al** [Sp. *chacal*; Pers. *shacal*], the *Canis aureus*, a wild dog of Asia, South-eastern Europe, and Africa, which hunts in troops, is a carrion-eater, and is easily domesticated. It is regarded by some authorities as specifically identical with the dog and the wolf. It may not improbably be one of the originals whence the domestic dog has sprung, as the two breed freely together.

**Jackdaw**. See DAW.

**Jack'mantown Plantation**, tp. of Somerset co., Me. Pop. 65.

**Jack's**, tp. of Laurens co., S. C. Pop. 2720.

**Jacksborough**, post-v., county-seat of Campbell co., Tenn., 3 miles E. of Careyville Station on the Knoxville and Ohio R. R. Pop. 178.

**Jacksborough**, post-v., county-seat of Jack co., Tex., 85 miles W. N. W. of Dallas.

**Jack's Creek**, tp. of Yancy co., N. C. Pop. 946.

**Jack'screw**, an apparatus for raising heavy buildings and other great weights by means of the screw. The name is, however, sometimes applied to devices for the same purpose which contain no screw. The principle of the hydraulic press is sometimes employed. There are numerous machines of this character.

**Jack'son**, county of N. E. Alabama, bounded on the N. by Tennessee, and for a short distance on the E. by Georgia. Area, 1150 square miles. It is traversed by the Tennessee River and the Memphis and Charleston R. R. The surface is broken by low mountains. The soil is fertile. Cattle, tobacco, wool, corn, and cotton are staple products. Cap. Scottsborough. Pop. 19,410.

**Jackson**, county of N. E. Arkansas. Area, 612 square miles. It is traversed by White River and the Cairo and



**Fulton R. R.** It is very level, except in the N., and is fertile and well timbered. Cotton, corn, hay, fruit, and timber are the chief products. Cap. Jacksonport. Pop. 7264.

**Jackson,** county of Florida, bounded on the N. by Alabama, and on the E. principally by Georgia. Area, 900 square miles. The navigable Chattahoochee River flows along the E. side, and the Chipola intersects the county. The county is a heavily timbered limestone region, one of the best agricultural sections of the State. Tobacco, cotton, sugar-cane, rice, and corn are largely produced. There are several caves and other natural curiosities. Cap. Marianna. Pop. 9528.

**Jackson,** county of N. E. Georgia. Area, about 480 square miles. The surface is broken. The county abounds in mineral wealth, as yet undeveloped. Tobacco, cotton, and corn are staple products. Cap. Jefferson. Pop. 11,181.

**Jackson,** county of S. Illinois, bounded on the W. by the Mississippi River. Area, 576 square miles. It is intersected by the Big Muddy River and the Illinois Central and the Grand Tower and Carbondale R. Rs. Excellent coal is mined. There are productive salt-wells. A part of the county has a hilly surface, and is known as the fruit-region of Southern Illinois. The soil is very fertile. Cattle, grain, fruit, tobacco, timber, and wool are staple products. Cap. Murphysborough. Pop. 19,634.

**Jackson,** county of S. Indiana. Area, 544 square miles. It is traversed by the Driftwood fork of White River and by the Ohio and Mississippi R. R. The surface is varied, the soil generally fertile. Iron ore is found. Cattle, grain, and wool are staple products. Lumber and carriages are leading articles of manufacture. Cap. Brownstown. Pop. 18,974.

**Jackson,** county of Iowa, bounded on the N. E. by the Mississippi River. Area, 636 square miles. The surface is broken, the soil fertile. Lead and iron ores are found. Cattle, grain, and wool are staple products. Carriages, cooperage, lumber, saddlery, etc. are among the leading articles of manufacture. The county is traversed by Maquoketa River and the Sabula Ackley and Dakota R. R. Cap. Andrew. Pop. 22,619.

**Jackson,** county of N. E. Kansas. Area, 684 square miles. It is fertile and diversified. Coal has been found. Live-stock and grain are staple products. The county is traversed by the Kansas Central R. R. Cap. Holton. Pop. 6953.

**Jackson,** county of E. Central Kentucky. Area, 425 square miles. It is broken by mountain-ranges, but has fertile valleys, and is believed to contain much coal. Corn is the staple product. Cap. McKee. Pop. 4547.

**Jackson,** parish of N. Louisiana. Area, about 780 square miles. Cotton, pork, and corn are staple products. It is mostly undulating and fertile land. Cap. Vernon. Pop. 7646.

**Jackson,** county of S. Michigan. Area, 720 square miles. It is a rich, level region, having limestone, sandstone, and some coal and iron ore. Cattle, wool, butter, and grain are staple products. Bricks, carriages, and flour are leading articles of manufacture. The county is traversed by numerous railroads, centering at Jackson, the capital. Pop. 36,047.

**Jackson,** county of S. W. Minnesota, bounded on the S. by Iowa. Area, 720 square miles. It is undulating, fertile, and abounds in small lakes. It is traversed by the Des Moines River. Grain is the staple product. Cap. Jackson. Pop. 1825.

**Jackson,** county of S. E. Mississippi. Area, about 1050 square miles. It is traversed by the navigable Pascagoula River, and bounded on the E. by Alabama, and on the S. by the Gulf of Mexico. It is level, and is a part of the great pine-region. Rice is a staple product, and large quantities of lumber are exported to New Orleans. It is traversed by the New Orleans Mobile and Texas R. R. Cap. Scranton. Pop. 4362.

**Jackson,** county of Missouri, bounded on the W. by Kansas and on the N. by the Missouri River. Area, 580 square miles. It is a very fertile, rolling country, with a limestone soil. Cattle, grain, tobacco, and wool are staple products. The manufactures include metallic wares, carriages, clothing, saddlery, furniture, flour, cigars, etc. It is traversed by the Atlantic and Pacific R. R. Cap. Independence. Pop. 55,041.

**Jackson,** a former county of Nebraska, abolished since the census of 1870. Pop. in 1870, 9.

**Jackson,** county of W. North Carolina. Area, about 700 square miles. It is very mountainous, but has a fertile soil, beautiful and sublime scenery, and great mineral wealth. Iron, gold, and marble are known to exist. Cat-

tle, corn, tobacco, and wool are staple products. Cap. Webster. Pop. 6683.

**Jackson,** county in S. Ohio. Area, 378 square miles. It is somewhat hilly, very fertile, and abounds in coal, salt, iron, and marble. Cattle, wool, and grain are staple products. Pig iron is a leading article of manufacture. The county is traversed by a branch of the Marietta and Cincinnati R. R. Cap. Jackson. Pop. 21,759.

**Jackson,** county of Oregon, bounded on the S. by California. Area, estimated at 11,000 square miles. It is traversed by the Cascade Mountains and other ranges. The soil and climate are varied. The W. part is in the Rogue River Valley, the middle in Klamath Valley, the E. in a basin which does not communicate with the sea. Gold, iron, and lignite are found. Cap. Jacksonville. Pop. 4778.

**Jackson,** county of Tennessee, traversed by the Cumberland River. Area, about 180 square miles. It has a diversified surface and a productive soil. Tobacco, cattle, corn, and wool are staple products. Cap. Gainesborough. Pop. (in 1870), 12,583, since which time its area has been much reduced.

**Jackson,** county of Texas, traversed by Lavaca River and its branches, and on the S. W. touching Matagorda Bay. Area, 852 square miles. It is mostly a rolling prairie, with stiff clay soil, but very productive. Cattle, corn, and cotton are staple products. Cap. Texana. Pop. 2278.

**Jackson,** county of West Virginia, bounded on the W. by the Ohio River. Area, 405 square miles. It is generally hilly and rolling, with a rich soil and abundant pasturage. Cattle, grain, tobacco, and wool are staple products. Cap. Ripley. Pop. 10,300.

**Jackson,** county of W. Central Wisconsin. Area, 936 square miles. It has a diversified surface and is heavily timbered. The soil is good. Grain is the staple crop. Lumber is extensively manufactured. It is traversed by the West Wisconsin R. R. Cap. Black River Falls. Pop. 7687.

**Jackson,** tp. and post-v. of Clarke co., Ala., on the Tombigbee River. Pop. 1360.

**Jackson,** tp. of Boone co., Ark. Pop. 320.

**Jackson,** tp. of Calhoun co., Ark. Pop. 365.

**Jackson,** tp. of Crittenden co., Ark. Pop. 316.

**Jackson,** tp. of Dallas co., Ark. Pop. 637.

**Jackson,** tp. of Little River co., Ark. Pop. 820.

**Jackson,** tp. of Monroe co., Ark. Pop. 784.

**Jackson,** tp. of Newton co., Ark. Pop. 850.

**Jackson,** tp. of Ouachita co., Ark. Pop. 580.

**Jackson,** tp. of Sharpe co., Ark. Pop. 275.

**Jackson,** tp. of Union co., Ark. Pop. 814.

**Jackson,** tp. of White co., Ark. Pop. 355.

**Jackson,** post-v., cap. of Amador co., Cal., at the junction of the N., Middle, and S. forks of Jackson Creek, 55 miles S. E. of Sacramento; has 2 weekly newspapers, large quartz-mills, 2 churches, 2 hotels, etc. Farming, gardening, fruit-culture, and quartz and placer mining are carried on. Pop. of tp. 2408.

R. M. BIGGS, ED. "AMADOR WEEKLY LEDGER."

**Jackson,** post-v., county-seat of Butts co., Ga., 18 miles E. from Griffin.

**Jackson,** tp. of Effingham co., Ill. Pop. 1028.

**Jackson,** tp. of Will co., Ill. Pop. 1485.

**Jackson,** tp. of Allen co., Ind. Pop. 202.

**Jackson,** tp. of Bartholomew co., Ind. Pop. 618.

**Jackson,** tp. of Blackford co., Ind. Pop. 1399.

**Jackson,** tp. of Boone co., Ind. Pop. 2453.

**Jackson,** tp. of Brown co., Ind. Pop. 1750.

**Jackson,** tp. of Carroll co., Ind. Pop. 1301.

**Jackson,** tp. of Cass co., Ind. Pop. 1519.

**Jackson,** tp. of Clay co., Ind. Pop. 1711.

**Jackson,** tp. of Clinton co., Ind. Pop. 3932.

**Jackson,** tp. of Dearborn co., Ind. Pop. 1366.

**Jackson,** tp. of Decatur co., Ind. Pop. 1746.

**Jackson,** tp. of De Kalb co., Ind. Pop. 1141.

**Jackson,** tp. of Elkhart co., Ind. Pop. 1289.

**Jackson,** tp. of Fayette co., Ind. Pop. 1037.

**Jackson,** tp. of Fountain co., Ind. Pop. 1321.

**Jackson,** tp. of Greene co., Ind. Pop. 1969.

**Jackson,** tp. of Hamilton co., Ind. Pop. 3724.

**Jackson,** tp. of Hancock co., Ind. Pop. 1849.



**Jackson**, tp. of Harrison co., Ind. Pop. 1400.  
**Jackson**, tp. of Howard co., Ind. Pop. 1000.  
**Jackson**, tp. of Huntington co., Ind. Pop. 2257.  
**Jackson**, tp. of Jackson co., Ind. Pop. 1137.  
**Jackson**, tp. of Jay co., Ind. Pop. 989.  
**Jackson**, tp. of Kosciusko co., Ind. Pop. 1043.  
**Jackson**, tp. of Madison co., Ind. Pop. 1344.  
**Jackson**, tp. of Miami co., Ind. Pop. 1645.  
**Jackson**, tp. of Morgan co., Ind. Pop. 1723.  
**Jackson**, tp. of Newton co., Ind. Pop. 766.  
**Jackson**, tp. of Orange co., Ind. Pop. 1148.  
**Jackson**, tp. of Owen co., Ind. Pop. 757.  
**Jackson**, tp. of Parke co., Ind. Pop. 1377.  
**Jackson**, tp. of Porter co., Ind. Pop. 1072.  
**Jackson**, tp. of Putnam co., Ind. Pop. 1498.  
**Jackson**, tp. of Randolph co., Ind. Pop. 1349.  
**Jackson**, tp. of Ripley co., Ind. Pop. 1401.  
**Jackson**, tp. of Rush co., Ind. Pop. 770.  
**Jackson**, tp. of Shelby co., Ind. Pop. 1305.  
**Jackson**, tp. of Spencer co., Ind. Pop. 926.  
**Jackson**, tp. of Starke co., Ind. Pop. 125.  
**Jackson**, tp. of Steuben co., Ind. Pop. 1122.  
**Jackson**, tp. of Sullivan co., Ind. Pop. 1732.  
**Jackson**, tp. of Tippecanoe co., Ind. Pop. 1081.  
**Jackson**, tp. of Washington co., Ind. Pop. 779.  
**Jackson**, tp. of Wayne co., Ind. Pop. 4949.  
**Jackson**, tp. of Wells co., Ind. Pop. 1140.  
**Jackson**, tp. of White co., Ind. Pop. 1358.  
**Jackson**, post-tp. of Adair co., Ia. Pop. 339.  
**Jackson**, tp. of Benton co., Ia. Pop. 963.  
**Jackson**, tp. of Boone co., Ia. Pop. 798.  
**Jackson**, tp. of Bremer co., Ia. Pop. 1131.  
**Jackson**, tp. of Butler co., Ia. Pop. 569.  
**Jackson**, tp. of Calhoun co., Ia. Pop. 367.  
**Jackson**, tp. of Clarke co., Ia. Pop. 798.  
**Jackson**, tp. of Crawford co., Ia. Pop. 246.  
**Jackson**, tp. of Des Moines co., Ia. Pop. 103.  
**Jackson**, tp. of Guthrie co., Ia. Pop. 875.  
**Jackson**, tp. of Hardin co., Ia. Pop. 867.  
**Jackson**, tp. of Harrison co., Ia. Pop. 206.  
**Jackson**, tp. of Henry co., Ia. Pop. 1262.  
**Jackson**, tp. of Jackson co., Ia. Pop. 862.  
**Jackson**, tp. of Jones co., Ia. Pop. 899.  
**Jackson**, tp. of Keokuk co., Ia. Pop. 1528.  
**Jackson**, tp. of Lee co., Ia. Pop. 1460.  
**Jackson**, tp. of Linn co., Ia. Pop. 996.  
**Jackson**, tp. of Lucas co., Ia. Pop. 460.  
**Jackson**, tp. of Madison co., Ia. Pop. 534.  
**Jackson**, tp. of Monroe co., Ia. Pop. 942.  
**Jackson**, tp. of Montgomery co., Ia. Pop. 1109.  
**Jackson**, tp. of Poweshiek co., Ia. Pop. 1629.  
**Jackson**, tp. of Sac co., Ia. Pop. 469.  
**Jackson**, tp. of Shelby co., Ia. Pop. 486.  
**Jackson**, tp. of Taylor co., Ia. Pop. 351.  
**Jackson**, tp. of Van Buren co., Ia. Pop. 1292.  
**Jackson**, tp. of Warren co., Ia. Pop. 639.  
**Jackson**, tp. of Washington co., Ia. Pop. 879.  
**Jackson**, tp. of Wayne co., Ia. Pop. 356.  
**Jackson**, tp. of Webster co., Ia. Pop. 380.  
**Jackson**, tp. of Winneshiek co., Ia. Pop. 668.  
**Jackson**, tp. of Anderson co., Kan. Pop. 539.  
**Jackson**, tp. of Lyon co., Kan. Pop. 1079.  
**Jackson**, tp. of Riley co., Kan. Pop. 1249.  
**Jackson**, post-v., county-seat of Breathitt co., Ky., on the Kentucky River, 55 miles E. by S. from Richmond, Ky. Pop. 54.  
**Jackson**, a v. of East Feliciana parish, La. It has 1 weekly newspaper. Pop. 934.  
**Jackson**, post-tp. of Waldo co., Me. It has manufactures of lumber, and is 8 miles N. of Brooks Station on the Maine Central R. R. Pop. 707.  
**Jackson**, tp. of Frederick co., Md. Pop. 1699.  
**Jackson**, city, cap. of Jackson co., Mich., on the Michigan Central R. R. (main line), 76 miles W. of Detroit, at the junction of a branch of the Michigan Southern R. R.,

the Fort Wayne Jackson and Saginaw, and the Grand River Valley R. Rs., and the air-line division of the first-named road; has productive coal-mines, large manufactures of sal-soda, the main shops of the Central R. R., extensive foundries, engine-works, flouring and planing mills, fire-clay works, and other important manufacturing interests. It has extensive commercial interests, and is in a prosperous farming region. The city (incorporated 1857) has 5 banks, 13 churches, 2 daily and 2 weekly newspapers, a fine system of public schools, Holly water-works, a trotting park, omnibus lines, a fine passenger dépôt, good water-power, and is the site of the Michigan State prison, a large establishment, carrying on extensive manufactures. Pop. 11,447. CARLTON & VAN ANTWERP, EDS. "PATRIOT."

**Jackson**, post-v., cap. of Jackson co., Minn., at the prospective junction of the Southern Minnesota and the Des Moines Valley R. Rs., not yet finished to this point. It is on the Des Moines River, 8 miles N. of the Iowa line, in a fertile and well-timbered region; has large grist-mills, great water-power, a weekly newspaper, a church, 2 hotels, a fine court-house, and other public buildings. It is rapidly growing. H. M. AVERY, ED. "REPUBLIC."

**Jackson**, city, cap. of Mississippi, and shire-town of Hinds co., on the New Orleans Jackson and Great Northern R. R., 183 miles N. of New Orleans, on the Vicksburg and Meridian R. R., 45 miles E. of Vicksburg, and on the W. side of Pearl River. Among its public buildings are the State capitol and State penitentiary, while within the city limits are institutions for the blind and for the deaf and dumb; and one mile to the N. stands the lunatic asylum. Other institutions are 2 large public schools, a boys' high school, a young ladies' institute, and various other private schools; a large State library, 1 monthly, 1 daily, and 3 weekly newspapers, 10 churches (3 for the colored citizens), 2 foundries, 2 sash, door, and blind factories, 3 banking-houses, 2 hotels, a city-hall, a street railroad, and an efficient fire department with steam and hand engines. During the late war a large part of the city was destroyed, but it has been rebuilt in a substantial manner. Jackson is the place of meeting of the U. S. courts and of the circuit and chancery courts for a portion of the county; and the State supreme court sits here about nine months of the year. Jackson has a good trade in cotton and other commodities. Its population is now (1874) about one-half colored. It is a pleasant and well-built town. Pop. 4234. J. L. POWER, ASSO. PUB. "CLARION."

**Jackson**, tp. of Andrew co., Mo. Pop. 2401.

**Jackson**, tp. of Buchanan co., Mo. Pop. 890.

**Jackson**, tp. of Camden co., Mo. Pop. 810.

**Jackson**, post-v., cap. of Cape Girardeau co., Mo., 10 miles N. W. of Cape Girardeau, has a high school, public school, seminary, weekly newspaper, 6 churches, 2 hotels, a flouring-mill, and 6 dry-goods stores. Pop. 459.

MALONE & JOHNSON, EDS. "CASH-BOOK."

**Jackson**, tp. of Carter co., Mo. Pop. 695.

**Jackson**, tp. of Clarke co., Mo. Pop. 1472.

**Jackson**, tp. of Clinton co., Mo. Pop. 1752.

**Jackson**, tp. of Dallas co., Mo. Pop. 1432.

**Jackson**, tp. of Daviess co., Mo. Pop. 1059.

**Jackson**, tp. of Douglas co., Mo. Pop. 330.

**Jackson**, tp. of Gentry co., Mo. Pop. 1037.

**Jackson**, tp. of Greene co., Mo. Pop. 1759.

**Jackson**, tp. of Jasper co., Mo. Pop. 1238.

**Jackson**, tp. of Johnson co., Mo. Pop. 2200.

**Jackson**, tp. of Linn co., Mo. Pop. 948.

**Jackson**, tp. of Livingston co., Mo. Pop. 2603.

**Jackson**, tp. of Macon co., Mo. Pop. 1755.

**Jackson**, tp. of Maries co., Mo. Pop. 1419.

**Jackson**, tp. of Monroe co., Mo. Pop. 4367.

**Jackson**, tp. of Nodaway co., Mo. Pop. 895.

**Jackson**, tp. of Osage co., Mo. Pop. 1104.

**Jackson**, tp. of Ozark co., Mo. Pop. 353.

**Jackson**, tp. of Polk co., Mo. Pop. 1483.

**Jackson**, tp. of Putnam co., Mo. Pop. 799.

**Jackson**, tp. of Randolph co., Mo. Pop. 1175.

**Jackson**, tp. of Reynolds co., Mo. Pop. 327.

**Jackson**, tp. of Shannon co., Mo. Pop. 370.

**Jackson**, tp. of Shelby co., Mo. Pop. 1416.

**Jackson**, tp. of St. Clair co., Mo. Pop. 411.

**Jackson**, tp. of St. Genevieve co., Mo. Pop. 1112.

**Jackson**, tp. of Sullivan co., Mo. Pop. 902.

**Jackson**, tp. of Texas co., Mo. Pop. 537.

**Jackson**, post-tp. of Dakota co., Neb. Pop. 668.

**Jackson**, post-tp. of Carroll co., N. H., 90 miles N. by E. of Concord, among the White Mountains. Pop. 474.

**Jackson**, tp. of Ocean co., N. J. Pop. 1755.

**Jackson**, tp. of Washington co., N. Y., abounding in steep mountains, beautiful lakes, and forests and well-cultivated farms. Pop. 1662.

**Jackson**, post-v., county-seat of Northampton co., N. C., 8 miles from Seaboard Station, on the Seaboard and Roanoke R. R. Pop. 181; of tp. 523.

**Jackson**, tp. of Union co., N. C. Pop. 1010.

**Jackson**, tp. of Allen co., O. Pop. 1801.

**Jackson**, tp. of Ashland co., O. Pop. 1409.

**Jackson**, tp. of Auglaize co., O. Pop. 1502.

**Jackson**, tp. of Brown co., O. Pop. 995.

**Jackson**, tp. of Champaign co., O. Pop. 1831.

**Jackson**, tp. of Clermont co., O. Pop. 1658.

**Jackson**, tp. of Coshocton co., O. Pop. 1767.

**Jackson**, tp. of Crawford co., O. Pop. 4021.

**Jackson**, tp. of Darke co., O. Pop. 2088.

**Jackson**, tp. of Franklin co., O. Pop. 1923.

**Jackson**, tp. of Guernsey co., O. Pop. 867.

**Jackson**, tp. of Hancock co., O. Pop. 1209.

**Jackson**, tp. of Hardin co., O. Pop. 1412.

**Jackson**, tp. of Highland co., O. Pop. 905.

**Jackson**, tp. of Jackson co., O. Pop. 1352.

**Jackson**, or **Jackson Court-house**, post-v., cap. of Jackson co., O., on the Marietta and Cincinnati R. R., Portsmouth branch, 7 miles from Hamden Junction. It has 6 churches, a large school building, 2 weekly newspapers, and 6 pig-iron furnaces; has important coal-mines, and a large trade in coal and iron, both of fine quality. The town is rapidly increasing in population. Pop. 2016.

DAVIS MACKLEY, PROP. "JACKSON STANDARD."

**Jackson**, tp. of Knox co., O. Pop. 818.

**Jackson** (JACKSONTOWN P. O.), a v. of Licking tp., Licking co., O., on the Newark Somerset and Straitsville R. R. Pop. 428.

**Jackson**, tp. of Mahoning co., O. Pop. 909.

**Jackson**, tp. of Monroe co., O. Pop. 1354.

**Jackson**, tp. of Montgomery co., O. Pop. 2170.

**Jackson**, tp. of Muskingum co., O. Pop. 1174.

**Jackson**, a v. of Washington tp., Muskingum co., O., 5 miles from Zanesville. Pop. 56.

**Jackson**, tp. of Noble co., O. Pop. 1190.

**Jackson**, tp. of Paulding co., O. Pop. 556.

**Jackson**, tp. of Perry co., O. Pop. 1539.

**Jackson**, tp. of Pickaway co., O. Pop. 1202.

**Jackson**, tp. of Pike co., O. Pop. 1840.

**Jackson**, tp. of Preble co., O. Pop. 1430.

**Jackson**, tp. of Putnam co., O. Pop. 737.

**Jackson**, tp. of Richland co., O. Pop. 934.

**Jackson**, tp. of Sandusky co., O. Pop. 1350.

**Jackson**, tp. of Seneca co., O. Pop. 1131.

**Jackson**, tp. of Shelby co., O. Pop. 1461.

**Jackson**, tp. of Stark co., O. Pop. 1610.

**Jackson**, tp. of Union co., O. Pop. 935.

**Jackson**, tp. of Van Wert co., O. Pop. 249.

**Jackson**, tp. of Vinton co., O. Pop. 1294.

**Jackson**, tp. of Wood co., O. Pop. 347.

**Jackson**, tp. of Wyandot co., O. Pop. 771.

**Jackson**, tp. of Butler co., Pa. Pop. 1137.

**Jackson**, tp. of Cambria co., Pa. Pop. 906.

**Jackson**, tp. of Columbia co., Pa. Pop. 565.

**Jackson**, tp. of Dauphin co., Pa. Pop. 1036.

**Jackson**, tp. of Greene co., Pa. Pop. 964.

**Jackson**, tp. of Huntingdon co., Pa. Pop. 1662.

**Jackson**, tp. of Lebanon co., Pa. Pop. 3437.

**Jackson**, tp. of Luzerne co., Pa. Pop. 624.

**Jackson**, tp. of Lycoming co., Pa. Pop. 342.

**Jackson**, tp. of Mercer co., Pa. Pop. 752.

**Jackson**, tp. of Monroe co., Pa. Pop. 841.

**Jackson**, tp. of Northumberland co., Pa. Pop. 886.

**Jackson**, tp. of Perry co., Pa. Pop. 1103.

**Jackson**, tp. of Potter co., Pa. Pop. 49.

**Jackson**, tp. of Snyder co., Pa. Pop. 712.

**Jackson**, tp. of Susquehanna co., Pa. Pop. 1175.

**Jackson**, tp. of Tioga co., Pa. Pop. 1531.

**Jackson**, tp. of Venango co., Pa. Pop. 720.

**Jackson**, tp. of York co., Pa. Pop. 1499.

**Jackson**, city, cap. of Madison co., Tenn., is near the centre of West Tennessee, at the junction of the Mississippi Central and the Mobile and Ohio R. Rs., 72 miles N. E. of Memphis; has 125 business-houses, 2 banks, 5 hotels, 3 halls, 11 churches, 2 daily and 5 weekly newspapers, 2 railroad machine-shops, 3 planing and 3 flouring mills, 1 foundry, 2 carriage manufactories, besides many small manufacturing interests of various kinds. It has a very important cotton-trade, is the seat of West Tennessee College, and has 2 ladies' seminaries and other schools. Pop. 4119, much increased since the census.

D. M. WISDOM & CO., PRINS. "WHIG AND TRIBUNE."

**Jackson**, tp. of Amelia co., Va. Pop. 2827.

**Jackson**, post-tp. of Louisa co., Va. Pop. 1525.

**Jackson**, tp. of Rappahannock co., Va. Pop. 1568.

**Jackson**, tp. of Adams co., Wis. Pop. 481.

**Jackson**, post-tp. of Washington co., Wis. Pop. 1978.

**Jackson** (ABNER), D. D., LL.D., b. about 1811; graduated at Trinity College, Hartford, Conn., in 1837; was appointed tutor there, and afterwards professor of ethics and metaphysics. In 1858 he became president of Hobart College, and in 1867 president of Trinity College. D. at Hartford, Conn., Apr. 19, 1874.

**Jackson** (ABRAHAM REEVES), A. M., M. D., b. in Philadelphia June 17, 1827; educated in the public schools of Philadelphia, and graduated in the spring of 1846 at the Philadelphia Central High School, from which institution he subsequently received the degree of master of arts; studied medicine under Prof. John Wiltbank, and received the degree of doctor of medicine from the medical department of Pennsylvania Medical College at Philadelphia in 1848; practised his profession at Stroudsburg, Pa., until May, 1870, when he removed to Chicago, Ill.; founded the Woman's Hospital of the State of Illinois, of which he became surgeon-in-chief. In the winter of 1872 he was elected to the chair of diseases of women by the faculty of Rush Medical College, who, in the following spring, conferred upon him the honorary degree of M. D.; in the spring of 1874 elected editor of the *Chicago Medical Register* by the Chicago Medico-Historical Society; member of Illinois State Medical Society, Academy of Science, Chicago, Chicago Medical Society, Chicago Society of Physicians and Surgeons, Chicago Medico-Historical Society; corresponding member of the Gynecological Society of Boston. Author of papers—*Removal of Large Uterine Cystical Calculus* (1858), *Excision of Entire Fibroid*, etc. (1858), *Obstinate Hemorrhage from the Frænium Lingue* (1859), *On the Efficacy of Cold Affusion in Nerve-ism* (1859), *Hydrocele of the Neck*, and its Treatment by Excision (1861), *Successful Removal of both Ovaries* (1866), *Uterine Fibroid of Posterior Wall Successfully Removed* (1870), *Fibrous Tumor of Bladder Successfully Removed* (1870), *Non-ovarian Menstruation*, etc. (1870), *Some Remarks upon Cases of Obstruction of the Bovid*, etc. (1871), *Vesico-vaginal Fistula*, etc. (1871), *Removal of Fibrous Tumor of Uterus* (1871), *Unsuccessful Attempt to Remove Fibrous Tumor of Womb* (1873), *Treatment of Uterine Fibroids by the Use of Ergotine* (1874).

**Jackson** (ANDREW), LL.D., the seventh President of the U. S., b. at the Waxhaw Settlement, Union co., N. C. (at that time supposed to be in South Carolina), Mar. 15, 1767. His parents were Scotch-Irish, natives of Carrickfergus, who came to America in 1765 and settled on Twelve Mile Creek, a tributary of the Catawba. His father, who was a poor farm-laborer, died shortly before Andrew's birth, when his mother removed to Waxhaw, where some relatives resided. Few particulars of the childhood of Jackson have been preserved; his education was of the most limited kind, and he showed no fondness for books. In 1780, at the age of thirteen, he with his brother Robert volunteered to serve in the Revolutionary forces under Gen. Sumter, and was a witness of the latter's defeat at Hanging Rock. In the following year the brothers were made prisoners, and confined at Camden, experiencing brutal treatment from their captors, and being spectators of Gen. Greene's defeat at H. Kirk's Hill. Through their mother's exertions the boys were exchanged while suffering from typhoid fever. Robert soon died at Waxhaw, and Mrs. Jackson died not long after at Charleston of ship fever, contracted in attending the American prisoners. Young Jackson, b. 1800 at U. S., worked for some time in a saddler's shop, afterwards taught school, and at the age of eighteen commenced the study of law at Salisbury, N. C. In 1816 he was admitted to the bar, and removed in 1788 to Nashville, in what was then the western district of North Carolina, with the appointment of solicitor or public prosecutor. Two years later



Tennessee became a Territory, and Jackson was appointed by Pres. Washington U. S. attorney for the new district. In 1791 he married Mrs. Rachel Robards (daughter of Col. John Donelson), whom he supposed to have been divorced in that year by an act of the legislature of Virginia. It afterwards appeared that the divorce had not become legal until 1793, when it was formally granted by a jury in Mercer co., Ky., at the application of the husband, who was a resident of that State, and it was not until Jan., 1794, that Mr. and Mrs. Jackson were legally married by a second ceremony at Nashville. Under the circumstances it was not unnatural that the facts of the case were so misrepresented by opponents in the political campaigns a quarter of a century later as to become the basis of serious charges against Jackson's morality; which, however, has been satisfactorily attested by abundant evidence. Jackson was untiring in the exercise of his duties as U. S. attorney, which demanded frequent journeys through the wilderness and exposure to Indian hostilities; he acquired considerable property in land, and obtained such influence as to be chosen a member of the convention which framed the constitution of the new State of Tennessee (1796), and was elected in that year its first representative in Congress. The following year (1797) he was chosen to the U. S. Senate, but resigned in 1798 to accept a seat on the bench of the supreme court of Tennessee, which he held till 1804. He was elected a major-general of the State militia in 1801, and on the acquisition of Louisiana (1803) was an unsuccessful candidate for appointment as governor of the new Territory. In 1804 he withdrew from politics, settled on the plantation which he called the "Hermitage" near Nashville, set up a cotton-gin, formed a partnership, and traded to New Orleans, making the voyages on flatboats. Through his hot temper Jackson was involved in several quarrels and "affairs of honor" during this period, in one of which (1806) he was severely wounded, but had the misfortune to kill his opponent, Mr. Charles Dickinson. In 1805, Aaron Burr had visited Nashville and been a guest of Jackson, with whom he corresponded on the subject of a war with Spain, which was anticipated and desired by them, as well as by the people of the Southwest generally. Burr repeated his visit in Sept., 1806, when he engaged in the celebrated combinations which led to his trial for treason; he was warmly received by Jackson, at whose instance a public ball was given in his honor at Nashville, and contracted with the latter for boats and provisions. Early in 1807, when Burr had been proclaimed a traitor by Pres. Jefferson, volunteer forces for the Federal service were organized at Nashville under Jackson's command, but his energy and activity did not shield him from suspicions of connivance in the supposed treason. He was summoned to Richmond as a witness in Burr's trial, but was not called to the stand, probably because he was outspoken in his partisanship. On the outbreak of war with Great Britain in 1812, Jackson tendered his services, and in Jan., 1813, embarked for New Orleans at the head of the Tennessee contingent. In March he received an order to disband his forces, but in September he again took the field in the Creek war, and in conjunction with his former partner, Col. Coffee, inflicted upon the Indians the memorable defeats at Talladega, Emucklaw, and Tallapoosa. In May, 1814, Jackson, who had now acquired a national reputation, was appointed a major-general of the U. S. army, and commenced a campaign against the British in Florida, conducted the defence of Mobile (Sept. 15), seized upon Pensacola (Nov. 6), and immediately transported the bulk of his troops to New Orleans, then threatened by a powerful naval force. Martial law was declared in Louisiana, the State militia was called to arms, engagements with the British were fought Dec. 23 and 28, and after reinforcements had been received on both sides the famous victory of Jan. 8, 1815, crowned Jackson's fame as a soldier, and made him the typical American hero of the first half of the nineteenth century. In 1817-18 he conducted the first war against the Seminoles of Florida, during which he seized upon Pensacola and executed by court-martial two British subjects (Arbuthnot and Ambrister)—acts which might easily have involved the U. S. in war both with Spain and Great Britain. Fortunately, the peril was averted (1819) by the cession of Florida to the U. S., and Jackson, who had escaped a trial for the irregularity of his conduct only through a division of opinion in Monroe's cabinet, was appointed (1821) governor of the new Territory. Soon afterward he declined the appointment of minister to Mexico. In 1823, Jackson was elected to the U. S. Senate, and nominated by the Tennessee legislature for the Presidency. This candidacy, though at first a matter of surprise, and even merriment, speedily became popular, and in 1824 the hero of New Orleans received the largest popular vote among the four candidates, though J. Q. Adams was elected by the House of Representatives

through the influence of Henry Clay. In 1828, Jackson was triumphantly elected President over Adams after a campaign of unequalled bitterness, which may be considered the point of departure of the modern Democratic party. Inaugurated on Mar. 4, 1829, he at once removed from office all the incumbents belonging to the opposite party—a procedure new to American politics, but which naturally became a precedent. The first term of Jackson was characterized by quarrels between the Vice-President, Calhoun, and the secretary of state, Van Buren, attended by a cabinet crisis originating in scandals connected with the name of Mrs. General Eaton (wife of the secretary of war); by the beginning of his war upon the U. S. Bank, and by his vigorous action against the partisans of Calhoun, who in South Carolina (1832) threatened to nullify the acts of Congress establishing a protective tariff. In the Presidential campaign of 1832, Jackson received 219 out of 288 electoral votes, his competitor being Mr. Clay, while Mr. Wirt, on an "Anti-Masonic" platform, received the vote of Vermont alone. In 1833, President Jackson removed the government deposits from the U. S. Bank, thereby incurring a vote of censure from the Senate, which was, however, expunged four years later. During this second term of office the Cherokees, Choctaws, and Creeks were removed, not without difficulty, from Georgia, Alabama, and Mississippi to the Indian Territory; the national debt was extinguished, Arkansas and Michigan were admitted as States into the Union, the Seminole war was renewed, the anti-slavery agitation first acquired importance, the Mormon delusion, which had originated in 1829, attained considerable proportions in Ohio and Missouri, and the country experienced (1837) its greatest pecuniary panic. Railroads with locomotive propulsion were introduced into America during Jackson's first term (1829), and had become an important element of national life before the close of his second term. For many reasons, therefore, the administration of Pres. Jackson formed an era in American history, political, social, and industrial. He succeeded in effecting the election of his friend Van Buren as his successor, retired from the Presidency Mar. 4, 1837, and led a tranquil life at the Hermitage until his death, June 8, 1845. During his closing years he was a professed Christian and a member of the Presbyterian Church. No American of this century has been the subject of such opposite judgments; he was loved and hated with equal vehemence during his life, but at the present (1875) distance of time from his career, while opinions still vary as to the merits of most of his public acts, few of his countrymen will question that he was a warm-hearted, brave, patriotic, honest, and sincere man. If his distinguishing qualities were not such as constitute statesmanship in the highest sense, he at least never pretended to other merits than such as were written to his credit on the page of American history—not attempting to disguise the demerits, which were equally legible. The majority of his countrymen accepted and honored him in spite of all that calumny as well as truth could allege against him. His faults may therefore be truly said to have been those of his time; his magnificent virtues may also, with the same justice, be considered as typical of a state of society which has nearly passed away. Jackson's life has been many times written: by Eaton (1824), William Cobbett (1834), Amos Kendall (1844), Jenkins (1850), Headley (1852), and with great fulness and completeness by James Parton (New York, 3 vols., 1859 *seq.*). See also Thomas H. Benton's *Thirty Years' View* (1854) for the political history of his administration. PORTER C. BLISS.

**Jackson (CHARLES), LL.D.,** b. at Newburyport, Mass., May 31, 1775, son of Hon. Jonathan Jackson; graduated at Harvard College in 1793; studied law in the office of Chief Justice Parsons, and, removing to Boston in 1803, soon attained an eminent position at the bar; was judge of the Massachusetts supreme court 1813-24, member of the constitutional convention in 1820, and chairman of a commission to codify the State laws in 1833. Through his labors several important reforms were introduced into Massachusetts legislation, especially in reference to debit and credit. He published a treatise on *Pleadings and Practice in Real Actions* (1828), which is a recognized authority upon the law of property. D. at Boston Dec. 13, 1855.

**Jackson (CHARLES DAVIS), D. D.,** b. in Salem, Mass., Dec. 15, 1811; graduated at Dartmouth in 1833, and at Andover in 1838; was for a time professor in Lane Seminary and a teacher in Petersburg, Va., and afterwards in Flushing, N. Y.; in 1842 took priest's orders in the Protestant Episcopal Church; has since held the rectorships of St. Stephen's, N. Y., St. Luke's, Staten Island, and St. Peter's, Westchester, N. Y. He is the author of several volumes of sermons and of works on education. D. at Westchester, N. Y., June 28, 1871.

**Jackson (CHARLES THOMAS), M. D.,** b. at Plymouth,



Mass., June 21, 1805; studied medicine in Boston; took part in 1827-29 with Francis Alger in the geological survey of Nova Scotia; studied medicine and geology in Europe 1829-32, assisting in more than 200 autopsies of cholera victims in Vienna; in 1836 became State geologist of Maine (published three annual reports); in 1837 had a controversy with Prof. Morse regarding the invention of the telegraph, to which he had some claims; in 1839 State geologist of Rhode Island (1 vol. of reports); in 1840 State geologist of New Hampshire (1 report 1844); was 1847-49 U. S. surveyor of mineral lands in Michigan (report 1850). He has also received numerous honors as the discoverer of anesthetics—a distinction which has found several other claimants. He has published various chemical reports for the U. S. patent-office and a *Manual of Etherization* (1861).

**Jackson** (CLAIBORNE F.), b. in Fleming co., Ky., Apr. 4, 1807; removed in 1822 to Missouri; was a captain in the Black Hawk war, and was one year Speaker of the House in Missouri. In 1861 he was chosen governor, but was deposed by the State convention in the same year. He became a Confederate general, and d. at Little Rock, Ark., Dec. 6, 1862.

**Jackson** (CONRAD FEGER), b. in Pennsylvania; previous to 1861 was engaged in railroad business with the Philadelphia and Reading R. R.; appointed colonel 9th Pennsylvania Volunteers at the outbreak of the civil war, and served in McCall's division of Pennsylvania Reserves at Dranesville, Va., and throughout the Va. Peninsula campaign 1862; appointed brigadier-general of volunteers July, 1862, and commanded a brigade at South Mountain, Antietam, and Fredericksburg, where he was killed, Dec. 13, 1862.

G. C. SIMMONS.

**Jackson** (HENRY), M. D., LL.D., b. in Moreton-Hempstead, Devonshire, England, July 7, 1778; brought to this country in the twelfth year of his age by his brother, Gov. James Jackson of Georgia; thoroughly educated at the Pennsylvania University in Philadelphia, where he first took the degree of M. D., and commenced the practice of medicine in association with Dr. Grimes of that city, then one of the most eminent physicians in the U. S. From this lucrative pursuit he was called to the professorship of natural philosophy in the University of Georgia in 1811. Having more taste for science than desire for the acquisition of fortune, he accepted the tendered position. When William H. Crawford was sent minister to France in 1814, Dr. Jackson accompanied him as secretary of legation. This position he accepted, partly with a view of recruiting his health, but mainly with the view of extending the circle of his knowledge. When Mr. Crawford returned he remained at Paris as American *chargé d'affaires* until 1818. On his return he resumed the duties of his professorship with renewed energy and power of usefulness, but from domestic affliction was compelled to resign in 1827. D. near Athens, Ga., in 1840.

A. H. STEPHENS.

**Jackson** (HENRY R.), b. in Athens, Ga., June 24, 1820; was educated partly at Princeton and partly at Yale College. He entered the latter in 1835, and graduated there in 1839 with the first honor of his class; studied law, and was admitted to the bar in Georgia in 1840; first opened an office in Columbus, but finally located in Savannah; was appointed U. S. district attorney for the State in 1843; served as colonel in the Mexican war in 1846; after that war (in which he gained distinction) he was elevated to the circuit court bench of the State, which position he held 1849-53, when he resigned it to accept the appointment of *chargé d'affaires* to Austria. This mission was raised to the grade of minister resident in 1854, and he was continued in it until 1858. It was while he held this position the interesting *quasi* imbroglio took place between the Austrian empire and the U. S., growing out of the then late Hungarian war and the Khosta affair. His conduct in all these matters received the warmest approval by the authorities at Washington. He, however, resigned the position in 1858, and resumed the practice of law in Savannah. In 1859 he was employed by the Federal government authorities to prosecute the *Wanderer*, a celebrated slave-ship which had recently landed on the coast of Georgia a cargo of Africans. This high duty he performed with unflinching fidelity and distinguished ability. In the winter of 1859 he was unanimously chosen chancellor of the State University, but declined to accept it, except on certain conditions which were not complied with. He was a delegate to the famous Democratic Presidential convention at Charleston in 1860, and though he opposed the extreme views of Mr. Yancey, yet when the delegations from all the other cotton States withdrew, he also withdrew, believing a division of the South under the circumstances would be the greater of two evils. He was afterwards one of the Presidential electors at large for the State

on the Breckenridge and Lane ticket put forth in Baltimore after the rupture at Charleston. Soon after the passage of the ordinance of secession by Georgia the governor was authorized to appoint two major-generals to command the military forces of the State. The senior position of these commands was conferred on Col. Jackson, and accepted by him, but was soon after resigned by him, with a request that it should be conferred upon William Henry Walker, a gallant and distinguished officer of the Federal army who had resigned his position in that army with a determination to cast his fortunes with the people of his native State (Georgia), and who was at the time out of service. Col. Jackson's request was complied with. Upon the organization of the provisional government at Montgomery for the Confederate States (1861) he was tendered the office of Confederate judge for the State of Georgia. This position at first he declined, but afterward, by earnest entreaties from all quarters, was induced to accept. He, however, held it for a few months only, when he entered the provisional army of the Confederate States as brigadier-general, and was ordered to report to Gen. Garnett, then in North-western Virginia. Before reaching his appointed destination the news of the disaster which had befallen that commander met him, with a portion of Garnett's army in rapid retreat. By order of Gen. Lee he assumed the command of the shattered forces at Monterey. With these and his own two regiments he organized a force that prevented any further advance of the Federals from that quarter. On Oct. 3 he was attacked by Gen. Reynolds on Greenbrier River, but held his position. For winter-quarters he took position on the Alleghany. He was again appointed by Gov. Brown of Georgia major-general, to command a division of State troops called to the field for the defence of the Georgia coast. This position he accepted, but in doing it was compelled to resign his commission in the Confederate army, and after the passage of the Confederate conscript law in 1862 he resigned his commission as major-general of State forces, as by that law most of his forces were transferred to other branches of the service. He was again appointed brigadier-general in the Confederate army, and assigned to duty in the West. He was under Hood in his famous expedition to Tennessee in the fall of 1864, and acted a conspicuous part in the battles of Franklin and Nashville; in the latter, his entire command, thinned in its ranks to only a few hundred, was surrounded and captured on the field. As a prisoner of war he was first taken to Johnson's Island, then transferred to Fort Warren, where he remained till the close of the terrible conflict of arms. The subject of this sketch, amidst all his various vocations, has ever had a fondness for letters. Early in life he was a valued contributor to the *Orion*, the *Augusta Mirror*, the *Southern Quarterly Review*, and other periodical publications of like character. A volume of his poetic writings was published in 1850. It was entitled *Tallulah, and other Poems*, which met with general popular favor. Since the war he has taken no active part in public affairs, but has confined himself closely to the practice of his profession in Savannah, and is also at this time (May, 1875) president of the Georgia Historical Society.

A. H. STEPHENS.

**Jackson** (ISAAC W.), LL.D., b. at Cornwall, Orange co., N. Y., in 1804; graduated at Albany Academy in 1824, and from Union College in 1826; was appointed tutor in mathematics at Union College in the same year, and shortly after professor. D. at Schenectady July 28, 1877. He was a very successful teacher, and his mathematical school-books are widely used.

**Jackson** (JAMES), b. in Moreton-Hempstead, Devonshire, England, in 1758, and migrated to Georgia in 1772; took an active and zealous part in the war for independence; was made brigade-major in 1778, and in 1781 commanded the legionary corps of the State of Georgia. Upon the evacuation of Savannah by the British (July 12, 1782) he received the keys. In consideration of his many gallant and valuable services during the war, the general assembly of the State purchased and presented him with a commodious house and lot in the city of Savannah. After the war was over he engaged in the practice of law, and pursued it with success. He was elected a member of the first Congress of the U. S., which assembled under the new Constitution in 1789. He was soon after chosen one of the Senators from Georgia, which position he held until 1795, and then resigned upon the passage of the famous Yazoo bill, as it was called, by the legislature of his State; which bill he succeeded in getting condemned and finally repealed. In 1798 he was elected governor of the State, which position he held until 1801, when he was again returned to the U. S. Senate. D. Mar. 19, 1806, in the zenith of his power and influence. In politics he was of the Jeffersonian school, and he made an impress upon the popular mind in Georgia of his principles unequalled by any man of his day and times.

A. H. STEPHENS.



**Jackson** (JAMES), b. in Jefferson co., Ga., 1819; graduated at the State University in 1837; studied law, and admitted to the bar in 1840; was elected secretary of the State senate in 1842, and was a member of the State legislature 1845-47; 1849-57 was on the circuit court bench of the State. This position he resigned to become a member of the 35th Congress. He was again elected to the 36th Congress, and resigned his seat in the House when Georgia passed her ordinance of secession in 1861. Since the war he has taken no active part in politics, but confined himself to the practice of law at Macon, Ga. For many years he has been a trustee of the university of the State.

A. H. STEPHENS.

**Jackson** (JAMES), M. D., LL.D., b. at Newburyport, Mass., Oct. 3, 1777; graduated at Harvard in 1796; studied medicine in Europe, and began practice in Boston in 1800. He was the first physician of the Massachusetts General Hospital, in 1810 became a professor of clinical medicine in the Massachusetts Medical School, and in 1812 professor of theory and practice. He wrote *On the Brucian System* (1809), *On the Effects of Dentition* (1812), *Syllabus of Lectures* (1816), *Letters to a Young Physician* (1855), and several other works. D. at Boston, Mass., Aug. 27, 1867.

**Jackson** (JAMES S.), b. in Madison co., Ky.; educated at Centre College; studied and practised law; in the war with Mexico he served with a regiment of Kentucky volunteers, returned to his native State at its close, and resumed his profession; elected to the 37th Congress, he resigned his seat in 1861, organized the 3d Kentucky Cavalry (Union), of which he became colonel, and with which he was actively engaged during the winter and spring of 1861-62; was appointed brigadier-general of volunteers July, 1862, and commanded a division at the battle of Perryville, where, while endeavoring to rally a wavering body of his command, he was killed, Oct. 8, 1862. G. C. SIMMONS.

**Jackson** (JOHN), b. at Lensey, Yorkshire, in 1686; was educated at Cambridge; became rector of Rossington, and in 1729 master of Wigton Hospital. His success in obtaining rank and dignity in the English Church was seriously impeded by the Unitarian (then called Arian) principles which he set forth in many treatises, and defended against such antagonists as Warburton, Whiston, and Middleton. He was also distinguished for his writings against the deists Collins and Tindal, and produced a valuable work on biblical chronology (1752). D. in 1763.

**Jackson** (JOHN), D. D., b. at London Feb. 22, 1811; was educated at Pembroke College, Oxford, graduating in 1833 with first-class honors. In 1836 he became head-master of the proprietary grammar school at Islington; in 1846 rector of St. James's, Piccadilly; in 1847 chaplain to the queen; in 1852 canon of Bristol; and in 1853 bishop of Lincoln. Dr. Jackson was a select preacher before the University of Oxford in 1845, 1850, 1862, and 1866, and delivered the Boyle Lectures in 1853. He was promoted in 1869 to the bishopric of London.

**Jackson** (JOHN DAVIES), A. M., M. D., b. at Danville, Ky., Dec. 12, 1834; graduated from Centre College in 1854; received his medical degree from the University of Pennsylvania 1857; and settled to practise in his native place. In the war between the States he served as a surgeon in the Confederate army. His contributions to medical literature are to be found chiefly in the leading medical journals and in translations—*In Operative Manual, Ligation of Arteries*, by Dr. L. H. Parabeuf (1871), *Trichiniasis in the Journal of A. M. Science* (1869), *The Black Arts in Medicine, Medical Office Pupils, Floating Cartilage in Knee-joint, Gunshot Wounds in Bladder*, etc. J. M. TONER.

**Jackson** (JONATHAN), b. at Boston June 4, 1743; graduated at Harvard College 1761; and became a wealthy merchant at Newburyport. He served as a member of the Provincial Congress of Massachusetts in 1775, as a representative in 1777, a member of Congress in 1782, and State senator in 1789. He was the author of *Thoughts upon the Political Situation of the U. S.* (1788). Three of his sons became men of distinction—CHARLES (Dr.), JAMES, and PATRICK T. (which see). D. at Boston Mar. 5, 1810.

**Jackson** (NATHANIEL J.), b. at Newburyport, Mass.; took part in the American civil war as colonel of the 1st and 5th regiments Maine volunteers; appointed brigadier-general volunteers Sept. 24, 1862; commanded a brigade in the 12th army corps during the McClellan and Pope campaigns in Virginia; was wounded at Gaines's Mill; commanded 1st division 20th corps in Sherman's march to the sea, and was made brevet major-general of volunteers.

**Jackson** (PATRICK TRACY), a brother of Dr. James Jackson, b. at Newburyport, Mass., Aug. 14, 1780; early acquired a large fortune in the East India trade, and with F. C. Lowell, his brother-in-law, engaged in the cotton

manufacture, building their first mill in 1813 at Waltham, Mass. In 1821 they established what proved to be the germ of the city of Lowell. In 1837, after severe pecuniary losses, he removed to Lowell, and afterwards to Somersworth, N. H., and was engaged in manufacturing and in zealous and successful labors for the moral and intellectual good of his operatives. D. at Beverly, Mass., Sept. 12, 1847.

**Jackson** (ROBERT M. S.), a native of Pennsylvania, distinguished for a knowledge of natural science, rendered great service to the Pennsylvania geological commission, and was thoroughly acquainted with all the aspects of nature in the Alleghanies, having published a remarkable work called *The Mountain*, in which he enunciated bold but reverent ideas in natural theology. He served in the civil war as medical inspector of the 23d army corps and acting medical director of the department of the Ohio. D. at Chattanooga, Tenn., Jan. 28, 1865.

**Jackson** (SAMUEL, M. D., b. in Philadelphia Mar. 22, 1787; received his degree from Rutgers College in 1812; was 1835-63 professor of the institutes of medicine at the University of Pennsylvania, and enjoyed a wide reputation as a physician, lecturer, and medical writer. His chief work was the *Principles of Medicine* (1832). D. at Philadelphia Apr. 5, 1872.

**Jackson** (THOMAS), D. D., b. at Willowing, Durham, England, in 1579; was educated at Oxford; became president of Corpus Christi College in 1630, prebendary of Winchester in 1635, and dean of Peterborough in 1638. Dean Jackson was a voluminous and learned writer upon Anglican theology, and ranks high in the roll of the famous divines of the seventeenth century. His *Commentary on the Apostles' Creed* is still highly valued, and his whole works were republished at Oxford in 1844 (12 vols.). D. in 1640.

**Jackson** (THOMAS), D. D., b. at Sancton, Yorkshire, Dec. 12, 1783; was editor of *The Wesleyan Magazine* for twenty years; then theological tutor in the Wesleyan college at Richmond, being twice the president of the Wesleyan conference. His works are standard among Methodists, *The Institutions of Christianity* (3 vols.), *Life of Charles Wesley*, and *The Centenary of Methodism* being among them. D. at Richmond Mar. 11, 1873.

**Jackson** (THOMAS), M. A., b. at Preston, England, in 1812; graduated at St. Mary's Hall, Oxford, in 1834; took holy orders, and after holding several parochial appointments became principal of the Normal College at Battersea and canon of St. Paul's. In 1849 he was appointed bishop of New Zealand, and went thither, but returned without having been consecrated, in consequence of difficulties with Bishop Selwyn. Being preferred to the rectory of St. Mary, Stoke Newington (a district of London), he has built up there one of the most splendid churches in the British metropolis. His educational publications have been numerous and valuable.

**Jackson** (THOMAS JONATHAN), ("Stonewall"), b. at Clarksburg, Harrison co., West Va., Jan. 21, 1824. Attracted toward the profession of arms, young Jackson walked from the mountains of Virginia to Washington, invoked the aid of his Congressman, and got the appointment of cadet at the U. S. Military Academy at West Point, where he was entered in the summer of 1842, and was graduated in 1846. Attached to the army as brevet second lieutenant of the 1st Artillery, his first service was as a subaltern with Magruder's battery of light artillery. Present at the reduction of Vera Cruz, and noticed for gallantry in the battles of Cerro Gordo, Contreras, Molino del Rey, Chapultepec, and the assault and capture of the city of Mexico, he received the brevets of captain for conduct at Contreras and Churubusco, and of major for the storming of Chapultepec. Meanwhile, he had been advanced by regular promotion to be first lieutenant on the 20th of Aug., 1847. After the war, on the 29th of Feb., 1852, he resigned from the regular army, having been previously appointed to the chair of natural and experimental philosophy and artillery instructor at the Virginia State Military Institute at Lexington, Rockbridge co., Va., a position which he still filled (Apr. 17, 1861) when Virginia declared for secession, and in which he was chiefly notable for intense religious sentiment, coupled with personal eccentricities. But Letcher, governor of Virginia, a resident of Lexington, had noticed somewhat of the merits of the eccentric professor, and making him colonel placed him in command of a force sent to seize and occupy the U. S. arsenal at Harper's Ferry—which Jackson accomplished on May 3, 1861. Relieved by Gen. J. E. Johnston (May 23), he fell in command of the brigade of Valley Virginians, whom he moulded into that redoubtable corps, baptized at the first Manassas, and ever after famous, as the "Stonewall brigade." In his very first detached service the martial character of the man be-

came apparent in the affair at Falling Waters. The junction of the forces of Johnston and Beauregard having taken place in the rear of Bull Run, Jackson, previously made a brigadier-general, came prominently into public view with the battle of Manassas, where he acquired the sobriquet of "Stonewall." Made a major general (September, 1861), he was soon placed in command of the Confederate forces in the lower Shenandoah Valley, then menaced with occupation by a Federal army. Some apparently profitless, if not eccentric, marches and movements in that quarter during the next five months brought no material military results, but severely testing the mettle of his troops, somewhat impaired his popularity with them. Confronted finally, early in March, at Winchester, with a largely superior Union force, Jackson fell back with his small corps (3400 men of all arms, with 18 guns) towards Staunton, pursued as far as Strasburg. As his adversary retrograded in turn, the Confederate general swiftly took the offensive and fought the battle of Kernstown (Mar. 23, 1862) in characteristic fashion, after a forced march the same day of from 14 to 25 miles. Worst, however, in this action, he was forced to retire up the Valley again to a position of observation near Swift Run Gap in the Blue Ridge, on the S. fork of the Shenandoah River, about the 9th of April. Meanwhile, a fresh adversary, Gen. Milroy, was marching across the mountains from the West to unite with Banks, then at Harrisonburg, and Jackson's situation was critical. Reinforcements, however, under Ewell, were approaching, and another Confederate force under Gen. Edward Johnson was at Buffalo Gap, just W. of Staunton. Giving orders to Ewell to hold Banks in check while he, forming a junction with Johnson, should take the offensive against Milroy, Jackson encountered and defeated that officer in a severe action of four hours at McDowell (May 8, 1862), forcing him to retreat with heavy loss in supplies. This achieved, Jackson, retracing his steps, effected a junction with Ewell, and throwing himself into the Luray Valley, by a forced march day and night stole upon the flank and rear of Gen. Banks, capturing detached bodies of Union troops, artillery, and wagon-trains at Winchester, where some sharp fighting ensued, with the result that Banks retreated precipitately across the Potomac into Maryland. This brought the immediate concentration of several strong Federal columns from different quarters in the upper Shenandoah Valley upon Jackson's rear for his destruction. Thus menaced, detaching Ewell to meet Fremont approaching from the N. E., with his own division Jackson took position about the 1st of June to observe Gen. Shields's force, diverted from McDowell's corps at Fredericksburg, and then in the Luray Valley. Encumbered at the time with 2300 prisoners and more than 9000 stands of captured arms, with other valuable stores, but never embarrassed by obstacles nor losing opportunities for strokes, he promptly threaded the Luray Valley to the White House, burned the bridge there, crossed over to the main valley, and passing around Shields took position near Ewell at Port Republic, equidistant between Shields and Banks. On the 8th of June, Ewell became engaged with and beat the latter at Cross Keys, and on the 9th, Shields having advanced to Port Republic, Jackson, after a sharp, well-contested action, defeated him, inflicting the loss of seven guns with other casualties. In this campaign was made manifest his high rare talent for the business of war. Here he gave to a comparatively petty force that astonishing mobility which enabled him to deliver so many opportune blows, with the effect to neutralize an aggregate of nearly 70,000 Federal soldiers, with a highly adverse influence upon McClellan's general plan of campaign, added to the gravest apprehension excited at Washington and throughout the whole Union for the safety of the national capital. Fresh from such successes, Jackson was now called to add his corps to the main Confederate army at the moment crowded back upon Richmond. Then was made that notable flank movement which ended in the decisive stroke upon McClellan's right at Cold Harbor (June 27, 1862), a movement executed under orders, but in its manner Jackson's own. Gen. Pope having been called from the West and placed in command of a large force, which he pushed along the Piedmont region to the Rapidan, while McClellan still threatened Richmond from James River, Jackson was detached by Lee to confront the fresh menace with three divisions. Always bent on the offensive, Jackson immediately resolved upon attack, and encountered Pope's advance corps on the afternoon of Aug. 9, within 6 or 8 miles of Culpeper Court-house. In this action of Cedar Run he was victor at all points. Gen. Lee deciding to take the offensive in the same direction, Jackson was charged with the lead in the operation, which, impressed with his genius, resulted in one of the most brilliant feats of the war, and he was the conspicuous figure in the actions of Aug. 29-30, 1862. In the invasion of Maryland that followed, his troops led the van to Frederick.

Here he was detached for a special operation executed in his habitual manner, so that he was soon able to announce to his superior that the fortified position at Harper's Ferry had been surrendered into his hands, "with 11,000 men, an equal number of small-arms, 73 pieces of artillery, and 200 wagons," with large stores of camp and garrison equipage. But this success was dearly gained, for it entailed the inopportune absence of two-thirds of Lee's best troops so much longer than was anticipated, that, thrown meanwhile upon the defensive, his offensive plan of campaign was virtually foiled, while his adversary was enabled to assemble his strength, and force battle at Antietam with the Confederates unready, and therefore unable to push to a decisive close the advantage which they had gained at the end of that day, and their subsequent enforced retreat before their reinforced enemy. In that action, however, Jackson was present with two of his divisions, and his part of the field, the Confederate left near the Dunkers' church, was deeply impressed with his peculiar gift to develop the utmost fighting power of men, both offensively and defensively. In Burnside's attack on Lee at Fredericksburg (Dec. 11, 1862), Jackson held the Confederate right, with no marked opportunity for the display of his always ripening capacity for war. When, on the eve of the operations that ended at Chancellorsville, Gen. Hooker made the strong feint (Apr. 28, 1863) of passing the Rappahannock below Fredericksburg, the movement was confronted by Jackson, but as there was no prompt advance, Lee, forecasting Hooker's real plan, detached Jackson the next night with three divisions in the direction of Chancellorsville. In movement by midnight he found Hooker in a strongly fortified position. At Jackson's own suggestion, he was now entrusted with his last flank operation—a swift march around, and descent upon, the Union right and rear. Executing the operation in his habitual manner, he fell suddenly upon the 11th Federal corps on the afternoon of May 2, and completely routed it. Pressing the advantage as fast as the nature of the densely wooded country would admit, in his martial ardor he was carried far in advance of his men, until urged by his staff to return. Doing so, after nightfall, he and his suite, mistaken for Federal cavalry, received the fire of several Confederate regiments, and Jackson fell with three wounds, one ball having shattered his left arm two inches below the shoulder, another passing through the same arm below the elbow, and the other entering the palm of his right hand: several of his suite were killed outright, and several wounded. These volleys drew an immediate answer from a Federal force in the vicinity, and a sharp conflict was engaged, in the course of which the latter charged over the very body of the Confederate leader. Jackson recovered, however, in a counter-charge, was carried off the field on a litter under a terrible fire, from which one of the litter-bearers was slain, and by the fall of the litter Jackson was grievously contused. Meanwhile, his charge to the surgeon in attendance was, "Do not tell the troops I am wounded." The doubly wounded arm having been amputated, he was left serene, cheerful, and hopeful, talking freely of the battles, of the bravery and deserts of his subordinates, and of his old "Stonewall brigade." But pneumonia supervened, and in his weakened state from great loss of blood, Jackson died (May 10, 1863). An incomparable lieutenant, sure to execute any operation entrusted to him with marvellous precision, judgment, and courage, all his individual campaigns and combats bore the stamp of a masterly capacity for war. The more his operations in the Shenandoah Valley in the spring, summer, and fall of 1862 are studied, the more striking must the merits of this almost uniformly successful soldier appear, with all his intense perception of the value as well as right method of the *active defensive*, of which Jackson may indeed be rightly regarded as the very incarnation.

THOMAS JORDAN.

**Jackson** (WILLIAM), b. in Cumberland co., Eng., Mar. 9, 1759; came to Charleston, S. C., in boyhood; was liberally educated, and served creditably in the Revolution, attaining the rank of major as aide-de-camp to Washington. In 1781 he was secretary to Laurens in his mission to France; in 1782-83 assistant secretary of war; in 1787 secretary to the U. S. constitutional convention; private secretary to Washington during his first presidency; surveyor of the port of Philadelphia 1796-1801, and secretary of the Society of Cincinnati from 1800 until his death, which occurred at Philadelphia Dec. 17, 1828. He pronounced the funeral oration upon Washington at Philadelphia, where in 1801 he started one of the first daily papers in America, *The Political and Commercial Register*.

**Jackson Brook Plantation**, tp. of Washington co., Me. Pop. 206.

**Jack-sburg**, post v. of Jackson tp., Wayne co., Ind. Pop. 109.



**Jacksonburg**, post-v. of Wayne tp., Butler co., O. Pop. 127.

**Jackson Centre**, post-v. of Jackson tp., Shelby co., O. Pop. 60.

**Jackson Court-house**, post-v., cap. of Jackson co., W. Va. It is called Ripley also, and is 16 miles from Ripley Landing on the Ohio River.

**Jackson Creek**, tp. of Clarke co., Ala. Pop. 393.

**Jacksonport**, post-v., cap. of Jackson co., Ark., 80 miles N. E. of Little Rock, at the junction of White and Black rivers, and within 2 miles of the Cairo and Fulton R. R. It has a newspaper, 5 churches, free and select schools, Knights of Pythias, Knights of the Silver Ring, Old Fellows, and Masonic lodges, and a \$40,000 court-house. Cotton is extensively shipped from this point. Pop. 769. JOHN P. FAGIN, Ed. "STATESMAN."

**Jacksonport**, tp. and post-v. of Door co., Wis., on Lake Michigan. Pop. 139.

**Jackson's Hill**, post-tp. of Davidson co., N. C. P. 637.

**Jackson Springs**, tp. of Moore co., N. C. Pop. 537.

**Jacksonville**, post-v. and tp., cap. of Calhoun co., Ala., on the Selma Rome and Dalton R. R. It contains 1 newspaper, a male college, a female school, fine waterworks, 1 mill, an extensive tannery, 2 hotels, a livery stable, a number of stores, etc. It has a good trade with the surrounding valleys, beautiful mountain scenery, and a delightful climate. Pop. of v. 953; of tp. 1849.

I. F. & L. W. GRANT, Eds. "REPUBLICAN."

**Jacksonville**, city, cap. of Duval co., Fla., on the river St. Johns, 25 miles from its mouth; is the eastern terminus of the Jacksonville Pensacola and Mobile R. R. It ships annually some 50,000,000 feet of lumber, besides naval stores, cotton, and other commodities, and is the centre of business and travel for this section of the State, many thousands of tourists and others arriving here yearly by rail and river. It has a savings bank, 2 private banking houses, 1 semi-weekly, 1 tri-weekly, and 2 weekly newspapers, good graded schools, a hospital, 10 churches, a Roman Catholic academy for ladies, etc. It is well laid out, and is a very popular resort for invalids and pleasure-seekers. Pop. 6912, very largely increased since the U. S. census. N. K. SAWYER, Ed. "UNION."

**Jacksonville**, post-v. of Telfair co., Ga., 18 miles from McVie, a station on the Macon and Brunswick R. R. Pop. 40.

**Jacksonville**, city and tp., cap. of Morgan co., Ill., is favorably situated in Central Illinois in the midst of a fertile prairie, near Mauvassetter Creek, an affluent of the Illinois River, 30 miles W. of Springfield, and at the intersection of the Jacksonville division of the Chicago and Alton with the Toledo Wabash and Western, the Peoria Pekin and Jacksonville, and the Jacksonville North-western and South-eastern R. Rs. The streets are wide and adorned with shade trees, cars run on the principal avenues, and the city is provided with gas and a complete system of waterworks and sewerage, all the city improvements being of a substantial character. It has a fine court-house, opera-house, 2 national banks, 2 private banks, a savings bank, 3 hotels, and 22 churches, the architecture of which is generally rich. It is known as "the Athens of the West," and well sustains the title, having State institutions for the insane, deaf and dumb, feeble-minded children, and the blind; of incorporated institutions, the Illinois College (Congregational), Illinois Female College (Methodist), Jacksonville Female Academy, Young Ladies' Athenæum, Illinois Conservatory of Music, and a combined academy and business college; of private institutions, the Lutheran orphan asylum, a retreat for the insane, and a surgical infirmary; and 1 high school, 7 public schools, 1 Roman Catholic parochial school, a free reading-room, and public library of 1600 volumes, all in separate, well-appointed buildings. Its manufacturing interests are rapidly developing, there being 4 flour-mills, woollen-factory, carworks, several foundries and machine-shops, carriage-factories, planing-mills, soap-factories, and gasworks. It has 1 daily and 3 weekly newspapers. Pop. of city, 9203; of tp. 3890. L. B. GLOVER, Ed. "DAILY JOURNAL."

**Jacksonville**, post-tp. of Chickasaw co., Ia. Pop. 828.

**Jacksonville**, post-v. (P. O. name of ONSLOW COURT-HOUSE) and tp., cap. of Onslow co., N. C. Pop. of v. 60; of tp. 1166.

**Jacksonville**, post-v., cap. of Jackson co., Or., on Rogue River, in a good agricultural and mining region, has 1 bank, 2 churches, 2 hotels, a public school, 2 newspapers. H. KELLY, Ed. "OREGON SENTINEL."

**Jacksonville**, a v. of Young tp., Indiana co., Pa. Pop. 141.

**Jacksonville**, post-v. of Cherokee co., Tex., on the International and Great Northern R. R., 28 miles N. E. of Palestine. It has 1 weekly newspaper.

**Jacksonville**, post-v. of Whitingham tp., Windham co., Vt., 25 miles W. by S. of Brattleboro', has manufactures of leather, etc.

**Jacksonville**, or **Floyd Court-House**, post-v., cap. of Floyd co., Va., 22 miles S. of the Virginia and Tennessee R. R., has 2 churches, 6 stores, 3 hotels, 1 foundry, 1 weekly newspaper, and a graded school. Pop. 321; of tp. 2773. JOHN SOWER, Ed. "FLOYD REPORTER."

**Jack's Springs**, tp. of Escambia co., Ala. Pop. 196.

**Jack's Valley**, tp. of Douglas co., Nev. Pop. 140.

**Jack Tree**, the *Artocarpus integrifolia*, a tree which originated in the East Indies, and is now naturalized throughout a large part of the tropical world. It produces abundantly a fruit resembling, but much larger than, the bread-fruit, to which it is very nearly related. Though its taste is far from being pleasant, thousands of the lower classes of India eat it as food. Its wood is excellent for many uses, and is extensively employed in Europe for inlaying, carving, and fancy joinery. (See *ARTOCARPACEÆ*.)

**Jacme (Jayme or Jaume) En I.**, king of Aragon and count of Barcelona, b. in 1207 or 1208 at Montpellier, then belonging to the counts of Barcelona, and d. at Xativa in 1276. To his inherited states he added by conquest the Moorish kingdoms of Majorca, Valencia, and Murcia, and he imposed tribute on those of Grenada, Tunis, and Tlemcen. Hence he is generally styled the *Conqueror*. The title *en* corresponds in signification to the more modern *don*, and though its origin is not clear, it is probably derived from the Latin *senior*, as in the Castilian *señor*. The life and exploits of En Jacme are recorded in the curious *Llibre dels Feys esdevenguts en la vida del malt alt Senyor Rey En Jacme lo conqueridor*. This work is professedly autobiographic, though its authenticity is disputed; but there exists a manuscript copy of it of the year 1343, and it is probably as trustworthy as any of the mediæval annals. It is, both historically and philologically, among the most valuable and attractive of the old Hispanic chronicles. The portion of it which describes the conquest of Valencia was printed in 1515 in the *Aurea opus Privilegiorum Regni Valentia*, and the entire work in 1557. A beautiful edition is now in course of publication at Barcelona in the *Biblioteca Catalana*. A Castilian translation by Flotato and Bofarull appeared at Barcelona in 1848. (See article CATALAN LANGUAGE AND LITERATURE, in APPENDIX.) GEORGE P. MARSH.

**Jacme (or Jayme) II.**, called the JRST, king of Aragon and count of Barcelona, b. about 1259, was grandson of the preceding, and second son of Pedro III., on whose death, in Nov., 1285, he became king of Sicily, and on the death of his brother, Alfonso III., in June, 1291, succeeded him on the throne of Aragon, leaving the government of Sicily to his brother Frederic. He maintained wars with Naples, Genoa, and Pisa (conquering the islands of Sardinia and Corsica), as well as with the Moors of Granada and Tripoli; founded the University of Lérida; expelled the Knights Templar from the kingdom; and d. at Barcelona in 1327, leaving the throne to his son, Alfonso IV.

**Jac'mel, or Jacquemel**, a port and city of Hayti, on the S. coast, 30 miles S. W. of Port-au-Prince, at the head of a bay of the same name. The city is ill built and unhealthy, but the harbor is deep and commodious. Commerce with the U. S. has been carried on for some years, and it is a port of call for mail-steamers. Pop. about 6000.

**Ja'cob, or Israel**, in biblical history the immediate ancestor of the Hebrew nation, being the son of Isaac, grandson of Abraham, and father of the twelve patriarchs from whom the tribes of Israel deduced their origin. The place of Jacob's birth cannot be ascertained from the narrative in Gen. xxv., except that it was in the *Negeb* or "south country" of the land of Canaan, probably near the well Lahai-roi (verse 11), which site has not been identified by modern travellers. In consequence of a quarrel with his twin-brother Esau about the supremacy in the household, Jacob was sent in his early manhood by his parents to his uncle Laban, at Haran in Padan-aram (a region variously located by some to the N. E. of the Euphrates, by others in the vicinity of Damascus), where he married his cousins Leah and Rachel, and resided twenty years, becoming wealthy in flocks and herds. Jacob then returned to Canaan with his family and his riches, not without a serious controversy with Laban. Arriving near home, he became reconciled with his brother Esau in a dramatic personal interview. Both on his journey to Haran and on his return Jacob had had visions (Gen. xxviii. and xxxii.) in which the greatness of his descendants was divinely announced to him, and the later sanctuaries at



Bethel and Penuel commemorated these events. Jacob's old age was embittered by the conduct of his sons, who sold his favorite, Joseph, as a slave to the Midianites, who took him to Egypt. Many years later, when Joseph had become viceroy of Egypt (Gen. xli.), the whole family of Jacob, after a wonderful series of events, recorded in the last ten chapters of Genesis, was established in Egypt, where the patriarch died seventeen years later at the age of 147 years. On his deathbed he pronounced a blessing upon each of his sons (Gen. xlix.), and commanded them to bury him with his fathers in the cave of Machpelah in the land of Canaan, which was accordingly done. The locality of this cave has been much disputed; the present text of Genesis assigns it to Hebron, in Southern Canaan, but as this is difficult to reconcile with the route taken by the funeral procession in crossing the Jordan (Gen. l. 11) and with the express language of the martyr Stephen (Acts vii. 16), placing the tomb of the patriarchs at Shechem or Sychem, it has been concluded by some expositors that *Hebron* is a gloss which has erroneously crept into the text of Genesis. The chronology of Jacob's life is one of the most perplexing problems of biblical criticism. Kitto and others date his birth about B.C. 1855, and his death B.C. 1557. (See Ewald's *History of Israel*, translated by Martineau, vol. i., and Dean Stanley's *Jewish Church*, vol. i.)

PORTER C. BLISS.

**Jacob (Bibliophile).** See LACROIX (PAUL).

**Jacob (JOHN), GENERAL,** b. at Woolavington, near Bridgewater, England, in Jan., 1812; was distinguished for his gallantry in India as commander of the Scinde cavalry, for the influence he acquired over the natives of the N. W. frontier, whom he prevented from joining the mutiny of 1857, and for the invention of the Jacob rifle, a very popular cavalry arm in India, where it is the rival of the Enfield. D. at Jacobabad, a town founded by him in Scinde, Dec. 5, 1858. His *Views and Opinions* on Indian subjects were published after his death.

**Jacob de Voragine,** b. at Viraggio, near Genoa, in 1230; was archbishop of Genoa in 1292, and d. there in 1298. He was the author of the very famous *Legenda Aurea*, or *Golden Legend*, a collection of fanciful and fabulous lives of saints, widely read in the Middle Ages.

**Jacob of Edessa,** one of the most celebrated Syrian theologians, flourished in the second half of the seventh century. About 651 A.D. he became bishop of Edessa, and devoted himself to sacred and classical studies. His annotations upon the Syriac version of the Old Testament, of which some fragments are extant, are considered valuable, while his translations of Greek works into Syriac procured him the honorable title of "interpreter of the books." D. June 5, 708.

**Jacob of Hungary,** called THE MASTER, was a religious fanatic who played an important part in French history in the time of the seventh Crusade. In his youth he was reported to have been a Cistercian friar, to have learned magical arts from the Spanish Moors, and even to have embraced Islamism; these statements, however, are of doubtful authority. When the news of the surrender of St. Louis to the Mussulmans of Egypt became known in Europe, the "Master of Hungary" went through the provinces of France preaching a crusade for the liberation of the king. He laid claim to divine inspiration, and, appealing only to the poor and lowly, soon gathered about him in Flanders some 30,000 shepherds and peasants, called *Pastourels* or *Pastoureux*, at whose head he started for Paris. At Amiens the mob obtained arms and recruits, and it numbered 100,000 when it presented itself before the walls of Paris. The Pastourels when admitted into Paris began to commit depredations and to murder monks, while Jacob assumed priestly faculties and officiated publicly in the church of St. Eustache. He divided his followers into several bands, and sent them by different routes towards the Holy Land. At Orléans they massacred the priests, at Bourges the Jews. These excesses caused the *Shepherds*, who had at first been favored by the queen and the magistrates, to be excommunicated, and Jacob their leader was killed by the queen's order while preaching in the midst of his followers, who were then easily annihilated or dispersed. (See the *Chronicles* of Matthew Paris and Matthew of Westminster, and Milman's *Latin Christianity*.)

**Jacob of Vitry,** b. at Vitry, in France, in the second half of the twelfth century; was first a parish priest at Argenteuil, then became a zealous apostle of Maria of Oignies, a woman who was supposed to possess supernatural gifts. Led by his enthusiasm, he undertook to preach a crusade against the Albigenses, and finally devoted himself to the interests of the Holy Sepulchre at Jerusalem, travelling through France to collect alms. He was appointed by Pope Honorius III. (1217) bishop of Acre in

Palestine, where he effected great conversions of Saracen children. He resigned that bishopric in 1225; was appointed by Pope Gregory IX., in 1229, cardinal-bishop of Tusculum, and papal legate of France, Brabant, and the Holy Land, and d. at Rome Apr. 30 (or May 1), 1230. He was the most eloquent preacher of the time, but his fame now rests upon his *Historia Orientalis*, generally called *History of Jerusalem*, which is a valuable source of information upon the Crusades. He also wrote a *Historia Orientalis*, a *Life of the Blessed Mary of Oignies*, and left an interesting collection of letters.

**Jacobean Lily** (*Anagallis formosissima*), a beautiful South American flower which has been acclimated in the U.S. Its bulb is large, dark-colored, and long-necked, protruding above the surface of the ground; the flowers, which appear before the leaves, are large, irregular, and of a brilliant crimson color. (See LILY.)

**Jacob (ABRAHAM), M. D.,** b. at Hartum, in Westphalia, May 6, 1830; graduated at Bonn in 1851, and came to the U.S. in 1853 in consequence of political persecutions in Germany. Dr. Jacobi has become a leading authority among the medical profession of America upon the subjects of obstetrics and diseases of women and children, having been professor of these branches at the New York Medical College (1860-69) and the College of Physicians and Surgeons. He has published *Obstition and its Derangements* (1862) and other works, and edited 1868-71 the *American Journal of Obstetrics and Diseases of Women and Children*.

**Jacobi (FRIEDRICH HEINRICH),** b. at Düsseldorf Jan. 25, 1743, and received a commercial education at Frankfurt and Geneva, in which latter city he spent three years. In 1763 he was placed at the head of the paternal firm, and conducted the business of the house for seven years with great conscientiousness and with success. In 1770 he retired from mercantile affairs, having been appointed a councillor of finance for the duchies of Julich and Berg. This office gave him leisure and a superior social position; he was possessed of a large fortune, and had married a spirited and intelligent woman, and soon his literary taste, his philosophical spirit, his talents, and his studies brought him into intimate connection with many of the leaders of the German civilization—Goethe, Wieland, Lavater, Hamann, etc. His country-seat, Pempelfort, near Düsseldorf, was for several years a centre of literary life in Germany. In 1794, on the invasion of the French, he removed to Northern Germany, and lived for ten years mostly in Eutin. In 1804 he was called to Munich as a member of the newly-erected Academy of Science, of which he became president in 1807. In 1813 he resigned this position, and d. Mar. 10, 1819. His talent as a writer was half poetical, half philosophical, and as such it was eminently well suited to the standpoint which he occupied, and from which he exercised no small influence on the course of German civilization. His two romances, *Edvard Althelt* (1792) and *Woldemar* (1799), are now out of date; the exquisite delicateness of Woldemar's feelings is affected, and the subtle analysis to which they are subjected is a mental disease. But in an age whose task was to break through a petrified intellectuality and vindicate the right of the imagination and feeling in human life, the book was of great importance and very beneficial. Of more lasting interest are his *Ueber die Lehre des Spinoza* (1785), *David Hume über den Glauben* (1787), *Sensations und Fichte* (1799), *Von den göttlichen Dingen und ihrer Offenbarung* (1811). Reason, the vital centre of the human mind, is with Jacobi the source of immediate knowledge, of an instinctive intuition, of a kind of revelation divinely safe; while the knowledge with which the understanding furnishes us, and which is derived from the senses by a train of reasoning, always is more or less exposed to mistakes and errors. Furthermore, the organ of this centre of the mind, the foundation on which the reason rests, is with Jacobi the feelings; the feelings stand in the same relation to reason as the senses to the understanding, only they err not. This standpoint, the philosophy of feelings, is not and could hardly be presented in systematic form. It is developed polemically against Spinoza, Hume, Kant, Fichte, and Schelling, and in an aphoristic manner. But the criticism is often very acute and the positive representation always clear and eloquent. His collected *Works* appeared in 6 vols., 1812-24; *Letters*, 2 vols., 1825-27; *Corres. with Goethe*, 1846. (See Kuhn, *Jacobi's Life and Philosophy in his Zeit*, 1834.)

CLEMENS PETERSEN.

**Jacobi (KARL GUSTAV JAKOB),** b. at Paderborn Dec. 10, 1804; studied mathematics and philosophy in Berlin; was appointed adjunct in 1825, and professor in 1827 in mathematics at Königsberg; travelled in 1845 in Italy for his health, and lived in Paris, where he d. Feb. 18, 1851. His principal works are *Fundamenta arithmetice*, *Arithmetica ellipticum* (1829), *Calc. Arithmetica* (1839).



**Jacobi** (MORITZ HERMANN), brother of the preceding, b. at Potsdam Sept. 21, 1801; became professor in civil engineering at the University of Dorpat in 1835, member of the Academy of Science in St. Petersburg in 1847, and received the title of councillor of state. D. in St. Petersburg Mar. 10, 1874. He is the inventor of the galvanoplastic art, on which he wrote an essay in 1840, *Die Galvanoplastik*.

**Jacobins** [Lat. *Jacobini*, "James"], members of a political society founded 1789 by some deputies from Brittany during the session of the States General at Versailles. This society was at first called the "Breton Club," which name, being regarded as too exclusive, was soon changed to "Société des amis de la Constitution." The king and the Assembly went to Paris Oct., 1789; the club followed, and established itself in an old Dominican monastery in the Rue St. Honoré. The French Dominicans were commonly called Jacobins, from the fact that a church dedicated to St. James had been given to them shortly after their settlement in Paris in the thirteenth century; and before long the name was adopted by the new club. Many distinguished persons were among its members; for instance, La Fayette, Talleyrand, Mirabeau, Robespierre, the duke of Orleans, the poet Chénier, the actor Talma. Its power increased rapidly. Its opinions were disseminated by the *Journal des amis de la Constitution*, which was industriously circulated through the whole country. As its influence spread, its principles became more democratic, so that in Apr., 1790, Talleyrand, La Fayette, and many other moderate members withdrew and founded the "Club of 1790," afterwards styled "les Feuillants." Revolutionary societies on the Jacobin model were established in nearly every town and village of France, and affiliated to the original club, whose orders they implicitly obeyed. The Jacobins dictated every government measure. "They are Lords of the Articles," says Carlyle, "they originate debates for the legislative; discuss peace and war; settle beforehand what the legislative is to do." Robespierre was their most influential member; through him they ruled during the Reign of Terror, and after his downfall in 1794 they also were overthrown. In Oct., 1794, the affiliation of societies was forbidden by the Convention; in November, the Jacobin club was suspended, and the hall where it had met was closed. Some of its members joined the Electoral Club; others, the section "des Quinze-Vingts," in the Faubourg St. Antoine. Soon afterwards the monastery was destroyed, and upon its site was built the "Marché St. Honoré."

Much Jacobin and anti-Jacobin literature exists in the form of plays, poems, and pamphlets, most of which are rather curious than edifying; for example, *Le Secret des Jacobins*, *La Jacobinade*, *Les Crimes des Jacobins*, published in Paris between 1790 and 1795. The poetry of the *Anti-Jacobin*, a journal edited by George Canning, is, however, one of the best works of humor in the English language. In this collection are to be found the well-known "Knife-grinder," and the burlesque of the "Rovers," in which occurs the song of the "University of Göttingen." The term *Jacobin* is still sometimes applied to persons of extreme revolutionary principles. JANET TUCKER.

**Jacobites**. I. An Oriental Christian sect, monophysite in doctrine, deriving their name from Jacob Baradaï, "the ragged," originally a monk and presbyter near Nisibis in Mesopotamia, who became bishop of Edessa 541 A. D., and d. 578. He took upon himself the general superintendence of Monophysites in the East, and brought their number up to about 100,000, mainly in Mesopotamia and Syria. In the time of Gregory XIII. (1572-85) they numbered only 50,000 in Syria, Mesopotamia, and Babylonia. They are now still more reduced. In Syria they are a mere handful in a few villages, and very poor. They are under a patriarch who resides in a monastery near Mardin. In public worship use is made of the ancient Syriac language, which the people do not understand. There are said to be 200,000 Jacobites in India (Malabar and Travancore). Of the United or Roman Catholic Jacobites in Syria we have no statistics. Attempts were made to Romanize them as early as the fourteenth century, but with no considerable success till the seventeenth. About 96,000 Roman Catholic Jacobites are claimed in India.—II. In Great Britain, partisans of King James II., dethroned in 1688. They were strongest in Scotland, rebelling twice (in 1715 and in 1744), and were not wholly extinct as a party till after the death of Charles Edward, the Pretender, in 1788. R. D. HITCHCOCK.

**Ja'cobs** (MICHAEL), D. D., one of the founders of Pennsylvania College at Gettysburg, professor of mathematics and of the physical and natural sciences in it; b. near Waynesboro', Franklin co., Pa., Jan. 18, 1808. In early childhood he was left an orphan; entered the preparatory department of Jefferson College, Canonsburg, Dec., 1824; graduated with the valedictory 1828; taught for five months

in a Presbyterian school at Belle-Air, Md.; came to Gettysburg to assist his brother, Rev. D. Jacobs, Apr., 1829; was professor 1832-71; was licensed by the West Pennsylvania synod at Hanover Oct. 11, 1832; ordained at Somerset 1834; president of synod 1849-51; secretary of general synod 1845; received the title of D. D. simultaneously from Jefferson and Wittenberg colleges 1859. D. July 22, 1871. His very valuable *Notes on the Rebel Invasion*, quoted by Everett as the best sketch of the battle: some eight articles in the *Ev. Review*, two in *U. S. Service Magazine*, and a number in *Lincoln Record and Journal* (of which he was for two years editor), comprise all his publications. Among the most important manuscripts left by him are his *Lectures on Meteorology*. In this department he was one of the closest and most reliable observers of his day. His qualities as a man and an instructor were of a very high order. His character was of transparent Christian purity, his mind clear, his scholarship accurate, and his modesty great, almost to a fault. C. P. KRAUTH.

**Jacobs** (PAUL EMIL), b. at Gotha in 1802; studied at the Academy of Munich 1818-25, and in Rome 1825-28; lived in St. Petersburg 1830-34; settled in 1840 in his native city, where he d. Jan. 6, 1866. Several of his pictures, such as *Adam and Eve*, *Judith and Holofernes*, *Samson and Delilah*, became very popular.

**Ja'cobsburg**, post-v. of Smith tp., Belmont co., O. Pop. 89.

**Jacob's Fork**, post-tp., Catawba co., N. C. Pop. 1106.

**Ja'cobson** (JOHN CHRISTIAN), b. about 1785, a bishop of the Moravian Church. After a ministerial service of over fifty years he d. at Bethlehem, Pa., Nov. 24, 1870.

**Jacobson** (WILLIAM), D. D., b. in Norfolk in 1803; graduated at Lincoln College, Oxford, in 1827, with high honors; obtained a fellowship at Exeter College in 1829; was vice-principal of Magdalen Hall from 1832-48, when he became regius professor of divinity. In 1865, Dr. Jacobson was appointed bishop of Chester. While at Oxford he edited for the University press the *Remains of the Apostolic Fathers* (2 vols., 1840), Nowell's *Catechism* (1844), the *Collected Works of Bishop Sanderson* (6 vols., 1854), and other works, besides publishing two volumes of his own sermons (1840-46).

**Jaco'bus** (MELANCTHON WILLIAMS), D. D., LL.D., b. at Newark, N. J., Sept. 19, 1816; graduated at the College of New Jersey in 1834, and in 1838 at Princeton Theological Seminary, where he was assistant teacher in Hebrew 1838-39. In 1839 he was settled in Brooklyn, N. Y.; in 1850-51 travelled in Europe and the East; and in 1851 was made professor of Oriental and biblical literature in the theological seminary at Allegheny, Pa., which office he still held in 1875. He received the degree of D. D. from Jefferson College in 1852, and of LL.D. from the College of New Jersey in 1867. In 1869 he was moderator of the General Assembly. He published *Notes on the New Testament—Matthew* (1848), *Mark and Luke* (1853), *John* (1856), *Acts* (1859); also two volumes on *Genesis* (1865). D. Oct. 28, 1876. R. D. HITCHCOCK.

**Jaco'by** (JOHANN), b. at Königsberg May 1, 1805; studied medicine at Berlin and Heidelberg, and settled in 1830 in his native city as a physician. It was his political activity, however, which made him famous. Four times he was accused of high treason—in 1841, on account of his *Vier Fragen*; in 1845, on account of his *Das königliche Wort Friedrich Wilhelm III.*; in 1849 and in 1866. The three first times he was acquitted, but the last time he was sentenced to imprisonment. He was a member of the German Parliament in 1848, and at different periods of the Prussian Diet. He also wrote *Die Grundsätze der preussisch-demokratischen* (1859). D. Mar. 7, 1877.

**Jacoby** (LUDWIG SIGISMUND), D. D., b. at Alt Strelitz, Mecklenburg, Oct. 21, 1811, of Jewish parents. Converted to Christianity when about twenty-one years of age, he came to America some years later and joined the Methodist Episcopal Church, in which he became a preacher about 1840. After being for several years presiding elder of German districts in the Western States, he returned to Germany in 1849 to introduce Methodism in that country. Through his labors missions were established in many places, as well as a publishing-house and a theological seminary at Bremen under his own superintendence. In 1872 he returned to America, and is now (1875) pastor of a church in St. Louis, Mo. Among his writings are a *Concordance of the Bible* and a *History of Methodism in the Whole World down to 1869*.

**Jacotot** (JEAN JOSEPH), b. at Dijon, France, Mar. 4, 1770; was appointed professor of Latin and Greek literature at his native place when barely nineteen years of age; entered the army in 1792, becoming captain of artillery in the invasion of Belgium, and assisted the celebrated

board established at Paris for the manufacture of gunpowder by extraordinary methods at a time when the supply of ingredients seemed exhausted. Jacotot soon afterwards was made professor of mathematics at the *École Normale*; then of Roman law; a director of the *PolYTECHNIC*, and filled at Dijon the chair of scientific method, in which he introduced an original system of instruction with which his name has become identified. Exiled in 1815 for having supported Napoleon in the Chamber of Deputies during the "Hundred Days," Jacotot retired to Belgium, where he became professor of French at the University of Louvain and director of the military school, introducing and popularizing his new system, which exercised a great influence upon education throughout Europe, it being the precursor of the methods of Hamilton and Ollendorff. Jacotot returned to France in 1830, and d. at Paris July 30, 1840.

**Jacquard'** JOSEPH MARIE, b. in Lyons, France, July 7, 1752, of poor parents, by whom he was first brought up as a weaver, and successively apprenticed to a bookbinder, a cutter, and a typefounder. At the age of twenty he inherited from his father a workshop containing two weavers' looms, but was obliged to sell all his property to meet the expenses he contracted in experiments for improving looms. After a long period of poverty and obscurity, during which he participated in some of the campaigns of the Revolution, he succeeded in inventing the Loom (which see) which has made his name a household word in both continents. He experienced an ill-fortune not unusual in the history of inventors in being mobbed by the operatives of Lyons in 1804, acting under the erroneous belief that the new loom would be ruinous to their class. This circumstance led to the purchase of the invention by the imperial government, and Napoleon, by a decree dated at Berlin Oct. 27, 1806, declared it public property. As a result, the subsequent prosperity of Lyons was largely attributable to the genius of Jacquard, who received during his lifetime the cross of the Legion of Honor, and since his death his statue has been erected (1840) in his native city. D. Aug. 7, 1834, at Oullins, a village near Lyons.

**Jacquard Loom.** See Loom, by W. E. A. Axon.

**Jacqueline' of Bavaria,** b. in 1400, was the only daughter and heir of William VI. of Bavaria, count of Holland and Hainault, and of his wife, Margaret of Burgundy. In childhood she was betrothed to Prince John of France, who, however, d. by poison in 1417, in which year Jacqueline succeeded to her father's estates. The hand of the heiress was a prize destined to be fiercely disputed by the princes of that rude age. After refusing to marry the duke of Bedford, brother of Henry V. of England, Jacqueline wedded her cousin, John IV., duke of Brabant, but soon abandoned him, and in 1420 went to England, where Humphrey, duke of Gloucester, another brother of the king, sought her hand, treating her former marriage as null. After the death of Henry, the antipope, Benedict XIII. annulled Jacqueline's first marriage, and in 1423 Gloucester obtained the coveted prize. He thereupon sailed for Hainault with 5000 troops to reconquer his wife's estates, which had been seized by the dukes of Burgundy and Brabant. After many vicissitudes of fortune, Jacqueline was imprisoned at Ghent, escaped to Holland, repudiated her husband, made war on her own account, and finally ceded her estates to the duke of Burgundy to purchase the liberation of her new husband, Francis of Borselen. D. in 1436, without issue.

**Jacquemart'** ALBERT, b. at Paris in 1808; filled important financial posts under the French government, and took a leading part in the Universal Exposition of 1867, chiefly in regard to the processes of the arts applied to industry—a subject which he illustrated in his learned works, *Histoire antique industrielle et commerciale de la porcelaine* (Lyons, 1861-62), *Mémoires de la Céramique* (1866), and *Histoire de la Céramique* (1872), the latter of which has appeared in English under the title of *History of Ceramic Art*, translated by Mrs. Bury Palliser, with 1000 illustrations (London, 1873).

**Jacquemont'** VICTOR, b. in Paris Aug. 8, 1801; studied botany under Adrien de Jussieu, and after visiting the U. S. and the West Indies was appointed by the Museum of Natural History in Paris to conduct a scientific expedition in Eastern Asia. He arrived at Calcutta in 1829, travelled in British India, studying the native languages, crossed the Himalayas into Tibet, and reached Chinese Tartary, returning by Lahore, where Runjeet Singh showed him great favor. Jacquemont d. prematurely at Bombay Dec. 7, 1832. His correspondence and travels have been published, and are very interesting, as well as valuable for their wealth of scientific observation.

**Jacquerie', Insurrection of the,** a war of the French peasantry against the nobles which broke out May

12, 1358, during the imprisonment of John II. the Good in England. The oppressions of Charles the Bad of Navarre and the long and grinding tyranny of the nobles were the causes. For some three weeks the peasants were rapidly successful, and were guilty of every enormity. But on June 9 the count de Foix and Cardinal de Beaufort gave them a terrible and final overthrow at Meaux. The name "Jacquerie" signifies the "Jacks" or clowns.

**Jacques** AMÉDÉE FLORENT, b. at Paris July 1, 1815, studied at the Collège de Bourbon, and entered the *École Normale* in 1832. After teaching philosophy at the colleges of Douay, Amiens, Versailles, and that of Louis le Grand at Paris, M. Jacques became in 1842 professor of his favorite branch of study at the *École Normale*. He brought into intimate association with Michelet, Quinet, and the leaders of the "Young France" of that period, he was one of the founders and the chief editor of *La Liberté de Penser*, the organ of the philosophers. He conducted this publication through the stormy years of the Second Republic (1848-51), contributing many remarkable articles to its columns, until the *coup d'état* of Napoleon III. silenced free thought in France, when he was ejected from his professorship. He had published in 1847, along with his colleagues, Saisset and Jules Simon, a *Manuel de Philosophie*, edited the works of Fénelon and Leibnitz, and contributed to the *Dictionnaire des Sciences Philosophiques*. In 1852, M. Jacques went to Montevideo in the republic of Uruguay, bearing the recommendation of Alexander Humboldt, and was appointed by the government to preside over a projected university. But political disturbances and the limited resources of that state interfered with the success of the project, and M. Jacques was then engaged to direct the government land-surveys. After some years, during which he made numerous scientific explorations, M. Jacques removed to Buenos Ayres, where he was entrusted with the management of one of the national colleges, in which capacity he rendered eminent services to the cause of education, being universally esteemed for his profound attainments and his readiness to promote every scientific object. He was a member of the leading learned societies of France and of South America. D. at Buenos Ayres in 1869.

PORTER C. BEISS.

**Jacques-Cartier'**, county of Quebec, Canada, including the W. part of the island of Montreal. Cap. Pointe Claire. Pop. 11,179.

**Jacquin', von** (NICOLAS JOSEPH, BARON, b. at Leyden, Holland, Feb. 16, 1727; studied botany under Jussieu at Paris, and settled at Vienna, where in 1753 he was engaged to superintend the planting of the garden at Schönbrunn. Soon afterwards he undertook a voyage of several years' duration in tropical America, collecting rare species of plants, in which he was so fortunate as to discover about fifty new genera. Returning to Europe, the remainder of his long life was devoted to the publication of his numerous researches, and in lecturing upon botany and chemistry at the University of Vienna, at which place he d. Oct. 24, 1817. His son, Joseph Franz, succeeded him in his professional posts; b. 1767, d. 1839.

**Jade,** a hard green stone, highly prized in the East and by ancient races for ornaments. (See NEPHRITE, by PROF. W. P. BRACE, A. M., PH. D.)

**Ja'de,** or **Jahde,** a small river and also a bay in Germany S. W. of the mouth of the Weser. It formerly belonged to the grand duchy of Oldenburg, but was purchased by Prussia in 1866, for the purpose of forming a war port on the German Ocean. The Bay of Jade covers an area of 74 square miles, which was formerly dry land, but inundated in 1611. (See INUNDATIONS, MARINE.)

**Jade,** a fortified seaport of Germany, on the North Sea, was formed since 1836. At that time Prussia bought the coast district from Oldenburg for 500,000 thalers, and it has since spent much labor and great expense in order to transform the Bay of Jade into a good naval harbor. Since 1869 the place is called Wilhelmshaven. The largest basin the largest is 120 metres long and 260 metres deep, and has been dug in the muddy ground of the marsh. These basins were then separated from the Bay of Jade by a dam, and in the beginning of the war with France the harbor was finished and the harbor taken into use by the navy. On the western side of the principal basin there are two docks, 160 metres long, and 100 metres wide, and the basin as the basin are walled with granite. Besides the docks are the wharves. To the E. the bay is connected with the Bay of Jade by a canal with locks, and provided with sluices. Besides the naval harbor the commercial harbor, which, however, is rather insignificant; it is not walled, has no sluices, and is separated from the bay only by an earthen dam. The whole harbor is surrounded with fortifications, and is connected with the sea, and provided with all the conveniences of the best port.



ibre in order to prevent any hostile vessel from approaching. Since the French war immense sums have been spent on the building of these fortifications. The town of Wilhelmshaven has grown up here since the harbor has been built: it is chiefly a military colony, and has excellent barracks.

AUGUST NIEMANN.

**Jaen'**, in the times of the Moors, was an independent kingdom, but in 1234 it was conquered by Ferdinand III. and added to the kingdom of Castile. Now it forms a separate province of Spain. Area, 5184 square miles. Pop. 392,100. It is rich in metals and fertile, but thinly peopled.

**Jaen**, town of Spain, the capital of the province of Jaen, on the Jaen, a tributary of the Guadalquivir. Its walls, surmounted by turrets and pinnacles, and its castle, which still is used as a fortress, were built by the Moors. It has two cathedrals of the sixteenth century, and beautiful promenades, but its silk manufactures, which once made it famous, are now entirely lost. Pop. 22,933.

**Ja'fa, Yafa, or Joppa**, town of Asiatic Turkey, in the province of Syria, on the Mediterranean, 33 miles N. W. of Jerusalem. In the times of David and Solomon it was the port of Jerusalem, and the cedars of Lebanon of which the temple was built were brought from Tyre to its harbor. During the Crusades it was the landing-place of the Christian armies. Now its harbor is nearly sanded up. Pop. 5000.

**Jaffnapatam'**, town of Ceylon, situated on the northern extremity of the island. It was originally a Dutch settlement, but most of the Dutch inhabitants have now left for Batavia. Pop. 8000.

**Jaffrey**, post-tp. of Cheshire co., N. H., 46 miles W. S. W. of Concord. It has two principal post-villages, Jaffrey and East Jaffrey. The latter is on the Monadnock R. R., has a national bank and a savings bank, and manufactures of cotton drillings, shoes, wooden ware, boxes, etc. Jaffrey Village has a high school and manufactures of chairs, leather, etc. The town has 4 churches and contains the Grand Monadnock Mountains. Pop. 1256.

**Jaffrey** (GEORGE), b. at New Castle, N. H., Nov. 22, 1682; graduated at Harvard College 1702; became successively councillor, judge, treasurer, and chief-justice of New Hampshire. D. at Portsmouth May 8, 1749.

**Jaganatha**. See JAGGERNAUT.

**Jagell'ons**, the name of a dynasty which reigned from the fourteenth to the seventeenth century in Poland, and during much of the time in Lithuania, Hungary, and Bohemia. The founder of the family was Jagellon or Jagiello, b. about 1354, grand duke of Lithuania, who was a pagan until his marriage (Feb. 17, 1386) with Hedwig, daughter of Louis the Great, king of Poland and Hungary. To this alliance Jagellon owed his election to the throne of Poland as successor to his father-in-law, under the name of Ladislas II. (Uladaslas or Wladislas). The sovereigns of this dynasty were the most illustrious of Polish rulers. Sigismund Augustus, who d. in 1572, was the last Jagellon king of Poland in direct succession, but through the female line the family retained the throne until the abdication of John Casimir in 1668. Most of the existing royal houses of Europe (1875) are descended from the Jagellons.

**Jä'ger** (GUSTAV), b. at Leipsic July 12, 1808; studied at Dresden, Munich, and Rome; settled in 1837 at Munich, but removed in 1847, as director of the academy, to Leipsic, where he d. Apr. 29, 1871. His fresco paintings in Munich and Weimar are his principal works.

**Jä'gerndorff**, town of Austria, in the province of Silesia. It has four well-frequented cattle-fairs. P. 6618.

**Jag'gar** (THOMAS AUGUSTUS), D. D., b. in New York City June 2, 1839; was educated by a private tutor; graduated at the General Theological Seminary of the Episcopal Church; was ordained deacon in 1860 and presbyter in 1863; became rector of Trinity, Bergen Point, in 1862, of Anthon Memorial church, New York, in 1864, of St. John's, Yonkers, in 1868 (founding there the St. John's Riverside Hospital), and of Holy Trinity in Philadelphia in 1870. He was made a doctor of divinity by the University of Pennsylvania in 1874; was elected bishop of Southern Ohio Jan. 14, 1875, and was consecrated to that office in May, 1875.

**Jaggernaut', or Puri**, town of Orissa, on the Bay of Bengal, in lat. 19° 45' N. and lon. 85° 54' E. It is an agreeable and healthy place, as the air is kept fresh by the south-western monsoon. Its name is a corruption of the Sanskrit word *Jaganatha*, "king of the world," which it received from an idol of Krishna, the lord of the universe, which it possesses—a wooden block in the shape of a cucumber, whose upper extremity represents a human face of utter hideousness. Around this idol has been erected a

most magnificent temple, or rather a city of temples, and hundreds of thousands of pilgrims visit the place every year. On great days of festival the idol is placed on a huge chariot, to which the faithful harness themselves in order to draw the idol from one place to another, and in the enthusiasm of the moment—we are told—they sometimes throw themselves under the wheels of the chariot. The gorgeousness and the peculiar beauty of this temple of Jaganatha are described as something unique, and, to increase the wonderfulness of the place, all columns, pinnacles, turrets, and other architectural ornaments are made of the most costly materials and have required centuries of labor to be worked out. Pop. 19,825.

**Jag'gery** [Hind. *jākri*; Prakrit, *sakkara*; Lat. *saccharum*; Eng. *sugar*], the sugar obtained in India from various palm trees, notably the cocoanut palm (*Cocos nucifera*), the toddy palm (*Phoenix sylvestris*), and the jaggery palm (*Caryota urens*). The tapping of the trees and the boiling of the sap are carried on by a special caste. The quality of the sugar is very poor, but its quantity is becoming very great, and it is now exported to England, and there refined more easily and cheaply than ordinary sugar. After refining the sugar is identical with cane and beet-root sugar. The *Nipa fruticans* is another valuable sugar-palm.

**Ja'guar** [Braz. *jagouara*], the largest of the cat family of America, found from Texas to Patagonia, generally inhabiting forests by preference, and being quite arboreal in its habits. It is exceeded in size by the lion and tiger. Its hide is often of a rich yellow, spotted and ringed with black. The skins are of considerable commercial value. The animal is fierce, and can conquer all the beasts of its native wilds except the great boar of the Brazilian *seton*.

**Jahn** (FRIEDRICH LUDWIG), generally known under the name of *Turnvater Jahn*, b. Aug. 11, 1778, at Lantz, in the Prussian province of Brandenburg; studied theology at Halle and Göttingen; lived for some time as tutor in a private family at Greifswald, where he made the acquaintance of E. M. Arndt; went in 1805 to Jena to continue his studies, but preferred to enlist in the Prussian army as a soldier. After the battle of Jena, in which he did not partake, however, he fled to Lübeck, but returned in 1809 to Berlin, where he became teacher in a gymnasium in 1810, published his *Das Deutsche Volkthum*, and opened the first turn-establishment in 1811. His ideas of preparing a tremendous uprising of the German nation by a return to the old, genuine German civilization of the times of Hermann, and by a perfect physical training, were utterly fantastic, and his language, costume, and general behavior ludicrously eccentric. But his "turn-art" was, nevertheless, a good thing. It formed immediately numerous centres around which the German patriotism gathered and developed, and later it exercised a salutary influence on the whole system of education. In the war of 1814 he commanded a corps of volunteers, at the head of which he entered Paris, and in the same year he published his *Runenblätter*. But after the war the "turn-places" became the field of demagogical machinations and riots, and in 1818 Jahn was seized by the Prussian government and imprisoned. In 1825 he was liberated, but not allowed to reside in any university town. He settled in Freiburg; became more and more fantastic and eccentric; wrote *Neue Runenblätter* (1828), and *Merken zum Deutschen Volkthum* (1833); was elected a member of the national assembly of 1848, but his appearance here was only a great disappointment to himself and to his former turn-pupils, who loved him passionately. D. at Freiburg Oct. 15, 1852. In 1816 he published, together with Eiselen, *Die Deutsche Turnkunst*. A biography of him was written in 1855 by Pröhle. CLEMENS PETERSEN.

**Jahn** (JOHANN), b. at Taswitz, Moravia, June 18, 1750; studied at Znaim and at Olmutz, and in 1772 entered a convent at Bruck, where he soon became professor of Oriental languages and of biblical criticism. When (in 1784) this convent was suppressed, Jahn obtained a professorship first at Olmutz, and afterward at Vienna, where he also gave instruction in dogmatic theology. Jahn was the most distinguished representative in his time of Roman Catholic learning and criticism, and his numerous works enjoyed a well-merited reputation. He nevertheless incurred the disfavor of the ecclesiastical authorities for the boldness of some of his opinions, and in 1803 was separated from his professorial chair under pretext of a promotion to a canonry of St. Stephen's. Jahn published grammars, lexicons, and elementary works on the Hebrew, Syriac, Chaldaic, and Arabic languages, an *Introduction to the Old Testament* (1792), *Biblical Archaeology* (5 vols., 1797-1805), a *Manual of General Hermeneutics* (1812), an edition of the Hebrew Bible (1806), and other works. His *Archæology* has been translated into English and reprinted in America. D. at Vienna Aug. 16, 1816.



**Jahn** (OTTO), b. at Kiel June 16, 1813; studied in his native city, at Leipzig, Berlin, and Copenhagen; travelled with a stipend from the Danish government in France and Italy; became professor of archæology at Greifswald in 1842, and at Leipzig in 1847. On account of his participation in the revolutionary movements of 1848 and 1849 he was dismissed in 1850, but received in 1855 a chair in ancient literature and archæology at Bonn. D. Sept. 9, 1869. Besides his editions of Latin authors, a number of essays on various philological and archæological subjects, especially on antique vases, he wrote a popular biography of Mozart (4 vols., 1866) and other papers relating to music.

**Jail.** The words *jail* and *prison* are employed in common usage with but little if any distinction of meaning, and even as applied in law are not infrequently used as synonymous terms. But *jail* had originally a somewhat different sense from *prison* in legal usage, and is sometimes employed technically at the present day with the same distinctive interpretation. In this special meaning it is a place for the confinement of persons arrested for debt or for the commission of minor offences and in the custody of the sheriff, or for the temporary confinement of witnesses or persons awaiting trial. A prison is, on the other hand, a place of permanent confinement and of punishment for crime. A jailer is at common law the servant or deputy of the sheriff of the county, and for any wrongful acts which the jailer commits in the performance of his duty the sheriff is responsible on ordinary principles of agency. Thus, if a person in custody be suffered to escape, the sheriff will be liable. (See *ESCAPE*.) (For the regulation of jails and the methods of prison management see *PRISON*, *PRISON DISCIPLINE*.) GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Jail Delivery, Commission of.** See *COURTS*.

**Jail Fever, a form of** *TYPHUS* (which see).

**Jai'nas**, a Hindu religious sect. There are not at the present time many Hindus professing the Jaina faith, as compared with those professing such creeds as the Vaishnava and Saiva, but the Jainas now in India are remarkable for their respectability, influence, and opulence as a class. They are chiefly to be met with in the N. and W. of the peninsula, although even in the S. groups of Jaina families are not uncommon. Whilst the characteristics of the Jaina religion are thoroughly well known, the date of the origin of the sect and the causes which led to its rise are hotly controverted points. The writer believes the true explanation to be as follows: It is generally allowed that Gotama Buddha (Sakyamuni) died at Gya in Southern Behar in 543 B.C. After this Buddhism quickly sprang up, and overran Hindustan. Brahminism itself was crushed and kept under for ten centuries by that ghastly religion of atheism, nihilism, and despair. But in the fifth century after Christ the old Vedic creed began to revive and Buddhism to fail. Ardent Buddhists noticed the change in the tide of Hindu opinion, and began to tremble at the consequences of a loss of prestige. The Brahmins were still numerous in the land, and the old reverence for their priestly character was regaining ground rapidly in the minds of the multitude. Caste, too, ignored as a religious institution by Buddhism, was beginning more and more to be regarded under its old aspect of an absolutely necessary institution for Hindus. So some of the shrewdest of the Buddhists determined on a compromise. They resolved to invent a religion which would unite in it several of the most important elements of Buddhism and of Brahminism. Thus, about the beginning of the sixth century A. D. Jaina doctrines began to be actively and successfully promulgated. Such, the writer believes, is the true history in brief of the origin of Jainism in India. The Jainas revered certain holy mortals who had, they held, acquired by practices of self-denial and mortification a station superior even to the gods worshipped by the Brahmins; and thus they conciliated the Buddhists. Gotama Buddha himself finds a place in Jaina mythology. On the other hand, the Jainas were extremely strict in avoiding the destruction of any animal life whatsoever, and they recognized caste; and thus they conciliated the Brahmins. In the matter of the Vedas, the Jainas tried to steer a middle course. Parts they rejected and parts they accepted as authority. For instance, those parts of the Vedas in which animal sacrifice is enjoined they treated without respect, and they refused to celebrate the *homa*, or burnt offering, lest insects crawling amongst the fuel, bred by the fermented butter, or falling into the fire, might be accidentally destroyed. But to the parts of the Vedas which could in any way be regarded as favorable to Brahminism the Jainas paid the greatest reverence, and frequently quoted in their discourses and writings. Besides, the Jainas, whilst doing homage to Buddhas, employed Brahmin priests in their service as the sole ministrants in their temples or *pośālas*.

The term *Jaina* is derived from the Sanskrit *Jina*, signifying "one who is a victor." The saints worshipped by the Jainas were *Jinas*—those who had conquered all human passions, desires, aspirations, and infirmities, and had attained to a state of perfect apathy. Such a saint was regarded as *Jagat prathā*, "lord of the world;" *Sarvajña*, "all wise;" *Kalkina karma*, "one to whom ceremonial acts were not requisite;" *Adhishwara*, "supreme lord;" and *Devādhipati*, "god of gods." He was one who had crossed the ocean of births (*Tathakara*), he was the possessor of a spiritual nature (*Kerati*), and he was venerated and worthy of all homage (*Arhat*). The Buddhists, though they had innumerable earthly Buddhas, confined their homage practically to seven; the Jainas venerated seventy-two saints. Twenty-four were of a past age, twenty-four of a present, and twenty-four were to come. The worship, however, of the last two of the "present" era, *Pāravanāth* and *Mahāvīra*, eclipsed the veneration paid to all other Jinas in Hindustan. As a whole, the Jinas appear to have possessed wonderful attributes. They were all beautiful of form; their bodies were all fragrant; their hair, always the same, curled gracefully; and their blood ran white in all their veins. They know no hunger or thirst, no infirmity or decay. "He can collect around him," says Wilson, describing the perfect Jina, "millions of beings—gods, men, and animals—in a comparatively small space; his voice is audible to a great distance; and his language, which is *Arddha Magadhi*, is intelligible to animals, men, and gods; the back of his head is surrounded with a halo of light brighter than the disk of the sun; and of an immense interval around him, wherever he moves, there is neither sickness nor enmity, storm nor dearth, neither plague-portents nor war." (H. H. Wilson, *Works*, vol. i. p. 289.) But in some points Jinas differed from each other—namely in color, size, and longevity. For example, some were represented as white, some red, some blue, some black, and a large number saffron. Then, as to the height and longevity of the Jinas, the first of the "present" era, *Rishabha*, was 500 poles tall, and lived 8,100,000 years; the last of that era had only the height of a man, and lived no longer than 40 years. From this fact the great Oriental scholar Colebrooke considered that probably of the Jinas the last two only were historical personages. Jaina legends, with reference to the decreasing longevity and stature of saints, are extremely similar to Buddhist accounts of their Buddhas. For instance, Gotama Buddha is supposed to have lived only 100 years, whilst his predecessor lived 20,000 years.

The Jainas were divided into laymen and clerics—viz. *Śrāvakas* and *Yatis*. The Yatis received alms from the Śrāvakas, who assembled in the Jaina temples to worship the *Tirtha Karas*, or perfected *Jinas*. It was the duty of Śrāvakas to be gentle, pious, honest, chaste, liberal, and, as far as they were able, to practise penitential acts, especially such as fasting at stated times from particular luxuries. In the temples they were enjoined to walk around the images, repeating certain humble salutations to all the saints, and especially to the saint whose image they were encircling. They were also exhorted to observe several stated festivals. The Yatis never actually officiated as priests. That was left to the Brahmins, whom Jainas acknowledged to be the orthodox priestly caste; thereby conciliating Hindus. But the Yatis either congregated together in semi-conventual establishments or engaged in several money-making pursuits. For instance, all over India, even at the present time, they enjoy the reputation of being capital jugglers, necromancers, palm-prophets, and magicians. Many of them are arrant knaves, and earn their livelihood by selling quack medicines and dabbling in alchemy. Others deal in merchandise, and many have been known to amass a good deal of wealth. But one and all, with very few exceptions, pride themselves on their extreme sanctity, and especially evince their holiness outwardly by the absurd length to which they ostentatiously carry their regard for life in all its phases. Wilson, the great authority on the subject of the Hindu sects, thus speaks of the Jaina Yatis: "According to the greater or less degree of sanctity to which they pretend are their seeming purity and outward precision, shown especially in their care of animal life; they carry a brush to sweep the ground before they tread upon it; never eat nor drink in the dark, lest they should inadvertently swallow an insect; and sometimes wear a thin cloth over their mouths, lest their breath should demolish some of the atomic ephemera that frolic in the sunbeams; they wear their hair cut short—strictly they should pluck it out by the roots; they profess continence and poverty, and pretend to observe frequent fasts and exercise profound abstraction."

There are two chief divisions of Jainas—namely, the *Digambaras* and the *Sarvāstivādas*. The Digambaras appear to be the larger as well as the more ancient division of the



two. Their name signifies "sky-clad" that is, naked. At the present time, however, they do not go about naked, but merely cast off their clothes during their meal-times. The Svetambaras are those who are "clad in white." Not only in matters of dress do these two divisions of Jains differ, but also in seven hundred points of doctrine and ceremonial observance, eighty-four of which are regarded as of paramount importance. For instance, Svetambaras adorn their images of saints with earrings, necklets, armlets, and tiaras of gold and precious stones—a practice which the Digambaras set their faces against. Svetambaras aver that there are twelve heavens under the rule of sixty-four Indras; the Digambaras assert that there are sixteen heavens and one hundred Indras. Svetambaras allow their Yatis to eat out of vessels; Digambaras use only the hand. Svetambaras make their ascetics carry about with them brushes, water-pots, etc., as essential insignia of their vocation; but Digambaras do not. Digambaras assert that no woman can enter *Nirvana*; the more glibly Svetambaras, however, hold the doctrine which, as Wilson humorously puts it, "admits the fair sex to the enjoyment of final annihilation." Besides these two great divisions of Jains, there exist several minor schisms, some of which date back to the very dawn of the faith. These are the sects of *Jamali* and of *Gosala*. The *Devnada* or southern sect of Jains sprang up in all probability about the seventh century after Christ. There is the *Mahavasthi* sect and the *Lompala*; which latter discard the use of images. The *Mula Sangis* dress in red, and use brushes of peacock's feathers, while the *Kashita Sangis* use yak-tail brushes and venerate wooden images. There are also the *Terah Panthis*, "followers of thirteen," and the *Bis Panthis*, "followers of twenty." It may here be remarked that the influence of the Digambaras seems to have been very powerful over Jaina art, as the majority of Jaina Buddhas are represented as stark naked. Buddhist Buddhas are nearly always well clothed. The *posālas*, or *maths*, of Jains are frequently of considerable architectural beauty. The humblest are so constructed as to be as roomy as possible, in order that the votaries, if numerous, may not be unnecessarily inconvenienced.

Jaina doctrines arrange themselves under nine *Tattvas*—namely, first principles, or necessary verities of the faith. Briefly they are—(1) *Jiva*, life; (2) *Ajiva*, lifeless; (3) *Punya*, good, or merit; (4) *Pāpa*, ill, or demerit; (5) *Araha*, source of acts; (6) *Samvara*, that by which acts are collected or impeded; (7) *Nirjara*, sin-destroying religious practice; (8) *Bandha*, association of life with acts; and (9) *Moksha*, final spiritual liberation from the bonds of action, exemption from the incidents of existence, and freedom from the necessity of being born again. We cannot in a brief space discuss the very vexed question as to the precise opinion held by the Jains as to this state of Moksha. Was simple liberation, ceaseless and boundless apathy, or utter annihilation the final goal of Jaina belief? Jains seem to have believed in the reality of elementary matter; in gods, demons, heaven, and hell; and, whatever else, at least in the final release of the vital sentient principle in man from all suffering. As time passed on, Jainism became, especially in parts of India, grossly corrupted, chiefly because probably of the influence the Brahmin priests must have gradually acquired over those for whom they ministered. For example, in Northern India the most vulgar and repulsive Saivism became gradually mixed up with the observances of Jaina worship. The Jains then began to worship Devi and Saraswati, and to erect the images of the *Bhairavas* and *Bhairavis*, the cruel attendants of *Siva* and *Kali*, in their temples.

In conclusion, a word or two may be said of Jaina literature. It consists of *Purānas*, histories, legends, books of prayer and ritual, and treatises on medicine, astronomy, arithmetic, and grammar. The chief *Purānas* were probably composed by Jina Sona Acharya in the tenth century after Christ. One of the greatest Jaina writers was Hemachandra, who may have flourished at the end of the twelfth century, about which time the *Kalpa Sutra* is believed to have been written. The earliest Jaina writing of any note cannot probably be assigned an earlier date than the beginning of the tenth century A. D. R. C. CALDWELL.

**Jakutsk.** See YAKUTSK.

**Jal** (AUGUSTE), b. at Lyons, France, Apr. 12, 1795, studied at the marine school at Brest, and formed at Lyons in Mar., 1815, a company of cadets who hastened to the defence of Paris against Napoleon on his return from Elba. He afterwards devoted himself to literary and artistic criticism, accompanied as newspaper correspondent the army which in 1830 conquered Algeria, and on his return was placed in charge of the archives of the ministry of marine. M. Jal made several journeys for discovering manuscripts in Italy, Greece, and Turkey, and wrote numerous works of art-criticism, naval and general history, archæology

(esp. *Archéologie Navale*, Paris, 1840, 2 vols.), and biography, of which the most important was the *Dictionnaire Critique de Biographie et d'Histoire*, a vast repository of documents and biographical materials intended to rectify and supplement all previous works of the kind. D. 1873.

**Jalabert** (CHARLES FRANÇOIS), b. at Nîmes in 1849; studied under Delaroche and in Italy, and exhibited in 1847 *Virgil reading his Georics to Juvenius*, which is now in the Luxembourg. Among his other pictures, *Romeo and Juliet* and *Rephael painting the Madonna di San Sisto* have become very popular.

**Jal'ap** (Sp. *Jalapá*, from a city of that name, or *Xalapá*, whence first imported in 1610), a cathartic drug, the dried root of *Eryopium purga* (*Iponoea Jalapa* of Hayne), natural order Convolvulaceæ. This is a climbing plant with large lilac-purple flowers, growing in the mountains above the city of Jalapa, state of Vera Cruz, Mexico. The root is turnip-shaped or radish-shaped, blackish without, gray within, varying in size from that of a walnut to that of a good-sized pear. It dries into a hard brittle mass, and is exported from Vera Cruz in large bags, either whole or cut into slices or pieces. Its active principle is a resin, consisting of a hard and a soft portion, both apparently equally effective medicinally. The percentage amount of the resin varies in different specimens, and since the worms that are apt to attack jalap do not touch this ingredient, worm-eaten roots contain more of it in proportion than the sound. Jalap is one of the milder of the drastic or actively irritating cathartics. It produces watery discharges, gripes, and in overdose may cause dangerous inflammation of the bowels. It is one of the most frequently used of this class of purgatives, but, like other drastics, is generally given in combination to reduce its harshness. The "compound jalap powder" is a mixture of jalap and cream of tartar. Jalap is an ingredient of the "compound cathartic pill" of the Pharmacopœia. EDWARD CURTIS.

**Jalapa**, city of Mexico, one of the two capitals of the state of Vera Cruz, is situated on the slopes of the Cordilleras at a height of 4500 feet above the sea, 60 miles N. W. of the port of Vera Cruz and 140 E. of the city of Mexico. Situated within a few miles of the snow-capped Orizaba and the peak of Perote, halfway between the *tierra caliente* of the sea-coast and the *tierra templada* of the central tableland, Jalapa enjoys one of the finest climates in the world. It is the residence of the wealthiest merchants, native and foreign, of Vera Cruz, with which city it will shortly be connected by a railway, now (1875) nearly completed. Jalapa is celebrated for the culture of its inhabitants and the beauty of its females; it is the native place of Presidents Santa Anna and Lerdo de Tejada, and has played a prominent part in Mexican politics. It was founded in the time of Cortes, who had extensive estates in the vicinity, and was occupied in 1847-48 by American troops, at which time a newspaper in English was printed there. The moistness of the climate is favorable to a superabundant vegetation; few spots in the world can more truly be called the botanist's paradise. Sugar-cane and tobacco are cultivated with great success, the silkworm is reared, wild honey, vanilla beans, and the jalap root are found in abundance in the forests. There are several cotton and cigar factories, tanneries and potteries, government buildings and fine educational institutions, with a bishopric and 3 newspapers. It is gradually becoming known as a delightful winter residence for American visitors. Pop. about 15,000. (See Rivera's *Historia de Jalapa*, 5 vols., 1870-71.)

**Jaley** (LÉON LOUIS NICOLAS), b. at Paris Jan. 27, 1802, being the son of an engraver of medals, by whom he was guided in the study of sculpture. Entering the École des Beaux Arts in 1820, he twice gained prizes for statuary. Returning in 1833 from a long sojourn in Rome, his works, exhibited in successive annual expositions, were much admired, and he was employed to execute commissions for the Museum of Luxembourg, the Chamber of Peers, the Opera Comique, the Museum of Versailles, and the Palace of Justice. He was a member of the Academy of Fine Arts and of the Institute. D. in 1866.

**Jalisco**, the most populous state of Mexico, is bounded by Sinaloa, Durango, Zacatecas, and Aguas Calientes on the N., Guanajuato and Michoacan on the E., Colima on the S., and the Pacific on the S. W. Area, about 50,000 square miles. Pop. 1,000,000. Jalisco was known as the kingdom of Nueva Galicia during the period of Spanish dominion, and was governed by the *audiencia* of Guadalajara as a province distinct from New Spain or Mexico. It was settled soon after the conquest of Mexico by Nuño de Guzman, and was explored by Cortés and Alvarado. It is traversed by the large river Toluolotan or Santiago, and includes the picturesque lake of Chapala and the volcano of Colima, 12,000 feet high. The surface is diversified by rugged mountains, with vast ravines or *barrancas*, the

river-beds sometimes lying between perpendicular walls of nearly 1000 feet in height. The climate varies according to situation, but is adapted to the cultivation of most tropical products, especially the sugar-cane. The harbors are not commodious. Chief towns, Guadalupe, Lazos, Zapotlan el Grande, and Tepic. Precious metals are abundant, but are mined upon a comparatively small scale. The inhabitants are in great part Indians of several distinct tribes.

**Jalna'**, town of Hindostan, in the dominion of the nizam, has a strongly built fort and some manufactures of silk, and produces large quantities of excellent vegetables. Pop. 10,000.

**Jamaica**, an island of the West Indies, one of the Great Antilles, belonging to England, and lying off the Bay of Honduras, between the Caribbean Sea and the Gulf of Mexico, between lat. 17° 40' and 18° 30' N., and between lon. 76° 15' and 78° 25' E., 90 miles S. of Cuba. Area, 4473 square miles. Pop. 506,154, of whom 13,101 are white, 101,346 mulattoes, and 391,707 black. The island is traversed from E. to W. by the Blue Mountains, from 7000 to 8000 feet high, which to the N. slope quite gently down towards the coast, while to the S. they present a range of wild and precipitous cliffs along the shore; they send a great number of small, rapid rivers down both sides, of which only one, the Black River, is navigable. The scenery is everywhere beautiful, the slopes of the mountains being covered with pimento groves or immense forests. The south-eastern part of the island is lower and more level, and here are the principal plains, which are mostly occupied with sugar-plantations. The climate of Jamaica is hot and unhealthy along the shores and in the depths of the valleys; yellow fever visits these regions every year. The rainy seasons occur in April and May, and in September, October, and November. They are generally preceded by a stagnation of the atmosphere which is very oppressive, and then ushered in by heavy thunderstorms and hurricanes. Earthquakes are also frequent, and have sometimes been very destructive, as, for instance, in 1692 and 1780. But at an elevation of 1500 feet the climate is healthful and very agreeable. It is so mild that coffee can be cultivated at an elevation of 5000 feet, and sugar, indigo, and other tropical plants flourish in the valleys. The forests are rich in bread-fruit trees, mahogany, and cedar; the principal palms are the cabbage-palm and the coconut tree. Of wild animals only the agoutis, iguanas, some species of monkeys, and alligators are numerous. But the domesticated animals of Europe, which have been introduced, thrive well. Since the emancipation of the slaves the productiveness of Jamaica has decreased, and it will probably take many years before the rich resources of this island become fully developed. The following table shows the development of the productiveness of the island, and the influence which the emancipation of the slaves exercised on it in 1833:

	Sugar, hogsheads	Rum, puncheons	Coffee, bags
1797	1109	28,746	7,669,133
1805	150,352	33,950	24,137,393
1818	121,755	32,329	23,329,156
1821	119,560	50,827	16,819,761
1832	98,086	44,887	19,845,010
1838	62,643	27,480	13,551,795
1844	34,444	14,641	7,148,775
1857	30,459	15,922	7,095,623

While the exportation decreases, the importation, particularly of food, increases. In 1870 the value of exports was £1,283,000, and the value of imports £1,340,000. Jamaica was discovered by Columbus May 3, 1494, and the first Spanish settlement was made there in 1509. In 1655 it was taken by the English, who retained it by the treaty of Madrid in 1670. In 1807 the slave-trade was abolished, and in 1833 the slaves were emancipated. The immediate results of this act were not good; several hundred sugar and coffee plantations were left without labor, and went to ruin, and in course of time the general agitation threatened a serious revolt in 1865, which was subdued with severity. Immediately after the emancipation was completed (Aug. 1, 1838) the planters associated and put down the wages to the very lowest, while they increased the rent which the negroes had to pay for their huts as much as possible. The result was that the negroes deserted the plantations and settled in the mountains. Chinese workmen were then imported, but without success. In 1846 the principles of free trade became victorious in the United Kingdom, and in the English sugar and coffee market free labor from Jamaica had to compete with slave labor from Cuba and Brazil. At last a series of bad harvests brought the miseries of the island to their culmination, and a wild race war began, which was put down by the English governor with great cruelty. Nevertheless, since the emancipation the various missions, for-

merly annoyed by the planters, have had free scope for their activity, and their exertions have been crowned with great success. Between the old slaves and masters grows up a new population of free citizens, through the agency of the missions and their schools. The island is divided into three counties; its capital is Kingston. It is governed by a captain-general, appointed by the Crown, and an assembly of 47 members, elected by the people.

CLIMENS PETERSEN.

**Jamaica**, post-v. of Queen's co., N. Y., on the Long Island, South Side, and Brooklyn Central R. Rs., 10 miles E. of New York. It has extensive farming and market-gardening interests, and manufactures of carriages and small wares. Many of its citizens do business in New York and Brooklyn. It has 6 churches, an academy and good public and private schools, gasworks, a public library, a savings bank, 4 weekly newspapers, a fire department, and fine public buildings. The township contains several other villages, has 8 churches, and considerable manufactures. Pop. 3791; of tp. 7745.

JOHN O'DONNELL, Ed. "JAMAICA STANDARD."

**Jamaica**, post-v. and tp. of Windham co., Vt., 18 miles E. of Manchester, has a national bank and manufactures of leather, boots, shoes, chairs, etc. Pop. 1223.

**Jamaica**, post-tp. of Middlesex co., Va. Pop. 1298.

**Jamaica Plain**, post-v., formerly in the town of West Roxbury, Norfolk co., Mass., but now, with the rest of that town, included in the 17th ward of Boston. It is on the Boston and Providence R. R., 3 miles from the city proper, to which it was united Jan. 1, 1874. The ward has 11 churches, a savings bank, public library, a weekly newspaper, 2 rubber-mills, 2 carriage-factories, a paid fire department, fire-alarm telegraph, and is connected by horse railroad with the city proper. Most of the inhabitants do business in Boston. C. A. J. FARRAR, Ed. "WEST ROXBURY GAZETTE."

**Jamalti'ca**, an ancient city of Honduras, 20 miles N. of Comayagua, now consisting of ruins similar in character to those of Copan. Many rectangular mounds, like the Mexican *teocallis*, are surmounted by the remains of edifices, and throughout the adjacent valley fragments of sculpture and well-painted vases are found.

**James**, county of Nebraska, organized since the census of 1870.

**James**, county of East Tennessee, having the Tennessee River on the N. W. and Georgia on the S. Area, about 200 square miles. It has a fertile soil, well adapted to grain. It is traversed by the East Tennessee Virginia and Georgia R. R. Cap. Oakewah. It has been organized since the census of 1870.

**James**, tp. of Bibb co., Ala. Pop. 859.

**James**, tp. of Pottawattamie co., Ia. Pop. 309.

**James**, tp. of Stone co., Mo. Pop. 447.

**James**, the son of Zebedee [Lat. *Jacobus*; Gr. *Ἰάκωβος*], called the GREATER, one of the twelve apostles, and brother of John. He was a fisherman on the Lake of Galilee when called to follow Jesus, and with Peter and John formed a group distinguished from the other apostles by being the chosen witnesses of several of the chief incidents in the ministry of Christ. Such were the transfiguration, the restoration to life of Jairus's daughter, and the agony at Gethsemane. James and John, with their mother Salome, appear at one time to have entertained false views of the nature of Christ's kingdom, and to have aspired to a sort of primacy, which was rebuked by Jesus; who on another occasion gave the brothers the appellation of Boanerges ("sons of thunder"), perhaps at the time when they rashly invoked fire from heaven upon a Samaritan village (Mark iii. 17; see also Luke ix. 52). James was the first martyr among the twelve, having been killed by the sword of King Herod Agrippa, A. D. 44 (Acts xii. 1). He is commemorated in the calendar of saints by the Roman Catholic Church on the 25th of July, and by the Eastern Church on the 24th of October. Under the name of SANTIAGO (St. James de COMPOSTELLA) he was venerated from an early day in Spain as the patron of the kingdom.

**James**, the son of Alphaeus, called the LESS, one of the twelve apostles. His mother's name was Mary (Matt. xxvii. 56; Mark xv. 40), who is called (John xix. 25) "the wife of Cleophas," and is referred to in the same verse as "sister" of Mary, the mother of Jesus. Whether this James is the same as "James the Lord's brother" spoken of by Paul in Gal. i. 19, has been much discussed, but the title of *apostle* given to him in the passage in question seems decisive. Nevertheless, this view involves grave difficulties, and Dr. Neander (quoted in McClintock & Strong's *Cyclopedia*, vol. iv. 751) pronounces this question to be "the most difficult in the apostolic history." Assuming the affirmative answer, the most consistent solution of the apparent discrepancies



in the New Testament references seems to be that advocated in a learned article in the *Cyclopaedia* last quoted above—namely, that the two Marys, the mothers of Jesus and of James, are called *sisters* in John xix. 25 by virtue of their marriage with two brothers, Joseph and Cleophas. If, then, Cleophas (otherwise Alphaeus) had died without issue, it became the duty of Joseph, according to the law found in Deut. xvi. 5) to marry his brother's widow, and the eldest son by such marriage would be the legal representative of Cleophas or Alphaeus, whose name he would bear. James the Less became the head of the Church at Jerusalem, and (according to the above theory) wrote the Epistle known by his name. Early Christian writers (as Hegesippus) give him the name of James the Just, and a well-known passage of Josephus (*Antiquities*, xv. 2, 1) describes his martyrdom, to which he attributes the downfall of the Jewish power; but most critics reject this account as an interpolation. Nothing, therefore, can be affirmed of the life of James posterior to the scriptural references. Several apocryphal writings have been attributed to James, of which one only, the *Pseudoangelum*, derives some importance from having been early known in the Church. It is a mere parody of the first two chapters of Luke, transferring, however, the events to the nativity of Mary. From this source the modern doctrine of the immaculate conception of the Virgin Mary appears to have been ultimately derived.

**James, Epistle of**, one of the canonical books of the New Testament, the first of the so-called catholic Epistles. It is ascribed to "James, the Lord's brother," who is generally identified with JAMES THE LESS (which see), though many commentators contend that he was distinct from both the apostles bearing the same name. The Epistle is believed by the majority of critics to have been written several years before the destruction of Jerusalem by the head of the Jewish Church, and addressed to the Christians of Asia Minor. The style is elegant, and the Greek better than that of any other portion of the New Testament. The "doctrine of works," which forms its chief topic, has occasioned more controversy upon this Epistle than upon almost any other book of the canon, it being regarded by some as irreconcilable with Paul's doctrine of faith. Though Luther and his immediate followers rejected this Epistle, modern Protestants think it represents faithfully the practical teaching of Christ, and find many analogies with the Sermon on the Mount. The distinctive doctrines of Christianity are not alluded to, except by implication. The literature of the subject, which is very extensive, is reviewed by Prof. Berschlag in *Studien und Kritiken*, Jan., 1874.

**James I.** of Great Britain (VI. of Scotland), b. at Edinburgh Castle June 19, 1566, was the only son of Mary, queen of Scots, by her second husband, Henry Stuart, Lord Darnley. In the following year, soon after Darnley was assassinated (Feb. 10), Mary was abducted by Bothwell, whom she married May 15; was imprisoned at Lochleven Castle in June by her insurgent nobles, and forced to resign the crown July 24 to the infant James, who was accordingly crowned at Stirling on July 29. During the stormy years of James's childhood, passed at Stirling Castle, the regency was successively in the hands of the powerful nobles the earls of Murray, Lennox, Mar, and Morton, until, on the overthrow of the latter in 1577, James nominally took the government into his own hands, which was confirmed by Parliament in 1578. His early education had been carefully directed by the famous historian and classical scholar George Buchanan, from whom he probably derived a taste for learning which degenerated into a ridiculous pedantry. Earl Morton regained power for a short time, but was beheaded in 1581 on a charge of complicity in the murder of Darnley, after which Arran and the French favorite whom James had created duke of Lennox ruled until Aug., 1582, when a party of the nobles seized the king at Ruthven Castle, imprisoned Lennox, and banished Arran. The civil war and court intrigues went on with a wearying iteration of similar events for several years, during which James made a treaty with Elizabeth, receiving from her a pension (1585), unsuccessfully interceded for his mother's life (1587), co-operated with England in preparations against the Spanish Armada (1588), went to Denmark, where he married the princess Anne (Nov. 24, 1589), carried on war with varying success against several Catholic lords from 1590 to 1597, and by the death of Elizabeth in 1603 succeeded to the throne of England, being proclaimed Mar. 24 and crowned at Westminster July 25. He presided at the Hampton Court Conferences in Jan., 1604; exiled Jesuits and seminary priests; assumed the title of "king of Great Britain, France, and Ireland" Oct. 24, 1604; discovered the "Gunpowder Plot" Nov. 5, 1605; instituted the order of baronets in 1611; and lavished honors upon the unworthy favorites by whom he was directed, such as Carr, made earl of Somerset in 1613, and Villiers, raised

through all the stages of the peerage, from baron in 1610 to duke of Buckingham in 1623. His son Henry, prince of Wales, died in 1612; his daughter Elizabeth, from whom the house of Hanover descended, was married in 1613 to the elector palatine, who became king of Bohemia, but lost his estates in 1620, at the outbreak of the Thirty Years' war, through the failure of James to render his promised assistance. Great efforts were made by James to obtain the alliance of Spain through the marriage of Prince Charles with a Spanish princess, and on the failure of negotiations in 1624, declared war against that power, but d. shortly after at the palace of Theobalds Mar. 27, 1625. The reign of James in England was distinguished by many memorable events; it witnessed the literary and political careers of Bacon and Raleigh, the disgrace of both, and execution of the latter; the dramatic activity of Shakespeare and Ben Jonson; the translation of the English Bible; the colonization of Virginia and New England; the formation of two well-defined schools of English Protestantism; and the genesis of the struggle between king and commons which brought the head of his successor to the block. James was despicable in his personal qualities; was weak, cowardly, passionate, vindictive, cruel, superstitious, fanatical, and prone to fall under the influence of worthless favorites. His learning was varied, though not scholarly; he published several books, which were much praised by his flatterers, but have now only an historical interest; *Essays of a Preceptor in the Divine Art of Poetry* (1584), *Demologies* (1597), *True Law of Free Monarchies* (1598), *Basiliikon Doron* (1599), *Trochilus Nodis Triplex Caneus* (1605), *Remonstrance for the Right of Kings* (1615), and *Counterblast to Tobacco* (1616). (See S. R. Gardiner's able histories of this reign, 1875.) PORTER C. BLISS.

**James II.** of Great Britain, a son of Charles I., b. in London Oct. 15, 1633; became duke of York; escaped in 1648 from the Parliamentarians and fled to the Low Countries; served with distinction under Turenne and Condé; was appointed by Mazarin captain-general in Italy 1656, in which year he entered the Spanish service and fought against Turenne; was appointed in 1660 lord high admiral of England and lord warden of the Cinque Ports; married Anne Hyde, daughter of Lord Clarendon, 1660; commanded against the Dutch 1665-72; avowed himself a Roman Catholic 1669; married Mary of Este 1673; retired to the Low Countries during the unsuccessful agitation for excluding him from the throne; as lord high commissioner for Scotland persecuted the Covenanters 1679, and succeeded Charles II. 1685. The great events of his reign were the insurrections of Argyle and Monmouth (1685); the persistent attempts of the king to overthrow constitutional government and to establish arbitrary royal power and the Roman Catholic religion; the declaration of freedom of conscience as a means to that end; the violation of the privileges of the universities; the imprisonment of the bishops for petitioning to be excused from reading a royal proclamation; the establishment of new and illegal tribunals; and the maintenance of a standing army without legal warrant. The whole nation became aroused; William, prince of Orange, a cousin of the king, and Mary, princess of Orange, the king's eldest daughter, were called by common consent to the throne; James abdicated Dec. 11, 1688, and fled to France, but in 1689 invaded Ireland, besieged Londonderry without success, and July 1, 1690, was defeated at the Boyne; retired to France, and spent the rest of his life in futile schemes for restoration to the throne. D. at St. Germain's Sept. 16, 1701.

**James I.** of Scotland, son of Robert III., b. in 1394 at Dunfermline; was captured by the English while on his way to France 1406, and imprisoned in the Tower and in Windsor Castle, and wrote the *King's Quhair* and other poems while in confinement; went in 1417 to France with Henry V.; married Joanna Beaufort, granddaughter of John of Gaunt, 1424; was liberated, proclaimed king, and crowned at Scone 1424; restored order to Scotland, and used so much rigor towards the turbulent nobles that he was murdered by their emissaries at Perth Feb. 21, 1437. James was celebrated for his courtly graces, his literary accomplishments, and his excellence in athletic exercises.

**James II.** of Scotland, son of James I. and Queen Joanna Beaufort, b. in 1430, was crowned at Edinburgh when but six years of age (1437). During his minority the kingdom was distracted by struggles for power between his tutors Crichton and Livingston and the "house of Douglas," represented by three successive earls of that title. James assumed the government in 1444; made war with England 1448; married Mary of Gueldres 1449; murdered William, eighth earl of Douglas, with his own hand 1452; defeated a powerful insurrection headed by the ninth earl; made a treaty with Henry VI. of England in 1459, by which he acquired the counties of Durham and Northumberland, in



consideration of supporting the house of Lancaster in the "war of the Roses," and was killed by the bursting of a gun at the siege of Roxburgh, Aug. 3, 1460.

**James III.** of Scotland, son of James II. and Queen Mary of Gueldres, b. June 1, 1452, was crowned at Kelso monastery on his father's death (1460). The government, after the death of the queen mother (1463) and of Bishop Kennedy (1466), fell into the hands of the Boyd family, one of whom married the king's sister in 1467, and was at the same time created earl of Arran. Henry VI. of England had taken refuge in Scotland in 1461, and involved the Scotch in the war of the Roses, which led to a league between Edward IV., the new Yorkist king, and the earls of Douglas and Ross and the Lord of the Isles for the partition of Scotland, but the plan proved abortive, and in 1464 a fifteen years' truce was concluded. James married the princess Margaret of Denmark in 1469, thereby acquiring the Orkney and Shetland islands, dismissed the Boyds from power the same year, and came under the influence of the Hamiltons; experienced several insurrections; imprisoned on a charge of witchcraft his brother, the earl of Mar, who soon died (1480); maintained a war with another brother, the earl of Albany, who laid claim to the crown and was supported by Edward IV.; was besieged in Edinburgh Castle, and reconciled to his brother (1482); had to wage another war against the nobles, who had placed at their head his son, Prince James (1487), and was either killed in battle or murdered thereafter at Sanchie, near Bannockburn, in June, 1488.

**James IV.** of Scotland, son of James III. and Margaret of Denmark, b. Mar. 17, 1472; joined the rebellious nobles against his father in 1487; was crowned at Scone in June, 1488; suppressed an insurrection headed by Lords Forbes and Lyle 1489; favored the impostor Perkin Warbeck, whom he received at his court as king of England (1492), on whose behalf he made war upon England (1496-97), but finally concluded a truce for seven years, and in 1503 married Margaret, daughter of the English king, Henry VII. In 1513 he took offence at a supposed insult from his brother-in-law, Henry VIII., invaded England, and was defeated and slain at Flodden Field, Sept. 9, 1513.

**James V.** of Scotland, son of James IV. and Margaret of England, b. at Linlithgow Apr. 10, 1512; succeeded to the throne under his mother's regency Sept. 9, 1513; assumed the government 1528; married Madeleine of France 1537, and on her death Mary of Lorraine, daughter of the duke of Guise, 1538; met with signal defeat from the English at Solway Moss Nov. 25, 1542; d. at Falkland Palace Dec. 14, 1542, and was succeeded by his infant daughter, Mary, queen of Scots.

**James** CHARLES T., A. M., b. at West Greenwich, R. I., in 1804; studied mechanics while working as a carpenter, and became an expert constructor of machinery for cotton-mills, of which he erected many in New England and the Middle and Southern States. He was U. S. Senator from Rhode Island 1851-57, after which time he devoted himself to inventing firearms, and was killed at Sag Harbor, L. I., Oct. 17, 1862, by the bursting of a shell.

**James Francis Edward Stuart**, b. in London June 10, 1688, being the son of King James II. by Queen Mary of Modena, and natural heir to the throne. In the year of his birth James II. was driven from power, and the rights of the infant prince were ignored by his sisters Mary and Anne, who successively occupied the throne. The exiled family found hospitable asylum at the court of Louis XIV., who, on the death of the ex-king, immediately recognized the prince as king of Great Britain under the title of James III. In 1708, Prince James sailed from Dunkirk in a French fleet, intending to effect a landing in Scotland, but did not execute that intention. Under the name *quercus* of the "chevalier of St. George the youthful Pretender" (as he was called in England) took part in the French campaigns of 1708-09 against the English in Flanders, for which reason Parliament set a price of 100,000 crowns upon his head. The prince's sister, Anne, designed to restore him to the order of succession, and numerous statesmen of England, among whom were Bolingbroke and Bishop Atterbury, favored his cause, but his refusal to renounce Catholicism was fatal to his prospects. In 1715 the Pretender was invited to Scotland by the earl of Mar, landed at Peterhead in December, passed through Aberdeen, made a public entry into Dundee, and occupied the royal palace at Scone. The enterprise, however, failed ignominiously, and the next month the Pretender retreated to France. The remainder of his life was passed chiefly in Italy, he having married in 1719 a princess Sobieski of Poland, by whom he had a son, Charles Edward, b. 1720, the "Young Pretender" of 1745. Prince James, after his second failure, declined to make any further armed attempt upon the throne of Britain, ceding his rights to his son when the latter reached

maturity; he passed his closing years in pious retirement at Rome, where he d. Jan. 2, 1766.

**James** (GEORGE PAYNE RAINFORD), b. in London, England, in 1801, became in early life, partly through the advice of Washington Irving, a writer of romances; was historiographer of England under William IV.; became British consul at Norfolk, Va., in 1852; British consul for the Austrian ports 1856; d. at Venice 1860. Of his many novels and other works, which once had great popularity, the best are *Richard* (1825), *Darcelly* (1830), *Memoirs of Great Commanders* (1832), *Life and Times of Louis XIV.* (1838).

**James** (SIR HENRY), F. R. S., b. at Rose-in-Vale, near St. Agnes, Cornwall, in 1803; was educated at the Royal Military Academy at Woolwich; entered the army as lieutenant of engineers; became colonel in 1857, and major-general in 1868. After directing the geological survey of Ireland (1844), and the admiralty engineering works at Portsmouth (1846), he was appointed in 1852 superintendent of the ordnance survey of the United Kingdom, and in 1857 chief of the topographical and statistical departments of the war office. He was knighted in 1860. Sir Henry is principally known for his successful efforts to introduce various applications of photography into the service of the exact sciences. As early as 1855 he reduced the ordnance maps by photography; in 1860 he availed himself of the experiments of M. Poitevin, of Mr. J. W. Osborne of Melbourne, and of Mr. Asser of Amsterdam for applying the new processes of PHOTOLITHOGRAPHY (see that article) to the reproduction of improved ordnance surveys. Gen. James has since invented a modification of this process, known as photozincography, and by its means has made a complete fac-simile in 32 volumes of the celebrated *Domesday Book*, as well as of other rare and ancient manuscripts. The principal writings of Gen. James have been *On the Figures, Dimensions, and Mean Specific Gravity of the Earth, as derived from the Ordnance Triangometrical Survey of Great Britain* (in *Philos. Trans.*, 1856); *Ordnance Survey in Ireland* (1855), *in Scotland* (1861), *in England and Wales* (1861); *On Photozincography and other Photographic Processes* (1862); *Account of the Principal Triangulation of the United Kingdom* (1864); and *Record of the Expedition to Abyssinia* (1870).

**James** (HENRY), b. at Albany, N. Y., June 3, 1811. When twelve years of age he suffered amputation of a leg in consequence of an accident. He studied in Union College and Princeton Theological Seminary; went to Europe, where he acquired Sandemanian and afterwards Swedenborgian views. He resides at Cambridge, Mass., and has published *What is the State?* (1845), *Letter to a Swedenborgian* (1847), *Moralism and Christianity* (1852), *Lectures and Miscellaneous* (1852), *The Church of Christ* (1854), *The Nature of Evil* (1855), *Christianity the Logic of Creation* (1857), *Substance and Shadow* (1863), *The Secret of Swedenborg* (1869), and other works.

**James** (HORACE), A. M., b. at Medford, Mass., May 6, 1818; graduated at Yale 1840; studied divinity at New Haven; held pastorates (Congregational) in Wrentham and Worcester, Mass., 1843-63; chaplain 25th Massachusetts Infantry 1861-64; captain and A. Q. M. and commissioner of freedmen in North Carolina 1864-66; pastor of First church, Lowell, Mass., 1867-70; Second church, Greenwich, Conn., 1871; also, since 1867, one of the proprietors and editors of the *Congregationalist*. D. June 9, 1875.

**James** (JOHN ANGELL), b. at Blandford, Dorset, England, June 6, 1785, was educated at Gosport College, entered the ministry when seventeen years old, and was (1805-59) pastor of the Congregational chapel, Carr's lane, Birmingham; was an able preacher and writer, and exercised a wide influence in Europe and America by his numerous religious works, of which the best known are *The Anxious Inquirer* (1834), *Christian Fellowship*, and *Christian Professor*. D. at Birmingham Oct. 1, 1859.

**James** (ROBERT), M. D., b. at Kinverston, Staffordshire, England, in 1703; was educated at Oxford; practised as a physician at Sheffield, Lechfield, Birmingham, and London; published, with the aid of Dr. Samuel Johnson, a *Medical Dictionary* (3 vols. fol., London, 1743-45), and invented the celebrated fever-powder known by his name, now called antimonial powder, composed of oxide of antimony and phosphate of lime. "James's powder" was one of the earliest and most successful prototypes of the so-called *patent medicines* which have since acquired so great a vogue. D. 1776.

**James** (THOMAS), an English sea captain who in 1611 was sent by a company of merchants of Bristol to search for a N. W. passage. He explored Hudson Bay, and from him the southern portion is still called James's Bay. Capt. James reached lat. 65° 30' N., when his further progress being stopped by ice, he returned to England. In 1621 he



published a quarto volume entitled *The Steamp and Dangerous Voyage of Capt. Thomas James for the Discovery of a North-west Passage to the South Sea*.

**James** (THOMAS CHALKLEY), b. at Philadelphia in 1766; studied medicine at the University of Pennsylvania. After taking a trip to the Cape of Good Hope as surgeon, he studied at Edinburgh and London from 1790-93, and founded after his return a school of midwifery in Philadelphia; was physician at the Pennsylvania Hospital for twenty-five years, and professor of midwifery at the University of Pennsylvania from 1811 to 1834. He enjoyed a great reputation both as practitioner and as teacher. D. July 20, 1835.

**James Bayou**, post-tp. of Mississippi co., Mo. P. 361.

**James City**, county of the peninsula of Virginia, having James River on the S., York River on the N., and the Chickahominy on the S. W. It is undulating, and has a soil adapted to raising grain and garden products. Area, 184 square miles. Cap. Williamsburg. Pop. 4425.

**James Creek**, post-v. of Huntingdon co., Pa., on the Huntingdon and Broad Top R. R., 12 miles S. of Huntingdon. It derives its principal support from the mining of iron ore. H. B. BRUBAUGH, Ed., "WEEKLY PILGRIM."

**James Island**, one of the sea islands of Charleston co., S. C., having Charleston harbor and Ashley River on the N. The battle of Secessionville (June 11, 1863) and several other spirited engagements occurred upon this island during the late civil war. Pop. 1808.

**Jameson** (ANNA), b. at Dublin May 19, 1797, was the daughter of Mr. Murphy, an artist of merit; was married in 1823 to Robert Jameson, a barrister, from whom she soon separated. Her writings upon Christian art and archaeology are of a high order. D. Mar. 17, 1860. Her principal works are *Diary of an Enchantress* (1826), *Lives of the Poets* (1829), *Lives of Female Saints* (1831), *Characteristics of Women* (1832), *Beauties of the Court of Charles II.* (1833), *Visits and Sketches* (1834), *Tales and Miscellanies* (1838), *Studies and Rambles in Canada* (1838), *Pictures of Social Life in Germany* (1840), a translation of Waagen's *Rubens* (1840), *Handbook to the Public Galleries of Art* (1842), *Companion to Private Galleries* (1844), *Memories of Early Italian Painters* (1845), *Manners and Customs* (1846), *Sacred and Legendary Art* (1848), *Legends of the Monastic Orders* (1850), *Legends of the Madonna* (1852), *Concomitance Book* (1854), *Sisters of Charity, Catholic and Protestant* (1855), *The Communion of Labor* (1856).

**Jameson** (CHARLES DAVIS), b. at Gorham, Me., Feb. 24, 1827; removed to Oldtown at an early age, where he subsequently engaged in the lumber business, which he largely extended, and in 1861 was one of the most largely interested dealers in the State. A Democrat in politics, and a Douglas delegate to the Charleston convention in 1860, he volunteered his services in support of the national government on the outbreak of civil war, and was appointed colonel of the 2d Maine Vols., the first to leave the State, which he commanded at the first battle of Bull Run with distinction, leading to his appointment in September as brigadier-general of volunteers. In the Peninsular campaign in Virginia, 1862, he commanded a brigade with great ability, where he contracted the disease which terminated his life at Oldtown, Me., Nov. 6, 1862.

G. C. SIMMONS.

**Jameson** (JOHN ALEXANDER), LL.D., b. at Irasburg, Vt., Jan. 25, 1824; graduated at the University of Vermont in 1846; was tutor there 1850-53, after which he removed to Illinois; practised law, and became in 1865 judge of superior court in Chicago. He has published several legal works.

**Jameson** (ROBERT), b. at Leith July 11, 1771; was educated for the medical profession at the University of Edinburgh, but, devoting himself entirely to natural history, explored the Scottish islands as a mineralogist, and published his discoveries in two volumes in 1798 and 1800. Dr. Jameson then studied for two years at Freiberg, under the celebrated Werner, whose geological theories he warmly espoused, and taught for many years from the chair of natural history in Edinburgh University, to which he was elected in 1804, having even founded a Wernerian Society. Later in life he abandoned his favorite dogmas as untenable, and adopted instead those of Hutton. He wrote a *System of Mineralogy* (3 vols., 1804-08), which has passed through many editions; a *Manual of Mineralogy* (1821); numerous papers published by the scientific societies to which he belonged; edited the geological department of the *Encyclopædia Britannica* (4th ed., 1819 seq.); founded in 1819, and conducted through life, the *Edinburgh New Philosophical Journal*; and assisted Sir D. Brewster and Hugh Murray in the preparation of many scientific treatises of a popular character. D. at Edinburgh Apr. 19, 1854.

**Jame'sone** (GEORGE), b. at Aberdeen, Scotland, in 1586; went to Antwerp in 1616, and studied painting under Rubens. Vandyck was his fellow-pupil, and Jamesone has been called the "Vandyck of Scotland" from the delicacy, softness, and clearness of his coloring, though somewhat deficient in vigor. Charles I. sat to Jamesone in 1633, and he was largely patronized by the Scotch nobility, of whom numerous portraits by this artist are preserved. D. at Edinburgh in 1644.

**James'port**, post-v. of Riverhead tp., Suffolk co., N. Y., on the Long Island R. R., 78 miles E. of New York, and on Great Peconic Bay. Pop. 323.

**James River** of Virginia, one of the noblest of American rivers, is formed in Alleghany co., by the union of the Jackson and Cowpasture rivers. It passes through the Blue Ridge, and pursues a devious course as far as Scottsville, whence its direction is about E. S. E. At Richmond it falls 100 feet in 6 miles, affording a grand water-power. Above this point the JAMES RIVER AND KANAWHA CANAL (which see) extends, following the course of the river, and embracing extensive reaches of which as slack-water navigation to Buchanan, 196 miles. The tide comes up to the Rocketts, just below Richmond. This is the head of navigation for steamboats and schooners of 130 tons. Shipping of the first class comes up to City Point, 40 miles below, at the mouth of the Appomattox. Below City Point the river is a broad, deep, and never-failing tidal estuary, 66 miles long, and inferior to the lower Columbia and the Potomac only among the rivers of the U. S. in the majesty of its flow. The James River, with the Elizabeth and the Nansemond, flows into Chesapeake Bay through Hampton Roads, the grandest harbor upon our Atlantic coast. The entire length from Covington, Va., to Old Point Comfort is some 450 miles.

**James River**, tp. of Buckingham co., Va. Pop. 3023.

**James River and Kanawha Canal.** This route is a project contemplating, besides the existing canal, a continuous line of water-communication from the waters of the Ohio River, at the mouth of the Kanawha River, W. Va., to the waters of the Chesapeake Bay and the Atlantic Ocean at the mouth of the James River. The idea of a water-communication between the valley of the Ohio River and the valley of the James River has for its author no less a distinguished person than George Washington himself, though it is popularly supposed to have originated with Gen. Spotswood, when on Aug. 20, 1716, he set out from Williamsburg on his expedition over the Blue Ridge. Upon the conclusion of the Revolutionary war, Gen. Washington was so impressed with the importance of a water-line across the Alleghanies that during the year 1784 he made a personal exploration of the country, travelling for that purpose many hundreds of miles. It was largely owing to his influence and instrumentality that the legislature of Virginia, on Jan. 5, 1785, passed "an act for clearing and improving the navigation of the James River." By this act the first or old James River Company was incorporated. This company was organized Aug. 25, 1785, and on the next day Gen. Washington was elected its first president, which position he held for some years. Several amendatory acts have since been passed; and the present company was incorporated in May, 1832, and organized in 1835. This company commenced the construction of the present canal from Richmond to Lynchburg in 1836, and the work was completed about Dec. 1, 1840. The part known as the second division of the canal, extending from Lynchburg to Buchanan, was commenced in the mean time, and completed in Nov., 1851. An extension of 47 miles to Covington on Jackson River, a few miles above the junction of Cowpasture River, was commenced in 1853, but remains yet incomplete. As the "central water-line" this route comes prominently before the public as one of the four or five great lines of transportation by which the products of the great West may reach the sea. This, indeed, was a fundamental idea from the beginning, and as early as 1826-28, Capt. McNeil of the U. S. engineers surveyed passages of the Alleghanies and the western extreme *via* the Greenbrier, New, and Great Kanawha rivers, and found a location by which the summit was surmounted at a level 1916 feet above tide by a tunnel 2.6 miles long. In 1868, Mr. E. Lorraine, then the engineer of the company, advised the adoption of a new location, which was about the same as Capt. McNeil's, except that it pierced the mountains by a tunnel about (estimated) 9 miles in length, and reduced the elevation of the summit-level to 1700 feet, thereby saving  $3\frac{1}{2}$  miles in actual length of canal, and 201 of equated length, considering the saving of time in lockages and cost of working and repairs. The creation by this route of a central water-line involved, besides the mere connection with the great fluvial navigation-system of the Mississippi Valley, an enlargement of the actually constructed portions

of this line. Hence the project involves: 1st, the enlargement of the existing canal from Richmond to Buchanan; 2d, the construction of the protected and definitely located portion of the canal from Buchanan to the mouth of Fork Run; 3d, the construction of the canal up Fork Run to the summit level, 1700 feet above tide, under the Tuckahoe and Katus mountains, by a tunnel 7 miles long, and thence down the valley of Howard's Creek to the Greenbrier River; 4th, the slack-water improvement of the Greenbrier, New, and Kanawha rivers to Paint Creek Shoals (with occasional short canals to avoid expensive location of dams); 5th, the open sluice dam improvement of the Kanawha River from the Paint Creek Shoals to its junction with the Ohio River.

This project was submitted Jan., 1874, by the secretary of war to a board of engineers consisting of Mr. B. H. Latrobe, civil engineer, and J. G. Barnard, Q. A. Gillmore, W. P. Craighead, G. Weitzel, officers of U. S. engineers, who reported favorably as to practicability. Further surveys were suggested, however, before the definite location of the tunnel and the fixing of the plans of utilizing the Greenbrier and New rivers as parts of the line. It is probable that these surveys will, besides determining an improved location of the great tunnel, result in showing that an "independent canal," instead of a "lock-and-dam" navigation, must be resorted to along the Greenbrier and New rivers. The board estimated the cost at \$60,000,000. (*See En. Doc.*, 219, H. R. 1st sess. 43d Cong.; also *Annual Report of Chief of Engineers* for 1874.) J. G. BARNARD.

**James's Bay**, the southern part of Hudson's Bay, lat. 51° 55' N., lon. 79° 52' 30' W. It was named from Capt. Thomas James, who wintered here in 1631-32 while attempting to find the N. W. passage. It abounds in shoals and islands. On its S. shores there are extensive marshy plains.

**James's Creek**, tp. of Marion co., Ark. Pop. 183.

**James'town**, post-v. of Clinton co., Ill. Pop. 120.

**Jamestown**, post-v. of Boone co., Ind., on the Indianapolis Bloomington and Western R. R., 28 miles N. W. of Indianapolis, has 3 churches, an academy, 6 benevolent societies and lodges, 22 stores, 2 flouring-mills, 4 manufactories, and a weekly newspaper. It is in a fertile grain-region. Pop. 603. FRANCIS B. RASE, Ed. "COMMERCIAL."

**Jamestown**, tp. of Steuben co., Ind. Pop. 779.

**Jamestown**, tp. of Howard co., Ia. Pop. 312.

**Jamestown**, post-v., cap. of Russell co., Ky., 5 miles from Horseshoe Bottom, on Cumberland River. Pop. 138.

**Jamestown**, post-tp. of Ottawa co., Mich. Pop. 1612.

**Jamestown**, tp. of Blue Earth co., Minn. Pop. 234.

**Jamestown**, post-v. of Chautauqua co., N. Y., on the Atlantic and Great Western R. R., 2½ miles from the Dunkirk Allegheny Valley and Pittsburgh R. R. It is on the outlet of Chautauqua Lake, on which three steamboats ply hence to Mayville. The outlet affords constant and extensive water-power, which is well utilized. It has 10 churches, 2 weekly and 2 daily newspapers, 3 national banks, a union school with a fine building and a collegiate department, extensive manufactories of alpaca goods and woolsens, 3 of chairs and 3 of furniture, 4 saw and 2 grist mills, 3 furnaces, 5 large hotels, besides many smaller manufactories and numerous stores. Manufacturing is the chief pursuit, and dairy business is extensively carried on in the vicinity. Pop. 5336. D. H. WATKIN, Ed. "JOURNAL."

**Jamestown**, post-tp. of Guilford co., N. C. Pop. 1539.

**Jamestown**, tp. of McDowell co., N. C. Pop. 412.

**Jamestown**, post-v. of Silver Creek tp., Greene co., O., 10 miles from Xenia. Pop. 322.

**Jamestown**, post-b. of Mercer co., Pa., at the junction of the Erie and Pittsburgh with the Ashbtubula and Oil City branch of the Lake Shore R. R., 36 miles from Lake Erie, has 2 banking-houses, a seminary, 2 hotels, a newspaper, 5 churches, 1 foundry, 1 machine-shop, 1 flouring and 2 planing mills, shops, large stores, etc. Pop. 572.

D. L. CALKINS, Ed. "SEN."

**Jamestown**, post-tp. of Newport co., R. I., consisting of the island of CANONET (which see), in Narragansett Bay. Pop. 578.

**Jamestown**, post-v., cap. of Fentress co., Tenn., on the Cumberland Mountain, 13 miles W. of Clinton, a station on the Knoxville and Kentucky R. R.

**Jamestown**, tp. of James City co., Va. It was the first permanent English settlement within the limits of the U. S.; was founded in 1607 on a peninsula 32 miles from the mouth of James River, Va.; it has now become an island by the action of the current, which has carried away a portion of the site of the ancient town. Only the ruins of the church, the fort, and of two or three houses mark the spot which was first occupied by the celebrated band of 107

colonists under Wingfield, Christopher Newport, and Bartholomew Gosnold. Entering the Chesapeake with three vessels Apr. 26, they sailed up the river, to which they gave the name of the reigning sovereign, and on May 13 began to build the town, which also bore his name. Great privations were suffered during the first season, and the settlers were largely indebted for their preservation to the energy and talents of the famous Capt. John Smith, who explored the neighboring country, was captured by the Indians, and saved by the intervention of Pocahontas, conciliated the savage chieftains, and obtained from them supplies of provisions. *See SMITH, JOHN.* A second company of colonists arrived in 1608, a still larger number under Sir Thomas Gates and Sir George Somers in 1609, the charter governor, Lord Delaware, arrived with reinforcements in 1610, Sir Thomas Dale brought 300 settlers and some cattle in the same year, and in 1611, Sir Thomas Gates brought still another company of 350. By this time other settlements began to be made. Jamestown soon became the capital of an extensive colony, and in 1619 (June 29) a house of burgesses, the first legislative assembly ever convened in British America, met here. In the same year 1200 new settlers arrived, and a Dutch trading-vessel brought to Jamestown 20 negroes, who were sold as slaves. After the seat of government was removed to Williamsburg, Jamestown began to decline; it was burned by Nathaniel Bacon during the rebellion of 1676, and never rebuilt. It was the scene of an engagement between the forces of Wayne and those of Lord Cornwallis in 1781. Pop. of tp. 1038.

**Jamestown**, post-tp. of Grant co., Wis. Pop. 1114.

**James'ville**, post-v. of Dewitt tp., Onondaga co., N. Y., on the Syracuse Binghamton and New York R. R., has 3 churches and a number of manufactories. Pop. 402.

**Jamesville** (MIDDLE GROVE P. O.), a v. of Greenfield tp., Saratoga co., N. Y. It has 2 paper mills, and is 9 miles from Ballston.

**Jamesville**, post-v. of Martin co., N. C., on the Roanoke River. Pop. 150; of tp. 2530.

**Ja'mi** (ABDERRAHMAN-BEN-AHMED), one of the most celebrated of the Persian poets, b. early in the fifteenth century at Jami in Khorassan, from which place he derived the name by which he is best known. Jami belonged to the mystical school of poetry, was a favorite with two or three of the sultans of Herat, where he resided and taught, and wrote a large number of learned works in prose and verse, some of which have been so fortunate as to be translated or edited by recent European scholars. D. about 1492.

**Ja'mieson** (JOHN), D. D., b. in Glasgow Mar. 3, 1759; was educated at the university of that city; became a minister of the Secession Church in Forfar, and was called to Edinburgh in 1797. Besides many theological treatises and several poems, he published a valuable *Etymological Dictionary of the Scottish Language* (1808-09, 2 vols.) and *Supplement* (1825), and other smaller works of philology and belles-lettres. The doctorate of divinity was conferred upon him by Princeton College, N. J. D. in Edinburgh July 12, 1838.

**Janauscheck' (FANNY)**, b. in Prague, Bohemia, July 20, 1830; was brought up to the stage, and from an early age began to show a talent for tragic rôles, which she undertook, first at Cologne, then for many years (1848-60) at Frankfort, and later at Dresden and the principal theatres of Germany. Mlle. Janauscheck came to the U. S. in 1867, and acquired great popularity, though performing in German only. Returning to Germany in 1871, she devoted herself to the study of English, and in 1873 captivated the American public by successfully representing in English the most difficult rôles of Shakspearian tragedy.

**Jane Lew**, post-tp. of Lewis co., W. Va. Pop. 2174.

**James** (EDMUND STORER), b. in Sheffield, Mass., Apr. 27, 1807. His family early removed with him to Salisbury, Conn. Having received the usual common-school education of Connecticut, he spent about six years (1824-30) in teaching. He studied law during three of these years, and was about to begin its practice when his father died—an event which led to a change of his whole life. He joined the Methodist itinerant ministry, taking his first appointment in the Philadelphia conference in 1830. He rose rapidly in his new work, and occupied important positions in the Philadelphia and New York conferences till 1840, when he was elected financial secretary of the American Bible Society, in which office he distinguished himself by extraordinary energy and success. In 1844 he was elected bishop of the Methodist Episcopal Church. He has been preeminent for his episcopal labors and travels, and has contributed much to the remarkable success of his denomination during the period of his episcopate. He resided (1870) in New York. D. in New York City Sept. 18, 1876.

**James'ville**, post tp. of Lassen co., Cal., in Honey



Lake Valley, 12 miles from Susanville, the county-seat. Pop. 441.

**Janesville**, tp. of Greenwood co., Kan. Pop. 259.

**Janesville**, post-v. of Waseca co., Minn., on the Winona and St. Peter R. R., 116 miles W. of Winona, in the "Big Woods;" has 2 flour and 3 saw mills, 1 chair and 2 steam stove factories, 3 hotels, 3 churches, a weekly newspaper, and a graded school. It is in a fine wheat-region. Pop. of tp. 947. C. E. GRAHAM, Ed. "ARGUS."

**Janesville**, city, cap. of Rock co., Wis., on both sides of Rock River, and on the Chicago and North-western and the Milwaukee and St. Paul R. R., 70 miles W. S. W. of Milwaukee; has a daily, a monthly, a semi-weekly, and 3 weekly periodicals, 7 churches, a very large reaper-factory, machine-shops, fine public schools, and a very large water-power, utilized to a great degree. Boots, shoes, carriages, etc., are among the manufactures. The town, which is well built, is the seat of the State institute for the blind, and has excellent musical schools, 2 national and 1 savings bank, and fine hotels. The breeding and dealing in horses is an important interest. Pop. 8789; of tp., excluding part of the city, 926. A. H. SEYVOIR, "GAZETTE."

**Janet-Lange'** (ANTOINE LOUIS), b. in Paris Nov. 19, 1818; studied painting under Collin, Ingres, and Horace Vernet, adopting the style of the latter, with whom he was associated in producing a series of designs illustrating the history of Napoleon I. He was from about 1846 the artistic editor of *L'Illustration Française*, and successfully executed many battle-pieces. D. at Paris Nov. 23, 1872.

**Janet'** (PAUL), b. in Paris Apr. 30, 1823; was educated at the École Normale, graduating as doctor in letters in 1848; taught philosophy at Bourges and Strasburg; was appointed professor of logic in 1857 at the lyceum of Louis-le-Grand, of history of philosophy at the Sorbonne in 1864; and was chosen member of the Institute in the same year. M. Janet is a leading representative of modern French philosophy, his doctrine being a reconciliation of the official system of Cousin with that entire liberty of research demanded by the most recent scientific school of psychology. His writings are numerous and learned.

**Jane'way** (JACOB J.), D. D., b. in New York City in 1776; graduated at Columbia College in 1794; was ordained a minister of the Presbyterian Church in Philadelphia in 1799; was for some time president of the Western Theological Seminary at Allegheny City; afterwards settled at New Brunswick, N. J., as pastor of the Reformed (Dutch) church and vice-president of Rutgers College. Dr. Jane'way was one of the early promoters of Princeton Theological Seminary, of which he was for forty years a director. He wrote several esteemed theological works, among which are the *Apostolic Age*, *Exposition of the Acts and of the Epistles to the Romans and the Hebrews*, *Internal Evidence of the Bible*, and *The Abrahamic Covenant*. D. at New Brunswick June 27, 1858.

**Janin'** (JULES GABRIEL), b. at St. Etienne, Loire, France, Dec. 24, 1804; was educated at the college of Louis-le-Grand, Paris; became a private tutor in the Quartier Latin, and finally became a journalist, feuilletonist, editor, novelist, and critic. He was at one time connected with *Figaro*, and afterwards with the *Quotidienne*; was one of the founders of the *Revue de Paris* and the *Journal des Enfants*. D. June 20, 1874.

**Ja'nina**, or **Joánnina**, town of European Turkey, capital of the eyalet of the same name (the ancient province of Epirus). It has important manufactures of morocco, leather, silk goods, and gold-lace. On the opposite shore of the Lake of Janina, which has received its name from the town, lay the ancient *Dodona* with its famous temple. Pop. 25,000, mostly Greeks and Jews.

**Jan'izaries** [Turk., "new troops"], a former corps of Turkish foot-soldiers, first organized in 1329 by Orkhan from young Christian captives, who were compelled to embrace Mohammedanism. For more than three centuries the corps was forcibly recruited from Christian subjects, though many Turks voluntarily joined it on account of the privileges it enjoyed. The Janizaries at first numbered 1000; in 1362, Amurath I. increased them to 10,000, and in the seventeenth century there were about 100,000 of them serving in the line, besides nearly 400,000 Jamaks, or irregular troops, attached to the corps. The number of regular Janizaries was afterwards much reduced. Endowed by Amurath I. with remarkable privileges, they became at one time virtual masters of the empire. In 1512 they deposed Bajazet II.; they procured the death of Amurath III. in 1595, of Osman II. in 1622, of Mustapha I. in 1623, of Ibrahim in 1649; deposed Mustapha II. in 1703, Achmet III. in 1720; slew Selim III. in 1807; deposed Mustapha IV. in 1808. In 1826, Mahmoud II., displaying the banner of the Prophet, led the rest of his army to the attack

of the Janizaries. The latter were defeated, 8000 of them were burned in their barracks, and some 15,000 were killed in the streets. Their defence was brave, but fruitless. Over 20,000 were banished during the next few months, and the force was formally dissolved. This force, long the terror of Europe, and under Solymán the Magnificent the best infantry in the world, had so changed as to be terrible only to its own masters and to society at home, and its final overthrow was a blessing to Turkey.

**Jankovacz'**, town of Austria, in the Temesvar banat, has 10,076 inhabitants, mostly engaged in agriculture. Much wheat, oats, and wine is produced.

**Jan May'en's Land**, an island in the Arctic Ocean, situated between Iceland and Spitzbergen, in lat. 70° 29' N. and lon. 7° 31' W. It is volcanic. Both its two highest points, Beerenberg, 6640 feet high, and Esk, 1500 feet high, are occasionally active. It was discovered in 1611 by a Dutch navigator, after whom it is named.

**Jan'ney** (SAMUEL M.), a philanthropist and Hicksite Friend, b. in Loudon co., Va., Jan. 11, 1801. He has published *The Country Schoolhouse* (poem, 1825), *Conversations on Religious Subjects* (1835), *Historical Sketch of the Christian Church* (1847), *Life of Penn* (1852), *Life of Fox* (1855), *History of the Friends* (4 vols., 1867), and other works, both in prose and verse. In 1869 he was appointed one of the superintendents of Indian affairs by Pres. Grant.

**Jan'sen**, or **Jansenius** (CORNELIUS), b. at Acquoi, near Leerdam, Holland, Oct. 28, 1585, of humble parentage; received a classical education at the University of Utrecht; studied Catholic theology at Louvain in Flanders; went to Paris in 1604 or 1605, where he formed a close intimacy with Jean Duvergier de Hauranne, afterwards abbot of St. Cyran, whom he accompanied to Bayonne, becoming the head of a college recently founded there. In 1617, Jansen returned to Louvain; was made principal of a college, and subsequently, in 1630, professor of scriptural interpretation. At Louvain, Jansen speedily became (1621) the chief exponent of a system of doctrine which after his death received the name of **JANSENISM** (which see), and became famous in the religious annals of Christendom; but during his life he was chiefly remarkable for polemics and contests, not altogether devoid of worldly rivalry, with the Jesuits, whom he succeeded in expelling from their position as teachers of philosophy in the university. In connection with this quarrel Jansen twice went to Spain (in 1624 and 1625), where he obtained the favor of the Spanish monarch, then the sovereign of Flanders. In 1635 he published a work entitled *Mars Gallicus*, in defence of the rights of Spain against France in the then impending war, and was rewarded by the bishopric of Ypres, at which place he d. of the plague, May 6, 1638. The last ten years of his life were devoted to the preparation of the work by which he is best known to posterity—an exposition of the doctrine of St. Augustine upon grace, free-will, and predestination—which was published at Louvain as a posthumous production in 1640 under the title *Augustinus, seu Doctrina Augustini de Humana Nature Sanitate, Egritudine et Medicinis, adversus Pelagianos et Massilienses*, and was reprinted at Paris (1641) and at Rouen (1643). PORTER C. BLISS.

**Jan'senism**, the name of a school in the French Church, so called from Cornelius Jansen, who flourished in the early part of the seventeenth century. It represents a controversy the most important occurring in the Romish Church since the Reformation—a controversy which began not with Jansen, but which, existing in its elements and showing tokens of itself at intervals from the time of Augustine, broke out more openly near the middle of the sixteenth century, and continued for a century and a half to agitate the Romish Church; arraying the Augustinians, Dominicans, and the liberals of the Gallican Church on the one side, and the Jesuits, Franciscans, and Ultramontanes on the other. It arose from the difficulty of harmonizing Augustine's doctrine of grace with the Romish and monkish scheme of work-righteousness, and had manifested itself even in the times of the ancient Church. But in 1567 a defence of Augustine by Michael Baius, professor at Louvain, was assailed by the Franciscans and Jesuits, and through their instigation seventy-six propositions gathered from it were condemned by Pius V. as heretical, and Baius was compelled to abjure. In 1583 the agitation was renewed by Louis Molina, a Jesuit in Portugal, who published Semi-Pelagian views on the doctrines in controversy, for which he was assailed by the Dominicans, but defended by the whole Jesuit order. In the following century this controversy culminated in the school of Jansen. A lecturer on Scripture, devout with a tinge of mysticism, addicted to patristic literature, and especially to the study of Augustine, he wrote a work, which was published after his

death, distinctly setting forth the doctrines of Augustine and Pelagius from their own writings, by which it appeared that certain honored scholastic writers and popes approached nearer the heretic than the saint. The Jesuits, alarmed, immediately assailed the work, and secured its prohibition by Pope Urban VIII. (1640). It found, however, many defenders, among whom, distinguished for learning and piety, were Jean Duvergier Hauranne, abbot of the Benedictine monastery of St. Cyran, and Anthony Arnauld, an able teacher in the Sorbonne. The latter soon became involved in an open controversy with the Jesuits, who persuaded Innocent X. to condemn five Jansenist theses as heretical and dangerous. The defenders of Jansenism did not assail the pope's decision, but denied that the theses condemned were found in his book in the sense in which they were condemned. Arnauld was now expelled from the Sorbonne at the instigation of the priests, and took refuge with his sister Angelica, abbess of the Cistercian nunnery of Port Royal, near Paris, a gifted and attractive woman, of gentle spirit and earnest and spiritual piety, and devoted to the monastic life. Through her influence Port Royal became eminently a centre of religious life and thought for France, and gathered at this time around itself a corps—living something in the manner of the old anchorites—of talented and devout young men, who admired Augustine, detested the lax morals of the Jesuits, and were enthusiastically devoted to the liberties of the Gallican Church. In sympathy with these men the profound, witty, and brilliant Blaise Pascal published in 1656 his celebrated *Provincial Letters*, in which, with authentic proofs and with equal earnestness, logic, and wit, he exposed the pernicious moral casuistries and theologic sophisms and infamous confessional of the Jesuits, to the derision and abhorrence of the French public. They avenged themselves by procuring a papal bull declaring that the propositions condemned were found in the sense in which they were condemned in the book of Jansenius. The Jansenists contended in reply that the pope, however rightly authoritative in matters of doctrine, was not infallible in decisions of questions of fact. But Louis XIV. and the pope insisted that all ecclesiastics, monks, and nuns should take the oath of acknowledgment of the bull and of condemnation of the Jansenist heresy (1665). Those refusing were banished, and though subsequently a milder subscription was allowed, the vengeance of the Jesuits pursued Port Royal till in 1709 the institution was abolished, its edifices demolished, and its very graves rifled. Meantime, the Jansenists, though in the Augustinian doctrines of grace in Calvinistic theology and in earnest spiritual piety, manifesting an affinity with the Protestant reform, were ever the more strenuous in repelling all suspicion of union with Protestants, denouncing them for persecution, and asserting their own loyalty to the Catholic Church.

A new measure of violence proceeding from the papal court, but instigated by French influence and the Jesuits, renewed the Jansenist controversy in 1713. This measure was directed against an edition of the New Testament published by Paschasius Quesnel, a man of learning and piety, and accompanying it with evangelical comment—a work much beloved by the people and approved by many bishops; among them commended by Cardinal Noailles, archbishop of Paris, with the approbation of Bossuet. The Jesuits, hating alike the Jansenist book and its commender, contrived to obtain, through the Jesuit confessor of the king, Père la Chaise, a bull from Clement XI.—the so-called constitution "Unigenitus"—condemning as heretical 101 propositions from Quesnel's book. The issuing of this bull, by which Augustine was virtually made a heretic, divided the French Church into two parts—the "Acceptants," or receivers of this "constitution," and the "Appellants," who appealed from it to a general council. Louis and the pope determined on its enforcement and the extermination of the Jansenists; but Louis died in the midst of the attempt. The death of Louis and the indifference of the regent, the profligate and brilliantly gifted duke of Orleans, gave the Appellants free scope for the time, and the bull of excommunication issued against them in 1718 was without effect. Subsequently, however, the duke, under the influence of the infamous Dubois, who sought a cardinal's hat, and afterwards Louis XV., under the instigation of his teacher, Cardinal Fleury, were led to persecute the Appellants and in every way to oppress them. Noailles was compelled to submit, and in 1730 the "constitution" was registered by Parliament as a law of the nation. Under these persistent persecutions a fanatic tendency manifested itself among the Jansenists. A young Jansenist clergyman, Francis, an abbé of Paris, died in 1727, a victim of voluntary penance, holding "appellation" documents in his hand. He was honored by his followers as a saint, and numerous miracles were reported to be effected at his tomb in the graveyard of Melanhus near Paris, which

became in consequence the resort of a multitude of pilgrims. These were wrought to a wild fanaticism, manifesting itself in convulsions and contortions of the body and in raving prophecies against the Church and State. The contagion seized on even the frivolous and unbelieving. In vain the government in 1732 walled up the churchyard; the earth stolen from the grave of the saint still wrought miracles and convulsions. Thousands of *convulsionnaires* were then thrown into prison, and the sacraments were refused to the dying who were not "acceptants" of the constitution. Under these severities Jansenism, which had passed from a theologic system to a popular fanaticism, gradually declined. The controversy meantime broke out afresh when the archbishop of Paris refused the sacrament to the dying regent as a non-acceptant; but peace was finally mediated by a mild letter of Benedict XIV. (1766).

Since then Jansenism has disappeared as a distinct school or sect in France, though it had many adherents down to the Revolution, and has left permanent results in the French mind, which it has largely imbued. It has propagated itself in a peculiar ecclesiastic organization in the Netherlands in the archbishopric of Utrecht, which embraces some twenty-five congregations, and has lately coalesced with the "Old Catholic" movement in Europe. The element of earnest spirituality in Jansenism has extended widely through various mystical writers and schools, and its freer ecclesiastic and theologic spirit has diffused itself as a liberalizing influence through the clergy of Italy, Germany, and the Gallican Church. T. M. POSE.

**Janssens** (ABRAHAM), b. at Antwerp in 1567 or 1569; was a pupil of the painter Jan Smellinck; studied in Italy, and enjoyed considerable reputation at Antwerp for his skill as a colorist, in which he rivalled Rubens. Many of Janssens' works are to be seen in the churches of Flanders and the galleries of Antwerp and Vienna. The torchlight scenes are especially famous. D. about 1631.

**Januarius**, SAINT, b. at Naples or Benevento Apr. 21, 272; was made bishop of Benevento about 303, and during the persecution by Diocletian was beheaded as a martyr at Pozzuoli Sept. 19, 305. Two phials filled with his blood were preserved, and the body was ultimately brought to Naples, where these relics are still shown in the church of Santa Chiara. St. Januarius is the patron saint of Naples. On his anniversary (Sept. 19) the relics are brought out, when the blood in the phials suddenly becomes liquid and bubbles up. This is of course esteemed a miracle by the populace, and claimed as such by the clergy, though it has never been formally sanctioned by the Church. Much speculation has been exercised in devising scientific hypotheses to account for the phenomena in question.

**January** [Lat. *Januarius*, from *Janus*, the god who presided over the origin of things], the first month of the year in the Gregorian calendar; according to Roman tradition, first added to the calendar by Numa, along with February. It had originally 29 days, to which two more were added by Julius Caesar when he reformed the computation of time. It corresponded in the Greek calendar to the latter half of Poseideon and the first half of Gamelion; was known by the Scandinavians as the month of Thor, and in the French Revolutionary calendar it formed part of *Nivose* and *Pluviose*. In England, January was made the first month of the year by act of Parliament of 1751.

**Janus** [for *Dianns*, from *dies*, "day"], and **Ja'na** [for *Diana*], two gods of ancient Rome, were originally personifications of the sun and moon. The name *Janus* is seldom seen, the form *Diana* being much more common. Janus was early identified with the Etruscan two-faced god. Hence *Janus Bifrons*, "the two-faced Janus," which Niebuhr thinks at first symbolized the union of the Romans and Sabines. Janus presided over the beginning of all things, and was one of the most important of the Roman divinities. There was a famous gateway containing a statue of Janus Bifrons, and leading from the Palatine to the Quirinal Hill. This passage was closed only in times when Rome was at peace with all nations. This closure occurred, we are told, but four times in all the Roman history. First it was closed in 494, B.C., next, at the end of the First Punic war; again in the days of Augustus Caesar; and lastly under Vespasian.

**Janvier** (JAYV), D. D., born Paterson, N.J., Apr. 29, 1846; was educated at Lafayette and Princeton. He was and Princeton Theological Seminary, went to India as a missionary of the Presbyterian Board in 1871. Served in Ladang in Northern India; soon acquired the Urdu language, and translated books on Hinduism into it. With Dr. Newton he compiled a Panjabi dictionary, printed in 1884, and pursued a career of energetic activity and usefulness until he was assassinated, Mar. 28, 1902, by a fanatic Sikh.



**Japan.** As the marvellous story of the empire of Japan may be traced through more than twenty-five centuries, all that can be done in a single article is to touch upon the more important points of its geography and history. Whilst we look with amazement upon the recent developments in that highly favored land of the Orient, we shall also find that there has always been something allied to the wonderful in its career, whether we consider its physical characteristics, its people, or its government.

This empire lies in the north-western part of the Pacific Ocean, and consists of four large islands and a great number of smaller ones. It is separated on the W. from Corea by a strait which is about 100 miles wide; at its north-western extremity is the island of Tisima, or "the Thousand Islands;" and at the N. is the island of Krafu or Saghalien, which has long been held jointly by the Japanese and Russian governments, but now, according to a recent agreement, is held by Russia alone. The largest of the islands which compose the empire is commonly called *Nippon* or *Nippon*—which name in reality belongs to the whole country—and contains about 95,000 square miles. The second is *Yesso*, with about 30,000 square miles; the third *Kiuaiu*, with 16,000 square miles; and the fourth is *Shikoku*, with an area of 10,000 square miles. The total length of the empire is 1600 English miles, its greatest breadth a little more than 200, the number of islands 3850, and the entire area is estimated at about 150,000 square miles—all these figures being gathered from the latest official statistics. The sea-coasts are generally bold and rocky, and indented with very numerous bays forming spacious and secure harbors. The poetical title by which the Japanese designate their country is "The Land of the Rising Sun," which well describes its location as the most eastern of all the Asiatic empires, and their national emblem represents the sun rising out of the sea. The theory that America was originally peopled by Japanese, who were driven by stress of weather across the Pacific Ocean, is not only interesting, but claimed by many to be sustained by historical facts and traditions. That much of what passes as authentic history among the Japanese is mythical cannot be questioned, but there seems to be no reason to question the truthfulness of the statements which, with the help of Japanese scholars, the present writer has been able to cull from their history.

The empire is partitioned into five *kies*, or departments, which surround the imperial capital, and eight *dis* or large divisions. The names of the former are *Yamato*, *Yamato*, *Kawachi*, *Idume*, and *Settsu*; while the latter, with the five *kies*, comprise 84 provinces, and the names of the *dis* are *Tokaido*, with 15 provinces; *Tosando*, with 13; *Ho-konaido*, with 7; *Saikaido*, with 8; *Sanagado*, with 8; *Nankaido*, with 6; *Saikaido*, with 9; and *Hokaido*, with 11 provinces. In the vicinity of Saikaido are also two islands, each of which constitutes a province. The divisions which in this country are called counties number 1315. In 1868 the empire was divided into 3 political departments, the first of which embraced three *foes*—*viz.* Saika, or the western capital; Tokei or Yedo, the eastern capital, and Osaka; the second consisted of 38 *kens*; and the third of 300 *hoes*.

Extending from one extremity of Japan to the other, across all its prominent islands, are mountains, many of them of volcanic origin and of great elevation. The highest of these, called Fusi-yama, is about 80 miles from Yedo, is 14,170 feet high, and has a summit covered with perpetual snow. It is an extinct volcano, the last eruption having taken place in 1707. There are also thirteen other lofty peaks, bearing the names of Tokiyama, or "Moon Mountains;" Olaki; Nagapuzan, or "Sunbeam Mountain;" Omime, or "Great Peak;" Sarayama, or "White Mountain;" Teteyama, or "Standing Mountain;" Kirisima, or "Fog Island;" Asozan; Tsukoobayama; Onsendaki, or "Hot Spring;" Asawayama; Toumimiyama; and Iwakeyama. The most extensive range, known as the Hakoni, attains an elevation of 6000 feet, and traverses the island of Nippon from E. to W. There are many volcanoes, and earthquakes are of frequent occurrence, but chiefly in the north-eastern parts. The mountains of Yesso rise to a height of 8000 feet, and a large part of the country is unexplored and covered with forests. The rivers of Japan are numerous, but short, on account of the mountains which send the waters in different directions. They are generally shallow, subject to great freshets during the rainy season, and their mouths are frequently obstructed by sandbars. The three largest are Torregawa, Sinanogawa, and Kisogawa; and next to these come Oyegawa, Fouzigawa, Sakagawa, and Okumagawa. The only fresh-water lake in the empire of any size or importance is near the city of Miako. It is 10 geographical miles wide and 55 miles long, and is called Biwako or Lake Omi. Small lakes or ponds abound, and hot springs are to be found in various parts of

the island of Nippon. The cities of Japan are numerous. Two of them have become famous because selected as capitals—Miako or Sankio, the western capital, and Tokei, commonly called Yedo, the eastern capital. The first, which has never been open to foreigners, lies in lat. 35° 00' N. and lon. 4° 10' W., and was the ancient seat of government, dating its origin from A. D. 794. It stands on a plain, is surrounded with mountains, and directly through the centre runs the river Kano, noted for the purity of its water. It contains 374,000 inhabitants, and, though small when compared with the modern capital, is a place of great interest. It is entered by six principal roads. Its streets are clean, its temples, which may be counted by the hundred, are beautiful, and its silk-factories have a wide reputation. The city of Tokei lies in lat. 35° 35' N. and lon. 139° 40' E. and in magnitude ranks next to Peking in China. In 1861 it claimed to have about 1,500,000 inhabitants, but the population is now considerably less. While it has decreased in numbers, it has increased in commerce. Its gardens and open spaces are numerous, and give it an air of comfort and freedom which is unusual. It is intersected by many canals, and its bridges are numerous. As the present capital and residence of the imperial court, it is the meeting-place of the national legislature, called a Parliament; it also has a well-endowed college, a governor and police force of 3000, is supplied with hospitals and asylums for infants and paupers, and by means of railroads and telegraph-lines is daily facilitating its communication with the entire country. It became an open port in 1869. The second largest city in Japan is Osaka, on the island of Nippon. It is both an open port and the one through which Miako communicates with the ocean, from which it is distant 33 miles. Its canals and bridges are very numerous, the latter often very handsome. It has an extensive trade, and is well fortified. The next city in size is Yokohama, and is the successful rival of an older place in the immediate vicinity known as Kanagawa. It is on the Bay of Yedo, 20 miles from the capital, and within the last few years has become the most important seaport in the empire. The harbor is spacious and secure, and is supplied with commodious piers, the accommodations being extensive, and the prevailing modes of living and of business giving to it the aspect of a port of the Western World. The next city of importance is Nagasaki, located on the island of Kiuaiu. Its harbor is very large and perfectly secure. This was the first port ever opened to foreigners in Japan, and a large trade has been carried on there by the merchants of China and of Holland, where they have for a long time been permitted to locate factories. The other principal cities of Japan are Negata, an open port, on the N. E. coast of Nippon; Kobe, also an open port, near Osaka; Hokodati, the open port of the island of Yesso; and Saki, formerly a place of importance and open to foreigners, but now holding no commercial intercourse with the outside world.

The climate of Japan is unequal, but as a general rule the central and most densely populated portion is mild and agreeable. In the extreme S., however, the heat is often oppressive, while in the island of Yesso the mercury occasionally sinks far below zero, and snow falls to a great depth on the mountains and in the valleys. The sun during the hottest days is much less debilitating than on the coast of China or in India, and as to the general conditions of salubrity, the empire is highly favored. The autumn is a kind of second summer, the months of October and November being the most pleasant and genial of the entire year, and amply compensating for the heat and frequent rains of May and June. A marked difference is said to exist between the climates of the eastern and western coasts of Nippon, the latter being much colder, and receiving a greater fall of snow, than the former; and this is attributed to the fact that on the E. there is a broad belt of warm water flowing constantly to the N. E., while the Japan Sea has a cold current constantly setting towards the S. W. from the Sea of Okhotsk. The month of September usually brings with it rough weather and those fearful hurricanes, called typhoons, which do the greatest damage along the eastern coast of the empire; and, as Japan is a land of earthquakes, it is said that they have had a palpable influence on the climate of the empire.

The most ancient name by which the empire was known was *Yamato Zima*, meaning "east of the mountains." Its present name is a corruption of *Jipunquo*, which is of Chinese origin, and means, as we have already stated, the "Country at the Root of the Sun," or the "Land of the Rising Sun," because, when so named, it was the most eastern in the known world; and Nippon, now used in Oriental countries, is the Chinese pronunciation of the same name. The true origin of its people is lost in tradition or fable—it is claimed that prior to the first emperor it had existed 2479 years—but it dates its chronological

history back to the year 667 before the Christian era. The first man of note connected with the empire of whom any thing is actually known was Zinmu, who, after a career of conquest, established himself at the foot of the volcanic mountain called Keresumi in the province of Fuga. From that point he extended his explorations and sway through the entire length of the Japanese territory, and is represented as civilizing the nation and reforming the existing laws and government. The credit is also awarded to him of having divided time into months and years, and in his person was vested the office of high priest, representative of Heaven, and emperor or mikado. He established his capital at Kasiwabara in Yamato, but the location of the capital was frequently changed by the succeeding emperors to the various provinces of Yamato, Omi, Setten, Nagato, and Kawadi, and after 1464 years from the time of Zinmu it was fixed at Saikio, or Miako, in the province of Yamaguchi; but after the revolution of 1867 it was located at Tokyo or Yedo. The total number of emperors who have reigned over Japan in an unbroken line is 124. From the earliest times down to the present they were called mikados, although for about 600 years the men who actually administered the government were called shiogouns or tycoons; and it was in the year 1867 that the mikado or tenno resumed his ancient privileges. To give a minute account of all the emperors and shiogouns of Japan, and of the deeds which characterized their several reigns, is quite impossible; all that can be done in these pages is to present a summary of the most distinguished persons of the empire, together with a passing notice of the more important events with which their names are associated. One fact which the reader should bear in mind is this—that the position of emperor of Japan has always been hereditary and his person venerated, and while many sovereigns may have been comparatively powerless, the line of descent has been unbroken. In the person of the mikado Zinmu, the founder of the line, vested the office of high priest, representative of Heaven, and emperor, and hence the modern idea of calling him the spiritual head of the nation. Another important fact to be remembered has reference to the title of shiogoun or tycoon. The possessors of this dignity were merely military chieftains who by intrigue or personal prowess acquired sway over the people. They belonged to various families, and the rivalries which naturally existed among them were the cause of the bitter wars which prevailed in Japan for hundreds of years. They never failed, with the people, to respect the office or position of the hereditary monarch, but while they wielded power they inspired fear rather than veneration. From the earliest period in the history of the empire mention is made of three things which necessarily appertained to the person who sat upon the throne—viz. a sword, a mirror, and a ball of crystal. These are known by the name of *Sanjoo no jinji*, and considered as symbols of the imperial power. The emperor Su-jin-tenno, who lived in B. C. 97, was the last ruler of Japan prior to the commencement of the Christian era. He built a Shinto temple in Issu, established an army over which he placed four generalissimos, ordered the first census of Nipon and Kiusiu, levied taxes for the purpose of building large ships, ordered the draining of lakes for irrigation, and was the first ruler to open intercourse with Corea. His successor was Sui-nin-tenno, who ascended the throne in A. D. 6. He acquired distinction by abolishing the barbarous custom which required that on the death of the emperor the empress and all her court should commit suicide by *hara-kiri*. Although the empress of Sui-nin came to a natural death, the highest of her lady attendants killed themselves by cutting their throats, and then the emperor decreed that this custom should also be abolished. This ruler devoted his attention to agriculture, and during his reign 800 canals and ponds were built in different parts of Japan for irrigation. The next man of note was Keko-tenno, who reigned between the years 71 and 130 A. D. After quelling obstinate rebellions in Kiusiu and the northern part of Nipon, he caused the arable lands of the empire to be surveyed, and, with a view of guarding against famine, caused the establishment of granaries in all the larger towns of the empire. The emperor Senmu-tenno reigned from A. D. 131 to 190, creating the office of daijin, the second position of honor and power in the realm; and the first dignitary of that rank who ever left Japan as an ambassador was Tomomi Iwakura, who visited America and Europe in the year 1872. Among the men who distinguished themselves during the reign of Senmu was Yamato Daki; he held the office of commander in chief of the army, and was called the "prince of warriors." His conquests extended as far as the island of Yesso; and because his wife Adzuma threw herself into the sea to appease a terrible storm, her name was given to the region of country which her husband had subdued. Chinai-tenno, who was the son of Yamato Daki, reigned for eight years, from A. D.

192 to 200, and the principal fact recorded of him was that he died from disappointment caused by being defeated in an expedition conducted by himself in person against the rebellion of a tributary prince of the empire named Kama-so of Kiusiu. The next ruler of Japan was an empress, Jingu Kogu, the wife of Chinai-tenno. She accompanied her husband in his unsuccessful expedition, and after his death assumed the reins of power. She distinguished herself by leading an invading army against the kingdom of Corea, compelling the inhabitants to give up their treasures and to promise an annual tribute to Japan. She had several children, one of whom became a very distinguished emperor. Her various conquests gave her a fame which surpassed all her predecessors, and her life and deeds of heroism are widely commemorated by the painters of Japan and in the popular literature of the country. Osin-tenno, the son of Jingu Kogu, ascended the throne in A. D. 270, and reigned about forty-three years. Although not born when his mother conquered Corea, the honor of that conquest has been given to him. In the second year of his reign the islands of Yesso and Saghalien voluntarily submitted to his rule, and three of the kingdoms of Corea continued to pay him an annual tribute. In 283 he brought a woman from Corea to teach his people the art of working in silk; in 284 an improved breed of horses was also introduced from the same country; in 285 a philosopher from China, named Wonin, introduced Chinese letters into Japan, from which time the works of Confucius became generally known; and in 300 from the wood of an old war-vessel a musical instrument called the *koto* was made, and has been in use down to the present time. In 306, Osin sent an embassy to China for the purpose of obtaining further information in regard to the production and the manufacture of silk. It is related of this emperor that, having been advised by the brother of his prime minister that the latter was conspiring against the throne, he caused them both to plunge their arms into boiling water, when, the ordeal proving favorable to the minister, the informer was executed. After his death the largest temples were erected to his memory, and he received the title of *hachimang*, or the "god of war," and his reign has always been looked upon with national pride by the Japanese. The next man of note was Jintoku-tenno. During his reign (313-399) extensive inundations led to the construction of dikes along the rivers, and rice-houses and mills for cleaning rice were for the first time built. He also sent an expedition to put down a rebellion in the island of Yesso. Lichu-tenno came to the throne in 400, and was the first to provide for the writing of a history of the empire, for which duty he appointed two scholars; and under the patronage of Yuriaku-tenno (479) mulberry trees were planted throughout the empire, and special attention was first given to the manufacture of silk. About this time also skillful carpenters were induced to immigrate from Corea, and an embassy was sent to that country to make certain collections of Chinese literature. The first event of importance connected with the era beginning with the year 500 was the introduction of the Buddhist religion into Japan, which was destined to take the place, to a great extent, of the Shinto religion and the moral instructions of Confucius. This occurred in 552, when an embassy was sent over from Corea, and presented to the Japanese emperor a collection of books accompanied by an image of Buddha Sakya, the leading idea of the books being that a pure life was desirable, and that it could only be secured through self-denial. One of the most active converts to the new religion was Monmaya-do-no-wosi, son of the emperor Nakatomi; he was a gentle character and devoted to the new faith, and at the time of his death there were 16 Buddhist temples, 816 priests, and 569 religious in the empire. The introduction of Buddhism through China and Corea brought with it some of the customs of those countries—the use of the *nengo*, or year-name, for marking events and dates, and also abedation by the emperors after every short reigns, which was followed by the elevation of mere children, whereby the sovereignty was for a time reduced to a name and the power of the nation given into the hands of the ministers. Among these child-rulers were the empress Seiwa, who began her reign at the age of nine; the emperors Yozai, at eight; Daigo, at thirteen; Reizan, at eighteen; Yenwou, at eleven; Goitsai, at nine; Konye, at three; and Rokuso, at two years of age. About this time a man named Nakatomi Kamatari obtained great influence, and is remembered as the founder of the laws of Japan. In the middle of the seventh century Ten-si, a real emperor, ascended the throne, and distinguished himself in warlike exploits against Corea and Tartary, and then it was that Yesso was subjugated. In 794, the general government having been divided into eight boards after the manner of the Chinese, the central power of the empire was fixed at Miako; and about this time was published the *Ketsu Ron*, a code of laws which are partly in force at the present time. An



other notable event of this period was the introduction of an alphabet, called the Hira Kana, to facilitate the reading of Chinese, the name of the scholar and venerated man who brought about this change being Kobo-daishi. It now became a custom with the emperors, on abdicating the throne, to adopt the garb and religious life of the Buddhist priests, which did much to perpetuate the prevailing religion. During the reign of the emperor Jitsiso (987-1012) two terrible plagues visited the empire. His successor, Go-ri-sen, became famous for his heroism in putting down a rebellion in the northern part of Nipon.

The 500 years which follow A. D. 1000, and now come under consideration, are of greater importance than the preceding era, and may be written in the successive rise to power of individuals connected with the peerage of the realm, and especially the families of Fujiwara, Sugawara, Minamoto, Tatchibanna, and other names regarded as illustrious and held in veneration to the present day. Among these may be mentioned Ten-mang, the greatest literary character of his country and an able man, who through a rival was banished to the island of Kiusiu, where he was starved to death, and to whose memory many splendid temples were subsequently erected in Miako and Yedo. Another famous personage was Yoshi-iyé, who, as commander-in-chief, subdued the rebellious provinces of Mootz and Kwanto, and because of his bravery and other qualifications was called "the eldest son of the god of war;" and still another celebrity was Kio Mori, descended from the emperor Kwan-mu, who was a prominent actor in the affairs of the nation, and is remembered as the ablest and most unscrupulous minister of his time, when the whole empire was devastated by war, but who at the age of fifty-one shaved his head and nominally became a priest. One of his daughters became an empress, and a grandson an emperor. The opening of the twelfth century was marked by many deeds of rare valor and of cruelty, and the conflicts between rival families were continuous and desperate. In 1104 the ex-emperor Sho-toku was banished to the province of Sanuki, where he wrote a letter to the reigning emperor on a piece of his shirt with his blood, and then died of starvation. In 1170, Tame-tomo became famous for his power in drawing the bow and as a rover on the South seas, and because he was the original occupier of the Lookee Islands, came to be considered as a sacred personage. The most famous emperor who reigned during this exciting period was Gozira-kawa, who died in 1192 at the age of sixty-seven. He had taken an active part in the working of the government for forty years, and after abdicating the throne witnessed a part of the reigns of five emperors, his sons and grandsons, and finally died in tranquillity. Two men who are generally regarded as among the greatest of their era were Yoritomo and Yoshitune. They were brothers, both attained the position of shiogoon, and were desperate in their rivalry of each other. The first is generally regarded as the greatest hero in Japanese history, and the first shiogoon of the dynasty which ended in 1867. He died in 1199, at the age of fifty-three, from the effects of a fall from his horse. The second man just named is looked upon as the mirror of chivalry, and his conduct is held up for the imitation of the youth of his country. The former conspired to take the life of the latter, and when reduced to an extremity destroyed himself after killing his wife and children. During the twelfth and thirteenth centuries the empire of Japan was almost continually engaged in intestine wars; severe contests occurred between the shiogoons of the North and South; and among the families which now rose to power were Hojio, Ashikanga, Nitta, Hossokawa, and others who occupied prominent positions, and it was during the period in which they lived that the following events occurred: In 1260 the Nitsiren sect of Booddhists was introduced, and it was one of the saints connected with this order, named Saysho-gosama, who subsequently became famous as a persecutor of Christians. In 1276, Corea became tributary to Japan, and an embassy was sent from China to obtain tribute-money from the Chinese. In 1281 the Chinese despatched a naval expedition, with ambassadors, to Japan, when 30,000 of the invaders were taken prisoners and killed, and one of the ambassadors was beheaded. In 1321 the office known as the *Kirokusho*, or "recorder of facts," was established at Miako, and twenty years afterwards an influential minister published a work called *The Red Book of the Court of Miako*. About the year 1367 there was an extensive war on the island of Kiusiu, when the Satsuma family largely increased its power at the expense of Kikootchi. In that year also Ashikanga, when ten years of age, was appointed shiogoon; he died in 1408. He was a man of great ability and influence, was styled by the Chinese Nippon-wo, or king of Japan, and from the reigning emperor received the title of Kubosama, having been the first person thus honored. The office of shiogoon became hereditary in his family, and the seat of

their power was Kamakura. In 1415 an arbitrary law was passed by which all mercantile engagements were at once ended and all debts cancelled, which was the cause of much trouble and anxiety among the people. In 1466 commenced the war known in history as the "Onin," which lasted more than ten years, and was followed by a famine in 1472, and an earthquake in 1475 destroyed a large part of the city of Osaka. A severe drought occurred in 1496, which was succeeded by another famine and a destructive disease among the forest trees.

From this time forward the leading events in Japanese history multiplied with increased rapidity, and hence, for the sake of convenience, we shall divide the remainder of our chronological record into centuries. The sixteenth century brought no cessation from intestine war and assassination. The year 1510 was signalized by the fact that Nango, a servant and relative of the minister at Kamakura, Ooyay Soongi, rebelled against his master, and took possession of his castle and territory in the province of Etzimo, and became a man of great power. In 1521, for the first time in many years, the emperor made his appearance in public, and his court became impoverished. This condition of affairs lasted for at least fifteen years, when the emperor Go Tsutehi died in such poverty that his body lay unburied for several days for want of money. Two years afterwards an attempt was made to trade with China, but it was unsuccessful, because the Chinese coasts were infested with Japanese pirates. In Nov., 1533, there was observed an extraordinary number of falling stars, and in the following year the country was visited by a fatal epidemic. Three years afterwards there was a bitter quarrel between different sects of the Booddhist priests, one of the results of which was the burning of one-half of the city of Miako. In 1541, according to the best authorities, Antony Mora, Francis Zaimor, and Anthony Pexot, three Portuguese merchants, in their voyage from Siam to China, were wrecked upon the coast of Kiusiu, and the firearms which they had with them caused a profound sensation throughout the empire, and the fact was noted in the national calendars. In 1543 the Portuguese merchants came back again, bringing with them Jesuit missionaries, and from that time the history of the empire was chronicled in the literature of Europe. Francis Xavier visited the country in 1549, and after remaining there two years left it, disheartened with the realities of missionary-work. About 1557 the military chieftain named Nobu Nanga made his appearance on the stage of public affairs, and for more than twenty years was the master-spirit of the empire, wielding the power of a shiogoon. He was descended from Kio-Mori, and his rule was quite as grasping and severe as that of any of his predecessors. In 1557 he put to death, for private reasons, his youngest brother, and seven years afterwards he killed his father-in-law, the lord of Mino, and took all his possessions. He began in 1569 a crusade against the Booddhists, and in a few years succeeded in destroying a large number of their temples and massacred many of their priests; at the same time, for selfish purposes, he encouraged the Jesuits. In 1572 he had a difficulty with the shiogoon, Yoshi-aki, whom he arrested and put in prison, thus bringing to an end the real power of the Ashikanga family. He had many able generals in league with him, the three most famous of whom were Hideyoshi, Akitehi-mitsu-hide, and Iyeyas. Under his encouragement the Jesuits rose to favor and power at court, and in 1581 they claimed to have in Japan 200 churches and not less than 150,000 Christians. He was reputed a brave, ambitious, and able man, and not without many moral virtues, and he laughed at the worship of the gods and considered the bonzes as impostors. In 1582 he was gradually overrunning all Japan, and was liberal in giving to his kindred the property he had acquired by conquest. He built a temple in which he collected idols of all the gods of Japan, and placing in the midst of it a statue of himself called Xanthi, or "supreme ruler," he issued an edict commanding all men to worship that image and no other. The first to obey this order was his oldest son, and the example was followed by the gentry and people in their course. His end was in keeping with his life; after being surrounded in his castle at Miako, he was wounded with an arrow, and then consumed in the building where he was sheltered, in the forty-ninth year of his age. When he died the tide of prosperity turned and ebbed until it gradually swept the whole Jesuit priesthood from the shores of Japan. The immense treasures which he had accumulated in the course of many years in the city of Azutehi-yama were given away and squandered in three days by his late confederate, Akitehi-mitsu-hide. After the death of Nobu Nanga, the man who had once been his servant, and afterwards his chief military assistant, and who had acquired a great reputation as a leader, became the military ruler or shiogoon. His name, which was originally Hideyoshi, was



changed a number of times until he became known as Taikōsama. He was of low origin and insignificant in appearance. His chief castle was at Osaka, which he did much to improve by digging canals and perfecting its fortifications. He had six wives. In 1583, with his permission, the Jesuit fathers induced four young noblemen to visit the pope in Rome, which expedition lasted for eight years. In 1585 he received from the emperor the family name of Toyotomi. About that time he became an earnest supporter of the Jesuits, although he would not accept their religion for himself; but when his plans had ripened, and the Jesuits were confident of increasing success, he suddenly gave them notice to quit the country within twenty days, forbidding them to preach their religion on pain of death. In 1586 he took forcible possession of Nagasaki, and made it a government port and property, declaring it to be the only place where foreign trade should be permitted. The threat made by Taikōsama was not carried out, and the Jesuits continued in the country, and he was charged with changing his policy because he desired to use their ships in a project to invade Corea. He led an army of 300,000 men against that country, one-half of whom were destroyed, when ambassadors were sent to Japan and the following demands were made: (1) That eight provinces of Corea be handed over to Japan; (2) that the emperor of China give one of his daughters to Taikōsama; (3) that there should be free trade between the two countries; and (4) that China and Corea should pay Japan a yearly tribute. In 1592 and the following year two envoys from Manila and the Philippines were received by Taikōsama, the first of which brought with them four Recollets of St. Francis to enter the missionary service. Among their presents was a Spanish horse, whose blood has probably affected the breed now known in Japan. About this time events occurred which led Taikō to believe that his nephew intended to usurp his place, whereupon, after many intrigues, he caused him to be put to death, as well as thirty-one women and children, all members of his family. In 1596 a comet was visible in the empire, and on its disappearance a terrible earthquake occurred, which seemed to prognosticate the death of the shiōgoon. While winking at the stealthy operations of the Jesuits, he caused twenty-five of them to be punished by the death of the cross. This act, as if in self-defence, he followed up with an order that all the Roman Catholics residing in Nagasaki should be at once sent home in their ships. But notwithstanding this hostility, when he became sick in 1598 he admitted a Romish priest to his bedside, and then died, all his nobility, according to the Fathers, "being much better pleased to see him on the list of dead gods than in the land of living men." In the annals of Japan the year 1599 is given as that in which the English and Dutch ships visited the country, and they are said to have come to the town of Saccal, near Osaka. Dutch pilots had already for several years been navigating the surrounding seas, and William Adams, the English pilot of the Dutch fleet of five sail which left Texel in June, 1598, did not reach Boongo until Apr., 1600, when his crew was found to be reduced to nine or ten men.

The great event which characterized the beginning of the seventeenth century was the accession to power of Iyeyas Mikawa-no-kami. He was born of a good family, but had succeeded as a military man by depending upon himself. At this period the emperor was a mere boy, and although the grandson by marriage of Iyeyas, that man claimed, and for a long time wielded, the sceptre of power. As the friend of the regent-emperor quite a number of the provincial governors formed a league against him; and in Oct., 1600, near Lake Owomi, a battle was fought which has ever been considered one of the most important and decisive connected with Japanese history, and Iyeyas was the victor. His opponents were scattered and he became at once master of public affairs. The most important of his many captives in the late battle was a noted chieftain named Konishi Setau, who had been viceroy of Kiusiu and commander-in-chief both of the naval and military forces in the Korean war, who was beheaded. But, notwithstanding this act of severity, Iyeyas treated his late enemies with kindness and granted a general amnesty. He acquired great power, one secret of which seems to have been that when he once made a promise he never broke it, the most perfect reliance being therefore placed upon his word. The portion of Japan which held out the longest against the new conqueror was the island of Kiusiu, but its principal ruler, Satsuma, was obliged to yield. Prior to the crowning military achievement of Iyeyas the imperial, ecclesiastical, and commercial capitals of the empire had been Miako, Narra, and Osaka; but he removed the government to Yedo, which at that time was an insignificant place, with only one street, known then and now as Kōji Matchi. He was reputed a true lover of his country, and was never

accused of being personally ambitious. He was a friend to all kinds of internal improvements, ruled with wisdom and discretion, and was honored with the title of *Se-i-dai-Shiōgoon*, or "tranquillizer of barbarians and commander-in-chief." The most important event of his reign was the promulgation of a code of laws, 100 in number, which he bequeathed to his descendants in power as a guide to them in the office he hoped would be hereditary in his family. These laws have had a paramount influence with the rulers of Japan ever since the death of Iyeyas, and to a very great extent his ambitious hopes have been realized by the subsequent fame and power of his immediate family. Between these laws and the writings of Confucius and Mencius the similarity is manifest. Whatever their intrinsic merits, it is certain that their effect upon the nation was most salutary, for it was blessed with an uninterrupted peace for more than 200 years after the death of Iyeyas. So impressed with this fact were the nobles and the people of Japan at a later day that in 1806 they inaugurated a national festival for the sole purpose of commemorating this unprecedented fact. For about twenty years prior to the year 1614 the Jesuits had obtained such a footing in Japan that they claimed to have visited the whole empire, and to have made more than 100,000 converts. Although they entered the country as missionaries, they were subsequently denounced as preachers of sedition and organizers of rebellion. The opposition which they called forth soon became so bitter that in 1636 the government issued an order that the image of the Saviour as it appeared on the copper medals should be periodically desecrated by being trampled under foot; and those orders remained in force until the conclusion of treaties with Christian nations in recent times. After such demonstrations it cannot be thought strange that when the time came for driving the Jesuits out of the country the expulsion should have been attended with many acts of cruelty. The first decree of banishment was issued by Iyeyas in 1614, but some fifteen years elapsed before the movement was in any degree successful. A new edict against the Roman Catholic Church was issued in 1666, and two years afterwards an order was promulgated prohibiting the erection of Buddhist temples, which has remained in force to the present time. In 1720 the Buddhist priesthood held a festival throughout the empire, by which they commemorated the eleventh centenary of the establishment of their religion.

In 1839 the Portuguese and Spanish were finally expelled, but a single Dutch factory was permitted to remain at the island Hirado. In 1709 another attempt was made to regain Japan to the Church of Rome, but it was unsuccessful. Various attempts, at long intervals, were made by different foreign nations to reopen a trade with the country. The Dutch, as well as the Japanese, bitterly opposed all such measures—the former from cupidity, and the latter from a motive of self-defence. According to the native annals, the coast of Japan was visited by foreign vessels in 1637, 1673, 1768, 1791, 1793, 1796, 1803, 1808, 1813, and 1829. American ships first arrived at Nagasaki in 1846 under Com. Biddle, and Com. M.C. Perry made his visit in 1853, made memorable by resulting in a treaty with the U.S. In 1854, Sir James Stirling, an English admiral, visited Nagasaki, and also concluded a treaty with Japan; and in 1858 it was proclaimed by the Japanese that they had concluded treaties with the American, English, Dutch, Russian, and Portuguese nations. The last of the shiōgoons who really held the reins of power was Iyaymuchi: he reigned from 1859 to 1866, when he died, having been the leading figure in the late rebellion, which resulted in dissolving the dual government which had existed for 600 years, and in restoring to his proper position the true emperor of Japan. In 1867 an effort was made by Yoshi-hisa to be recognized as the legitimate successor of Shiōgoon Iyaymuchi, but it was unsuccessful; and before the close of that year the spiritual emperor, who had just found himself received as the true and only ruler of the empire, died in the thirty-eighth year of his age, and left upon the throne his son, a boy of fifteen years, who is the present emperor of Japan.

As to the events which have taken place in that empire during the last twenty years, they resemble the stories of romance and are among the marvels of the age. Into that subject we cannot fully enter at present, but the following particulars may be mentioned for purposes of reference, and those who may desire more elaborate information will find it admirably set forth in a volume entitled *New Japan*, from the pen of an English diplomat, Samuel Mossman. The treaty with Com. Perry was ratified in 1854 at Kanagawa, and the ports of Hakodadi and Simoda were opened to foreign commerce; in 1855 the Russian government, through Admiral Putiatine, visited Simoda and secured the ratification of a treaty, which fact was strangely commemorated by the destruction of Simoda by an earthquake;



in 1858 treaties were also concluded by England and France, and the ports opened to them were Kanagawa, Nagasaki, Hakodadi, Higo, Osaka, and Neigata; in 1859, British and American legations were established at Yedo; in 1860, Dutch and Prussian treaties were signed at Yedo, and several assassinations occurred in that year, as well as in the preceding and succeeding years; in 1862 a diplomatic mission of about thirty-five members was sent to Europe by way of America, having sailed in an English frigate called the *Odin*, and the envoy was Takeno Votschie Shemodze; in 1863 the British and American legation buildings were destroyed at Yedo, and a retrograde policy was inaugurated by the Japanese officials, one of the results of whose hostile action was the payment of an indemnity to America and the leading powers of Europe; in 1865 the allied envoys received the consent of the mikado to the treaties; in 1866 and 1867, as already intimated, the imperial government was changed from the old to the new form; in 1868 was commenced the civil war in Japan, and the mikado became the sole monarch; in 1870 the Japanese government resumed with great ardor its work of reform, the prominent ideas being the education of Japanese students in foreign countries and the establishment of diplomatic relations with America, England, Russia, Germany, Austria, and France; and in 1872 the great embassy, headed by Tomomi Iwakura, visited the U. S. and Europe, the calendar of the Western nations was substituted for that of old Japan, and the empire found itself rapidly becoming an important member of the family of nations.

And now for a few remarks respecting the people of Japan as they existed just prior to their new birth. They are divided into eight classes, as follows: the Koongays, or Mikado nobility; the Daimios, or Yedo nobility; the Hattamotos, or lower daimios; the Hiakshos, or farmers without rank or title; the Shokonoris, who are artisans; the Akindos, or merchants; the Kiveiamonos, or actors and beggars; and the Yayias, who are turners, shoemakers, and manufacturers or dealers in leather. In the island of Yesso are to be found a people called Ainos, who closely resemble the Indians of North America. The religions of the empire are two, Sintoism and Booddhism, while the higher classes seem to be partial to the moral teachings of Confucius. The Japanese language is one of letters, and not of characters like the Chinese, but because of the very frequent use of the latter by people in every sphere a great many difficulties arise both in speaking and writing. The literature of the country is quite extensive, cheap books and instructive art-productions are always in great demand, and a very large proportion of the people are able to read and write, and a love of drawing and painting is very common. The food upon which they subsist is rice, the chief production fish and a great variety of vegetables; and among their leading productions may be mentioned silk, tea, cotton, hemp, salt, gold, silver, iron, copper, coal, and lead. Opium, which is the bane of China, they do not use, but they substitute for it a good quality of tobacco, which they grow and manufacture in large quantities. Their fruits are numerous, and their knowledge of horticulture and the secrets of the soil is so extensive that many of the Japanese in this country have looked upon the agricultural mission of Mr. Horace Capron, who was invited to teach them the science of agriculture, as a most useless enterprise. Their skill in manufacturing is of the highest order, and when they shall have learned the importance of increasing the number of useful articles in every department of labor under the influence of modern improvements, it is likely they will hardly be equalled by any of the nations of the world. It has already passed into history that their display at the great Vienna Exposition was wonderful, and superior to that of any of the Asiatic nations. One of the most striking illustrations of intellectual activity among the Japanese is found in the use they are making of the press; books and newspapers, both in the Japanese and English languages, are multiplying every day, and are universally becoming modelled upon the literary plans of the Western nations. In speaking of the press of Japan, one of the Yokohama papers lately made this remark: "It is now but three or four years since the press sprang into existence in Japan, yet it is already being used for the serious discussion of weighty questions, and certainly by its vigor and earnestness, its candor, fearlessness, and courtesy, puts to shame a large section of the local European press, which seems only to exist to prove how little salt is worth which has lost its savor." In literature and religion, in commerce and education, very great changes have taken place within the last four years; and from a chart of Japan, recently published by authority, we gather the following items of information: The total number of temples in the empire devoted to the Sinto religion was 97, of which 35 were supported by the general government, and the rest by the provincial authorities; the Booddhist temples numbered

296,900, to which were attached 168,654 priests, divided into eleven sects; but all this religious machinery has since been abolished by imperial decree; the population of the metropolis of Yedo had been reduced to 1,194,390; the two colleges in that city contained 563 pupils, but have greatly increased since 1872; there were also thirteen hospitals and almshouses; the imperial army consisted of seven battalions of infantry, four of artillery, and two companies of cavalry; regular army, twenty battalions of infantry; cadets in military schools, 726; ships of war, 16, including one iron-clad, officered by 1307 men; steamships, 69, including 22 iron ships, and the large sailing vessels numbered 18; lighthouses, 16; dockyards, 2 at Yokohama and Nagasaki; mines worked by government, 3; it was also stated that manufacturing establishments were on the increase in Yedo, Yokohama, and Higo, and two railroads, between Yedo and Yokohama, and between Osaka and Kobi, were both in partial operation. The working government of Japan, as now organized under the supreme control of the emperor, is divided into ten departments—executive, with 237 officials; public works, 375; department of religion, 138; judicial department, 169; foreign affairs, 116; treasury department, 539; agricultural department, 192; war and navy departments, 891; educational department, 221; and the imperial court consists of 240 officials. The name of the reigning emperor or mikado is Mutsuhito, born in 1852, and recognized as heir in 1860, and he came to the throne in 1867. He is married, the empress being his senior by two years. His six uncles and great-uncles (one of whom was recently in Prussia and another in England), and sister in Yedo, also three brothers (one of whom has been a student at Annapolis), with an aunt in Yedo, constitute the royal family of Japan.

The thinking men of Japan now claim—and the facts support them in their views—that the revolution now going on is needed, stands upon a firm foundation, and will be triumphant. All the officials and the higher classes, and a large proportion of the masses, are anxious to throw aside every impediment calculated to retard their progress in the career upon which they have entered. They would be loyal to the mikado and the empire, but they want more civil if not religious liberty than they have hitherto enjoyed, protection in their commercial interests, and all the advantages resulting from a high order of education. That they are thoroughly in earnest is proven most conclusively by the truly wonderful changes that they themselves have carried out during the last twenty years. The barriers of exclusiveness have been removed, and many seaports, as already stated, opened to the trade of foreign countries; the imperial ruler has thrown aside all the mystery and seclusion which have been held sacred for 1000 years, and with his dynasty has entered the comity of nations; the feudal system has given place to a government allied in character to the enlightened nations of the earth, and the daimios have given up their estates for the benefit of the whole country; foreigners, who were treated as enemies, are now welcomed as friends; customs like those of wearing two swords and committing enforced suicide have been abolished; money has been liberally expended by the central government in sending its youth to be educated in foreign lands; schools, seminaries of learning, scientific and benevolent institutions, all founded upon the models of the Western nations, have been established, and are daily becoming grounded in the elements of prosperity; a free press, as we have seen, has been established and is respected; also a new postal system; the sea and land forces have been reorganized, and placed upon a basis of such stability as to make Japan the most invulnerable nation in the Orient; all the modern helps to a safe navigation of the extensive coasts of the empire have been introduced; the old Japanese calendar has been superseded by that of the Western nations excepting Russia; talented men in literature and science and diplomacy have been invited to take office in the empire for the benefit of their experience; a gold and silver currency similar to that of the U. S. has been established; a system of railroads has been organized and partly completed, which has already added wonderful facilities to travel and commerce; and by a line of telegraph news may now be transmitted from Yedo to London in less than fifty hours. Such are some of the marvels that have actually been accomplished, and they surely prove that the Japanese are not only in earnest in all that they are doing, but that their genius for going ahead is allied to that of the "universal Yankee nation." What they have accomplished in less than one generation has not in any part of Europe been secured in less than a century.

But there is another wonder connected with this great Japanese revolution; which is, that the nation is marching upward and onward without casting a thought upon what the great empires of India and China may think or desire. The nation, like the individuals who have come to the



front, is fearless, proud, delicately strung, and independent. Where can be found a better illustration of lofty courage than was presented by Japan in her recent difficulty with China about Formosa? She felt that she had justice on her side, and looking upon the 35,000,000 of her united and loyal people with perfect confidence, she said, "The 500,000,000 of China shall not frighten us from the path of duty and right." China did the proper thing in submitting, and I ought to be applauded for her course; but when the subject of indemnity came up, Japan (unlike certain so-called civilized nations), true to her lofty instincts, asked only that the necessary expenses should be paid, and scorned to manifest a grasping love of gain. The only great questions connected with the prosperity of Japan which are not yet settled are those having reference to taxation and revenue, and the opening of the entire country to foreigners and to religion. The difficulties attending each of them cannot be fully understood by people in other countries; and yet there is nothing singular about them, if we remember that even in the U. S. we have never been free from some sort of excitement growing out of these identical questions. Good men and true are to-day working hard in Japan to perfect a system of taxation and revenue which will help the public purse and make the financial resources of the empire equal to its natural progress; when the European powers, headed by England, shall stop their domineering demands to have the empire thrown open at all hazards, then perhaps the imperial government may listen to reasonable appeals; and when the Japanese are convinced that religious fanaticism is a blessing, even in such countries as England and America, and that by giving the largest liberty they will not be made wretched by the intrigues of the Romish Church, then they may consider the policy of opening wide the gates to all denominations of Christians. With regard to the question of allowing foreigners to trade in all parts of the interior of Japan, a leading Japanese newspaper of Yedo recently made this remark: "The chief reasons why this measure cannot be carried out to-day are—firstly, that we cannot make foreigners submit to our laws; secondly, that the Japanese government is unable to alter the tariff by its sole authority; and, thirdly, that we cannot make them obey the regulations agreed to by the localities." Of the signboards proscribing Christianity which were formerly seen in Yedo, there is not one remaining at this day. But the fact is, that in Yedo and other large towns there are ministers of the gospel representing a number of sects who hold religious meetings regularly, and whose teachings are thankfully received by many of the native inhabitants. The prevailing sentiment towards the missionaries seems to be—"We have no objection to your instructing those who come to you for information, but we must not have any compulsory appeals;" and so we perceive that the hostility to the Christian religion is not by any means as active as it was in former years. Indeed, there is much talk among the Japanese about organizing a "new religion," which would of course be a long step towards recognizing Christianity in all its borders.

And now for a few words upon the prominent characteristics of the Japanese. They do not bestow the same honor upon women that is theoretically shown by the Western nations, but in that particular they are in advance of the other Asiatic nations. As already stated, several of their rulers have been females—8 out of 124, and one of them was the conqueror of Corea—and to-day let any woman manifest a superior mind and she will command the highest respect of her associates. Much has already been done to emancipate woman from her former degraded condition, and the last two ministers accredited to this country had the manliness and good sense to bring their wives with them. The Japanese, like human beings generally, may be fond of indulging their appetites, but drunkenness is not as common as it is in this country, and against the use of opium the most rigid regulations have been established. Although wedded to all kinds of aristocratic notions, they admire and foster intellect wherever found, and in their public offices always endeavor to find the best man for every position to be filled. They are also remarkable for their unsordid ideas of life and duty. They are an intellectual race, and their native education is wellnigh universal; the commonest people, we repeat, can read and write the Japanese language, and all who make any pretension to culture are well founded in the Chinese language, which to them is like Latin to the English scholar. All the writers who have associated with the Japanese in their own country, or while sojourning in America or Europe, coincide in the opinion that they are remarkable for their amiable and agreeable manners; and in this respect the great Iwakura embassy was most conspicuous—to such an extent, indeed, as to have been frequently commented upon both in this country and England. The porcelain,

lacquer-work, paper and silk, and the bronzes of Japan have never been surpassed, and in some particulars not equalled, in any other part of the world; and with regard to their pastoral art, their genius has been misapprehended. Contrary to the common opinion, they understand and practise the rules of perspective, and foreigners have made a mistake in judging of their skill as artists by the pictures which in Yedo are sold by the million for the tenth part of a penny. A large proportion of the books are regularly illustrated, and the writer of this paper has in his possession many pictures which display abilities of the highest order for correctness and freedom of handling.

The relations existing between Japan and the U. S. have been, and are now, of the most friendly character. There is not a bone of contention between them, but there is one great fact on the side of the latter which is humiliating to our national honor and pride. We allude to what is called the indemnity fund. In 1864 a noted daimio, who hated the new order of things in Japan, fired upon a foreign vessel in the employ of another daimio. The allied powers thought themselves insulted, and brought the matter to the attention of the imperial government, which disclaimed all intention of doing wrong, and confessed that it could not control the rebel daimio. The powers in question, the British, Dutch, French, and Americans, then formed a little fleet, and inflicted severe punishment on the offending daimio. That done, a convention was called, and Japan was made to promise that she would pay an indemnity of \$3,000,000. The sum-total of that indemnity payable to the U. S. is nearly \$1,200,000. When more than one-half of the amount due the U. S. had been paid, and which our government was ashamed to put in the treasury, Prof. Joseph Henry took the lead and suggested to Congress that it should be appropriated to educational purposes in Japan. The President was in favor of the proposition, but Congress did not act; and so the question rested for a while. In the mean time, the interested European powers were trying to force the mikado to open his empire to the trade of all nations. His Majesty objected. "Then," said the powers, "you must pay us the money you owe." The Japanese government paid the balance of their debt to the three European powers, and there was another pause. It was soon found, however, not to be diplomatic for the U. S. to refuse the unpaid balance due our government. The arguments were successful, and the American minister had to go up and present his bill, which was instantly paid. For a moment the friendly feelings of the Japanese towards America were slightly abated, but when they saw the diplomatic necessity, and thought of what Prof. Henry and the President had tried to do, the former kindly feelings were restored. And now there is a great—and in some particulars a disgraceful—squabble going on in the U. S. over this pile of ill-gotten gain. One of two things on this subject is true—either that it was right for the U. S. to take that money from a country like Japan when in a state of revolution, or that it was not. If the U. S. have no right to the money in question, then every dollar of it should be returned without any conditions. If, however, there is a bill for actual expenses, that amount (perhaps less than \$20,000) ought to be paid, and the very large balance should be returned. But what do we see now going on in the way of schemes for handling this money? (1) The very proper and most wise idea of Prof. Henry, to appropriate the money for educational purposes in Japan under the auspices of the Japanese themselves; (2) a proposition to divide the money among the American officers and sailors who on one steamer did such wonderful work at Simonoseki; (3) the founding of a college in Japan, to be wholly officered and controlled by Americans; (4) to build an American legation in Yedo; and (5) to educate a few dozen boys in the Japanese language for service at the American consulates in that country. Indeed, the preposterous propositions may be counted by the dozen, and the public will be surprised to learn that there was once a scheme suggested for taking this Japanese money to build a new state department in Washington. What will finally be done is doubtful, and we cannot but earnestly hope that the reputation of the U. S. for liberality and fair play will not be tarnished by the selfishness and cupidity of educational leaders or Congressional demagogues.

And now, by way of being a little more explicit on some of the points to which we have heretofore alluded, we submit under appropriate headings the subjoined information.

*Commerce of Japan.* The latest complete accounts that have been received in the U. S. respecting the trade of Japan are for the year 1873. The total amount of trade was 39,322,539 yens (6 c. dollars); exports, 21,217,481 yens; imports, 20,105,057 yens; and the business of the several ports open to foreign trade was as follows, in yens:



	Exports.	Imports.
Yokohama.....	15,335,849	20,712,994
Kobe.....	2,159,869	6,030,988
Osaka.....	926,371	402,193
Nagasaki.....	2,347,815	1,888,862
Hakodate.....	447,610	82,819
Neigata.....	665,000	7,200

The total amount of duties collected was 1,735,513 yens, of which 1,223,021 yens were paid at Yokohama, and the balance at the five other ports. The imports of gold and silver for the year 1874 amounted to 1,020,065 yens; exports of the same, 13,332,792 yens. Imports of corn for same period, 83,420 yens; and exports, 412,819. Amount of total imports, 22,841,166 yens; amount of total exports, 18,267,249. Duties collected, 1,584,879 yens. Exports to U. S., 7,464,843 yens; China, 3,635,010; Great Britain, 3,232,665; France, 2,759,496; Italy, 647,637; Germany, 62,718; and other countries, 131,774. Imports from China, 8,360,454 yens; Great Britain, 10,149,888; France, 1,683,763; U. S., 1,010,539; Germany, 703,071; Indies, 28,753; and other countries, 180,742,290.

*Exports and Imports in 1873. —Silk.*—The most important export staple of Japan is raw silk, and for several years, indeed since 1865, a large business has been done in supplying France and Italy with silkworms' eggs to regenerate the diseased breeds of those countries. The effect of this latter trade has been to injure the quality of Japanese silk, and measures have been taken to stop the trade: but these are likely to be futile, for a short time at least, on account of existing treaties. It is claimed that the remedy is in reality with the people of Japan. In Jan., 1875, the prices of silk in Yokohama ranged from \$420 to \$570 per picul, or 120 pounds. The silk exports for 1873 amounted to nearly 11,000,000 yens. *Tea.*—With regard to the tea-trade, it is almost exclusively confined to the U. S., and has been wonderfully developed within the last four years, and there is a prospect of greater extension in the immediate future. Of course, Japan has an imposing rival in China, but the former empire, with its popular brands and reasonable prices, is likely to be eminently successful. The tea exports for 1873 amounted to about 3,400,000 yens. By way of giving an insight into the character of Japanese productions we append the following items: The exports of tobacco amounted to 62,000 yens; of seaweed to 175,000 yens; mushrooms, 33,284 yens; cuttle-fish, 19,000 yens; lacquerware, 126,279 yens; earthenware, 48,000 yens; bronze and copper ware, 82,000 yens; copper in ore, slabs, and wire, 200,000 yens; ginseng, 63,641 yens; sunshades and fans, 23,000 yens; screens, 3400 yens; silk clothing, 9000 yens; and elona-root, 3433 yens. The imports from foreign countries have hitherto far excelled the exports, and the articles are too numerous to mention in this place, but the more important articles have recently been as follows: Woollen cloths, cotton satins, de laines, blankets, woollen and cotton mixtures, cotton fabrics, linens, manufactures of iron, span-wood, window-glass, cordage, sugars, cigars, paint, oils, steam-engines, printing-machines, machinery, glassware, ironware, copper roofing and sheathing, drugs, dye-powders, tapestry, carpets, tortoise-shells, boots and shoes, watches, clocks, soaps, furniture, stationery, wine, beer and brandy, mirrors, beans, coal, matches, coral, and coal oil. During the late difficulties with China the exportation of rice, the most vital commodity of Japan, was prohibited by the government, but that prohibition was removed early in 1875.

*Lighthouses.*—As a matter of interest to the commercial world, the following list of lighthouses, lightships, etc. is submitted: *Lighthouses.*—Suigawa, Yedo anchorage; Yokohama Hatoba; Kanonsaki, entrance to Gulf of Yedo; Tsurugi-saki, do.; Nosima-saki, province of Awa; Inu-boy-e-saki, province of Simosa; Iokasima, province of Sagami; Mikomoto, province of Idsu; Iro-o-saki, do.; Omisaki, Suruga Gulf; Toha, Toha Harbor; Matoya, Southern Head; Kashinosaka, province of Kii; Siwomisaki, do.; Tomangaisima, Isumi Strait; Temposan, Osaka; Wada-no-misaki, Kobe anchorage; Yesaki, entrance to the Inland Sea; Nabaesima, Inland Sea; Tsurisima, Inland Sea; Isaki, entrance to Simonoseki Straits; Rokuren, do.; Iwosima, Nagasaki Harbor; Satanomisaki, island of Kiuisu; Awomori, province of Mutsu; Ishinomaki, province of Rikuzen; Noshiaf-saki, island of Yesso; Nemero, island of Yesso—numbering in all 29. The *Lightships* are two—in Yokohama Bay and the harbor of Hakodate; and the great buoys and beacons number 11. All the lighthouses here mentioned are built and conducted according to the most approved ideas of modern times. Notwithstanding the necessarily heavy cost of maintenance of the lighthouse establishment, no dues are levied on vessels visiting the ports of the empire.

*Imperial Mint.*—The coinage of gold, silver, and copper, founded on the plan of the U. S., was commenced in 1871, since which time the old and various styles of Japanese

money have gone out of existence. The coin called a *yen* is equivalent to the American dollar, and is made of both gold and silver; the *sen* is equal to the American cent; and the *rin* is the same as the American mill. The gold yens are divided into the following denominations: twenty, ten, five, two, and one; the silver coins are for one yen, fifty sen, twenty sen, ten sen, and five sen; and the copper money is for two sen, one sen, half sen, and one rin. Down to Feb., 1875, the number of pieces coined at the imperial mint amounted to 136,885,541, and their value in yens was 64,421,744, or of gold 49,502,492, silver 14,419,411, and copper 499,841. In Mar., 1875, it was stated in the public prints of Yedo that coin to the value of 20,000,000 yens had been exported from Japan. In their general characteristics the coins of Japan are quite equal to those of the U. S. The Japanese historians claim that copper was melted in Japan as far back as A. D. 698 in the province of Suwo, whilst ten years later—in 708—they coined their first copper money. It was called wa-do-kai-zen, and was cast in the province of Musashi. Prior to that period, however, there had been a silver coin in use, which was prohibited on the appearance of the copper coin; and the first gold used as money was coined about twenty years after the appearance of the copper coin.

*Minerals.*—The subjoined items of information will illustrate the fact that the mineral wealth of Japan has hitherto been very extensive, and will naturally suggest the idea that the future developments, conducted by modern inventions connected with mining, are likely greatly to increase the wealth of that empire. Copper has been found and smelted in not less than forty provinces. Copper, silver, and gold have been exported on a large scale ever since 1545. There is no mention in any of the Japanese records that any of these minerals had ever been imported, but they do state that within the space of 249 years the copper exported, chiefly through the Dutch merchants, amounted to 4,209,500 piculs. Of this copper there are many kinds, but bar copper is the most valuable. The gold and silver exported by the Portuguese between the years 1550 and 1639 (89 years) amounted in value to £59,500,000 sterling. In 1671 the exportation of silver was prohibited for a time. The Dutch were also large exporters of the same minerals. Prior and subsequent to the year 1830, from 50,000 to 60,000 piculs were exported annually; since then the exportation has reached a total of 40,000,000 piculs. Silver ore was discovered in 667, and in that century the first gold was coined: silver metal first produced in 674. Between the years 1400 and 1500 much larger amounts of the precious metals were smelted than in modern times. Lead ores are abundant, but that mineral has never been popular among the Japanese. Iron ores of many kinds are also found in large quantities; also superior varieties of coal; and within the last few years special attention has been given to the development of these important sources of wealth. Hitherto, the metallurgy of Japan has not been fully described by any author. The work of Von Siebold, *Nipon Archiv*, was never finished, and its information is meagre, and the work of Kaempfer is not considered authentic. The leading works on this subject by Japanese authors are as follows: (1) *San-kai-sai-denshukai*, in 5 vols.; (2) *Hon-zo-ko-Moku-Kei-no*, 1 large vol.; (3) *Ko-do-Shu-roku*, a manual for the metallurgy of copper, a small volume.

*Population.*—The last census of Japan was taken in 1872, or the fifth year of Meiji, the 2532d year from the accession of Jinnmu Temu. The number of colonies is 1; organized cities, 2; kens, 73; provinces, 36; koris or departments, 717; kus or city parishes, 6862; muras or rural parishes, 70,443; towns, 12,535; Sinto shrines, 128,123; Booddhist temples, 98,914; and houses, 7,107,841. Total population, 33,110,825; males, 16,796,158; females, 16,314,667.

Age.	Males.	Females.
14 and under.....	4,590,915	4,465,393
15-21.....	2,070,071	1,968,063
21-40.....	5,005,747	4,635,561
40-50.....	3,655,561	3,435,567
50-60.....	1,435,567	1,345,567
60 and above.....	75,570	118,218
Age unknown.....	1,844	1,890
	16,796,158	16,314,667

Number of maimed, blind, deaf and dumb: males, 63,759; females, 37,828. Criminals in prison: males, 2311; females, 119; in penal settlements, males, 962; females, 26; criminals at hard labor, males, 2726; females, 320. *Trades and Classes.*—Farmers, 14,870,426; artisans, 701,416; merchants, 1,309,191; miscellaneous occupations, 2,129,522; total, 19,010,555. Princes and princesses, 29; nobles, 2666; shizoku (armed class, upper grade), 1,282,167; sotsu (armed class, lower grade), 659,074; chishi (still lower grade), 5316; priests, 211,846; Sinto officials, 102,477; nuns, 9621; common people, 30,857,271; in Saghalien, 2358.

*Legislative Information.*—National or provincial legislatures, according to the accepted plan of the Western na-





**Japanese Students in Foreign Lands.**—Among the many remarkable events which marked the advent to power of the present emperor of Japan was that of sending promising young men to foreign countries to be educated. This was done at the expense of the general government, and the idea was, that the persons thus honored should eventually give their services to their country. The largest proportion of these students were sent to America, but many of them went to England, France, and Germany. The total number who came to the U. S. was about 500. Many of them, after their return to Japan, entered the public departments, and all the men who are in 1875 in official positions in the U. S. were formerly government students. In 1873 the Japanese government, for reasons that have not been publicly explained, recalled nearly all the students, so that those who are now studying in foreign lands are, with few exceptions, receiving their foreign education as private individuals. Among the Japanese students sent abroad have been many who displayed very remarkable abilities, and some of their writings, published in 1872, were highly praised both in the U. S. and in England. Among the students who came to America in 1871 were five young ladies, and as they were the first who ever left the empire of Japan for purposes of foreign study, we append their names, as follows: Rio Yoshimas, aged fifteen years; Tei Wooyeda, aged fifteen; Stematz Yamagawa, aged twelve; Shinze Nagai, aged ten; and Ume Tsuda, between seven and eight years of age. The first two, for considerations of a personal nature, were obliged to return to Japan in 1872, but the three others are still in the U. S., and all of them prosecuting their studies in a manner that is considered quite remarkable, even the youngest of them being now able to write a correct and handsome letter in the English language. The *Japan Mail* in an article on the Japanese students made the following observations: "The Japanese students abroad were so earnest, diligent, polite, quick, and eager to learn that they won plaudits even from those unused to praise. The president of a Massachusetts college said he wished to have a Japanese in every college in America to teach the undergraduates good manners. The principal of a Connecticut high school said publicly that a body of young men of such powers of observation as the Japanese students exhibited could not be found in America. The journals of England and Germany, as well as of America, stinted no praise of the graceful Orientals in their schools. Several of the Japanese students won distinctions at English, German, and French universities and at American colleges, and others would have assuredly done so had not the grave come between them and the goal. All these things tended to produce the opinion held by some that the average Japanese is even superior to the average American or European student."

**School Statistics.**—The following figures are given to represent the educational interests in Japan in 1874: government schools, 7; teachers, 95; Japanese teachers, 51; foreign teachers, 46; public and private schools in the various fus and kens, 6261; teachers, 5856; students, 472,047. To these should be added 3 normal schools. These were all under the immediate control of the educational department, the head of which is the vice-minister of public instruction—a most earnest and competent gentleman—Tanaka Fujimaro. In 1872 a law was promulgated by the imperial government which decreed the establishment of 53,760 schools in Japan, and while some progress has been made, it will be years, probably, before it can be fully consummated. Some of the provisions of the aforesaid law are as follows: Eventually the people will pay all expenses, but for the present the government will assist by paying salaries and expenses of foreign teachers, the cost of building high schools, and providing books and instruments and allowances to foreign students. The annual appropriation for these objects has thus far been about \$300,000. The educational establishments which are now in successful operation in Yedo are as follows: The Dai Gakko, or university, which includes several separate colleges for the study of medicine, jurisprudence, philosophy, and mining, as also a polytechnic college. The veterinary, commercial, and agricultural colleges, as likewise the college of arts, have not as yet been opened. The Go Gakko, a school for instruction in foreign languages; several private schools, designed likewise for imparting instruction in foreign languages; the Shi Han Gakko, or normal school for the instruction of Japanese teachers; a principal female school; several preparatory schools; and certain establishments in connection with some of the public departments, which are designed for imparting knowledge of special subjects. The most competent observers agree in the opinion that Japan is in no sense an illiterate nation. The number of persons who cannot read and write is a small minority. Even the more common classes can read the ordinary Kana.

CHARLES LANMAN.

**Japan Clover** (*Lespedeza striata*), a plant introduced in some unknown manner into the Southern States of the U. S. before 1845 from Eastern Asia, and which has spread with wonderful rapidity. It is a low annual, growing to the height of little over a foot on the poorest soils, is readily eaten by cattle, and has become popular with stock-raisers.

**Japan'ning.** The art of applying a peculiarly durable and beautiful varnish as practised in Japan, from which country the name is derived. The original process in its highest form is very difficult and complicated. If applied to wood, great care is taken to prepare the latter, it being baked for many days and tested to ensure it from cracking. The varnish itself is the resinous product of a bush called the *aurasi no ki*, or varnish plant (*Rhus vernix*). The Chinese make it, but of inferior quality, from the *Angia Sincensis* or the *treichon* and *tsichou* (Canton dialect). According to Fisscher and Tomlinson, the lacker is obtained by incision. It is at first cream-like, but becomes black by exposure. A fine powder of charred wood is added after it has become black, and this being very evenly applied, it is dried in the sun, the charred wood giving it a peculiar body and preparing it for polishing. The reduction of the varnish and the mixing with the powder are very carefully executed by very tedious processes. Five coats of varnish are applied, each being dried with the greatest care. It becomes glass-like in its hardness, and is extremely tough, so as to resist the action of boiling water. It is then polished with a smooth stone and water (according to Fisscher, with reeds or a bamboo, as De Janeigry understands him, but Fisscher probably means with *Equisetum* or Dutch rush). When applied to papier-maché boxes or cups the varnish forms a *binding* like an enamel, and is no inconsiderable part of the object. Figures are painted on the polished surface with turpentine, or gilding is applied, after which the whole is finished with another coat of varnish. Mother-of-pearl is often set in the varnish. Different methods of *priming* the objects to be varnished are followed; a common one is to apply rotten-stone and ox-gall. Of course the excellence of the coating is improved by multiplying the coats, and in some cases twenty or more are applied. This is the true japanning of the East. In Europe and America the so-called japanning so frequently seen on articles of sheet metal, and which has a rich and peculiar lustre, generally of a warm semi-transparent kind, is effected by applying different varnishes, copal or animé, by the agency of heat. The varnish is colored or qualified with lampblack, asphaltum, white, green, or any other color required. Gold and silver or bronze are also applied with size and powder, and subsequently varnished and polished by a variety of processes. In general, the color is laid on first, and the japanning is effected by laying on several coats of varnish, the lustre and quality of which are increased by their being made without drying-matter. When only a single coat of varnish is used, the object being rather to imitate japanning in its best form, the process becomes lackering (see LACKER): while on the other hand lackering, when very fine varnish is used, and heat is applied, is inferior japanning. Ovens of different patterns are specially constructed for drying in japanning. Japanned or patent leather is made in the greatest perfection in Japan, and next in France. It is effected by applying to good, dry, thin leather a composition of linseed oil and turpentine colored with burnt umber and ivory or lampblack. Several coats are laid on, and each thoroughly dried, the outer or last coats being made quite black. The thinner the coat applied and the more thoroughly it is dried, the more pliable will the leather be, and the more durable the coating. The varnish is made with Prussian blue, or any color deemed suitable to give the tone required, and oil. It is reduced or rendered fluid with turpentine. After several coats are applied and dried, it is scraped and polished with pumice-stone. Great pains should be taken to prevent dust from falling on the leather during the process.

The term japanning is improperly applied not only to simple lackering and varnishing, but also to different kinds of mineral and glass or porcelain glazing, or in fact to vitrification. True japanning consists of the application of several coats of varnish, and of drying and polishing these so as to ensure the peculiar durability and gloss characteristic of the Oriental processes, and not in a superficial imitation of it, much less in effecting results of an entirely different nature, which, as in the case of glazing and vitrification, have already received much better and far more characteristic names. It is to be desired that writers on technology should be more careful in this as in many other cases, and not adopt the errors of merely practical men. We may observe with Tomlinson that in japanning every workman has his own favorite method of preparation and of mixing his varnishes, since the differences of climate,

CHARLES G. LELAND.

**Japu'ra, Iyapura, or Caquet'a**, a river of South America, rises in the Andes of Ecuador, in lat.  $1^{\circ} 20' N.$  and lon.  $76^{\circ} 50' W.$ , runs first between Ecuador and New Granada, then through Brazil, and enters the Amazon at lat.  $1^{\circ} 20' S.$  and lon.  $72^{\circ} 20' W.$ , after a course of about 1000 miles. Its navigation is much impeded by rapids and cataracts.

**Jardin** (KAREL DU). See DUJARDIN.

**Jardine** (SIR WILLIAM, BART., b. at Applegarth, Dumfriesshire, Scotland, Feb. 23, 1800; succeeded to the baronetcy in 1821; gave his attention chiefly to ornithology, though a voluminous writer upon all the vertebrate animals. He edited White's *Natural History of Selborne* three times; established the *Magazine of Zoology and Botany*; assisted in conducting the *Annals of Natural History* and the *Philosophical Journal*, besides publishing a *Calendar of Ornithology* (1849). D. in 1874.

**Jaroslav.** See YAROSLAV.

**Jarves** (JAMES JACKSON), b. in Boston, Mass., Aug. 20, 1818. Weakness of the eyes compelling him to desist from study, he travelled extensively on this continent, visiting California, Mexico, and Central America, and resided for some years at Honolulu, where he published the *Polyne-sian*, the first newspaper printed there. Soon after his re-

O. B. FROTHINGHAM.

**Jarvis** (EDWARD), A. B., A. M., M. D., b. Jan. 9, 1803, at Concord, Mass.; graduated in 1826 from Harvard University, and from the med. college of same institution in 1830 practised in Northfield and Concord, Mass., Louisville, Ky., and thirty-two years in Dorchester, Mass.; devoted himself to the study of vital statistics, the laws of life and health, insanity, etc., to which branches of science he has made many and important contributions. His principal writings are—*Physiology and Health, Elementary Physiology, Report on the Number and Condition of the Insane and Idiots of Massachusetts, Report on the Mortality of the U. S. in the Census of 1870*, besides essays in journals and magazines among which many attracted great attention, such as *The Increase of Human Life, Infant Mortality, Effect of Misdirected Education in the Production of Insanity, Political Economy of Health*. Since 1852, Dr. Jarvis has been president of the American Statistical Association.

O. B. FROTHINGHAM.

**Ja'sher, Book of**, a Hebrew work twice cited in the



Old Testament (Josh. x. 17 and 2 Sam. i. 18), but no longer extant. The former citation is the well known apostrophe of Joshua to the sun and moon, the latter the beautiful elegy of David upon Saul and Jonathan. The nature and contents of the book of Jasher have been a frequent topic for the ingenuity of biblical commentators. Gesenius conjectured that it was a poetical anthology formed or completed in the time of David or Solomon, and containing the favorite national songs, especially those commemorating the exploits of renowned heroes. The Hebrew name, *Sepher Hayashar*, is interpreted to mean "Book of the Just." Many forgeries have been produced purporting to be the lost book of Jasher, the most notable of which was one brought up in Hebrew in Italy and Poland, and also in German, during the seventeenth century, and was published in English by M. M. Noah, New York, 1840. Dr. J. W. Donaldson, an eminent English classical scholar, made an elaborate attempt to reconstruct the book of Jasher from the Pentateuch (*Jasher, Presumpta Archetypa Ceterum Hebraeorum*, etc., 1854), but his results were received with general incredulity. (See an essay on Jasher in E. Deutsch's *Remains*, 1874.)

**Jasmin'** (JACQUES), b. at Agen, in Southern France, Mar. 6, 1798, was the son of a tailor, and brought up in utter poverty until his twelfth year, when he was admitted into a priests' seminary; but being expelled two or three years later for some misconduct, he was apprenticed to a barber in his native town. At the age of eighteen he married and commenced business as a barber and hairdresser, but nevertheless allowed his literary instincts such development that he soon became widely famous as a troubadour. His earliest poem was printed in 1825, his masterpiece (translated by Longfellow as the *Blind Girl of Castel Cuillé*) appeared in 1836, and set the seal to his popularity. He was now patronized by king and nobles, but retained his simple mode of life until his death, Oct. 4, 1864. Jasmin received a pompous funeral, and his autobiographical sketches have been frequently reprinted.

**Jas'mine, Yellow**, an indigenous twining plant (*Gelsemium sempervirens*, natural order Loganiaceæ) growing in rich damp soil in the coast-districts from Virginia to the Gulf. It is a beautiful plant, with large, deep-yellow, sweet-smelling flowers, and climbs trees in the Southern forests. The root is used in medicine under the name *gelsemium*, and contains as its active principle an alkaloid, *gelsemia*. It is a nerve-poison, causing motor and sensory paralysis, and may be fatal in overdose through paralysis of respiration. EDWARD CURTIS.

**Ja'son** [Gr. *Iáson*, "healer" or "atoner"], a fabulous hero of the earliest Grecian mythology, whose exploits in the expedition of the ship *Argo* (see ARGONAUTÆ) to Colchis for the recovery of the Golden Fleece were recounted at great length and with infinite variety of adventure by the Greek cyclic poets, and by some of their Latin imitators. Modern inquirers into the origin of this myth have been led to class it as one of the numerous solar myths. (See Cox's *Mythology of the Aryan Nations*, 1869.)

**Jason**, a tyrant of Phœræ in Thessaly, probably the son of Lycophron, came into power about B. C. 395, and undertook to reduce all Thessaly under his dominion. In B. C. 375 he had succeeded in conquering all the cities except Pharsalus, which was supported by Sparta. Soon afterwards he was chosen dictator of Thessaly, took a prominent part in the wars between the states of Greece, and would probably have anticipated the career of Philip of Macedon had he not been assassinated, B. C. 370.

**Jas'per** [Gr. *iáspis*], a mineral, of the quartz family, occurring in abundance in veins and large masses, imbedded in a rock, sometimes as a rock itself, and often in the shape of pebbles. It is characterized by opacity and by numerous colors—red, yellow, green, white, blue, black, or brown—generally arranged in stripes and spots, apparently due to iron oxides. It is exceedingly hard, takes a fine polish, and is in request for ornamental objects, such as cameos, rings, and seals. Among the varieties are *Egyptian jasper*, yellow mixed with brown; *ribbon jasper*, so called from the distinctness of the stripes; *porcelain jasper*, full of small holes and much cracked; *Lydian stone*, flinty and black, used as a test of the purity of the alloys of gold; and *blood-stone* or *heliotrope*, deep-green with blood-red spots. The largest mines of jasper are those of the upper Ural in Siberia, especially the Korgon gorge, where this stone is cut out in enormous blocks. Jasper was highly prized by the ancients. It was the twelfth stone inserted in the breast-plate of the Jewish high priest (Ex. xxviii. 20), and the first of the twelve used in the foundation of the New Jerusalem; it was also the material of the wall (Rev. xxii. 18, 19), and the glory of the Divine Being is described (Rev. iv. 3) by comparison with a jasper. (Smith, *Dict. of Bible*.)

**Jasper**, county of N. Central Georgia. Area, 365 square miles. It is hilly, but fertile, producing cotton, to-

bacco, and corn. It contains iron, gold, and other mineral wealth. Cap. Monticello. Pop. 10,439.

**Jasper**, county of S. E. Illinois. Area, 484 sq. m. It is a level and very fertile region. Cattle, grain, wool, and tobacco are staple products. Cap. Newton. Pop. 11,234.

**Jasper**, county of N. W. Indiana. Area, 550 square miles. Its surface is mostly prairie, and a part is marsh-land. Much of its surface affords excellent pasturage. Live-stock, grain, and wool are largely produced. Cap. Rensselaer. Pop. 6354.

**Jasper**, county of Central Iowa. Area, 720 square miles. It is largely prairie-land, is very fertile, and yields abundance of coal. Cattle, grain, wool, and butter are staple products. Carriages, wagons, and harnesses are leading articles of manufacture. The county is traversed by the Des Moines Valley and the Chicago Rock Island and Pacific R. Rs. Cap. Newton. Pop. 22,116.

**Jasper**, county of S. E. Central Mississippi. Area, 650 square miles. It is a fertile and undulating region. Cotton, pork, and corn are staple products. Cap. Paulding. Pop. 10,884.

**Jasper**, county of S. W. Missouri, bounded on the W. by Kansas. Area, 600 square miles. It is diversified and fertile. Cattle, grain, tobacco, and wool are staple products. It is traversed by the Memphis Carthage and Northwestern R. R. Cap. Carthage. Pop. 14,928.

**Jasper**, county of E. Texas. Area, 918 square miles. It is heavily timbered, and has coal, iron ore, petroleum, and valuable salt-wells. The soil is productive. Cotton, corn, tobacco, pork, rice, and lumber are produced, the latter very extensively. The navigable Neches River flows along the W. border. Cap. Jasper. Pop. 4218.

**Jasper**, post-v., cap. of Walker co., Ala., 56 miles N. E. of Tuscaloosa, in a fertile and healthful region abounding in coal. It was twice burned during the war; has a good court-house, jail, church, Masonic hall, and a high school capable of accommodating 300 pupils. It has 6 dry-goods and 4 grocery stores, etc., and is steadily growing. Six miles N. lies the new city of S. Lowell. It has 1 weekly paper.

ANTHONY & SON, LDS. "MOUNTAIN EAGLE."

**Jasper**, tp. of Crawford co., Ark. Pop. 688.

**Jasper**, tp. of Crittenden co., Ark. Pop. 1416.

**Jasper**, post-v., cap. of Newton co., Ark., 70 miles N. N. W. of Little Rock. Pop. 72.

**Jasper**, post-v., cap. of Hamilton co., Fla., on the Atlantic and Gulf R. R., 100 miles by rail from Jacksonville and from Tallahassee. Pop. 138.

**Jasper**, post-v., cap. of Pickens co., Ga., 30 miles from Resaca, on the Atlantic and Western R. R.

**Jasper**, tp. of Wayne co., Ill. Pop. 1016.

**Jasper**, post-v., cap. of Dubois co., Ind., on the Patoka River, at the junction of the Mt. Vernon and Rockport divisions of the Cincinnati and South-western R. R., in the centre of an important black-coal region. It has 2 churches, a weekly newspaper, 5 hotels, 3 lumber and 2 flour mills, manufactures of carriages, agricultural implements, etc. The lumber, coal, and tobacco trade, and the manufactures above indicated, are the leading pursuits. Pop. 347. CLEMENT DOANE, ED. "COURIER."

**Jasper**, tp. of Adams co., Ia. Pop. 438.

**Jasper**, tp. of Carroll co., Ia. Pop. 157.

**Jasper**, tp. of Midland co., Mich. Pop. 139.

**Jasper**, tp. of Camden co., Mo. Pop. 292.

**Jasper**, tp. of Dallas co., Mo. Pop. 933.

**Jasper**, post-tp. of Jasper co., Mo. Pop. 758.

**Jasper**, tp. of Ozark co., Mo. Pop. 618.

**Jasper**, tp. of Ralls co., Mo. Pop. 1394.

**Jasper**, tp. of Shannon co., Mo. Pop. 93.

**Jasper**, tp. of Taney co., Mo. Pop. 615.

**Jasper**, post-tp. of Steuben co., N. Y., has 6 churches and some manufactures. Pop. 1683.

**Jasper**, tp. of Fayette co., O. Pop. 1992.

**Jasper**, post-v. of Newton tp., Pike co., O., 25 miles from Portsmouth, on the Ohio Canal and the Scioto River. Pop. 181.

**Jasper**, post-v., cap. of Marion co., Tenn., the N. terminus of the Jasper branch of the Nashville Chattanooga and St. Louis R. R., in the fertile Sequatchie Valley, which is well watered, finely timbered, and abounds in water-power, coal, iron ore, limestone, and sandstone. The town has 2 weekly newspapers, 3 churches, good schools, stores, etc. Pop. 375. A. L. GRIFFITH, ED. "UNION."

**Jasper**, post-v., cap. of Jasper co., Tex., on a creek near the Neches River, has 2 churches, 3 day and 2 Sunday schools, 3 weekly newspapers, and 3 hotels, and is an im-

portant business-centre for South-eastern Texas. Agriculture and mercantile business are the chief pursuits. It has nearly county fairs. T. J. CARRAWAY, Ed. "NEWSBOY."

**Jasper** (WILLIAM), b. in South Carolina about 1750; enlisted in the 2d South Carolina regiment at the commencement of the Revolution; became a sergeant, and distinguished himself in the attack upon Fort Moultrie by a British fleet, June 28, 1776, by leaping through an embrasure under a galling cannonade to recover the flag of the State, just shot off. In recognition of this act of heroism Gov. Rutledge gave Sergeant Jasper his own sword, offered him a commission as lieutenant, which he declined, and employed him thereafter upon outpost and picket duty, in which he frequently distinguished himself by deeds of eccentric daring. In the assault upon Savannah (Oct. 9, 1779) Sergeant Jasper accompanied D'Estaing and Lincoln in their attack upon the Spring Hill redoubt, and was killed while attempting to fasten to the parapet the colors of his regiment, presented by Mrs. Elliott. A square in the city of Savannah and a county in Georgia bear his name.

**Jasper Four-Corners** (P. O. JASPER), a v. of Jasper tp., Steuben co., N. Y. It has 3 churches and manufactures of lumber. Pop. 200.

**Jas'sy**, the capital of Moldavia, which since 1861 forms a part of Roumania, situated on a tributary of the Pruth. It is a large but poorly built and dirty city, in which fine ecclesiastical buildings and splendid palaces belonging to the nobility alternate with the miserable huts of the Jews and the lower population. It has important trade in grain. Pop. 90,000.

**Jasz-Bereny'**, town of Western Hungary, in the district of Jazygia, on both sides of the Zagya. It has a considerable trade in corn, cattle, and wine. In the middle of the city stands a monument said to indicate the tomb of Attila. Pop. 17,334.

**Ja'tiva, or San Feli'pe de Ja'tiva**, the ancient *Setabis*, town of Spain, in the province of Valencia. It is a handsome and well-built town, with several monuments from the times of the Moors. Pop. 15,631.

**Jats, or Jauts**, a singular race inhabiting North-western India between the Indus and the upper waters of the Ganges, variously considered by ethnologists as descendants of Getæ, Dacians, Huns, Avars, or other ancient races. They have also been treated as the ancestors of the gypsies. The Jats are tall, well-formed men, addicted to war, but good agriculturists, and are divided in religion between Mohammedanism, Brahmanism, and the Sikh doctrines.

**Jaubert** (CHEVALIER PIERRE AMÉLÉ), b. at Aix, in Provence, Southern France, June 3, 1779; studied Oriental languages under Sylvestre de Sacy, and at the age of nineteen accompanied the French expedition to Egypt as interpreter, in which capacity he rendered great services to and gained the friendship of Napoleon. Employed in various official posts in the East, Jaubert was sent to Persia in 1805, was imprisoned several months by the pasha of Bagdad, and became in 1815 *chargé d'affaires* at Constantinople. In 1818, Jaubert travelled to India with the object of bringing to France a herd of Cashmere or Thibetan goats, of which he succeeded in introducing 400. After this he became a professor of Oriental languages at the College of France, member of the Academy of Inscriptions in 1830, peer of France and councillor of state in 1841. Jaubert published his travels in Armenia and Persia (1821), a Turkish grammar (1823), a Berber grammar and dictionary (1844), and a French translation of the famous Arabian geographer Edrisi (2 vols., 1836-40). D. at Paris Jan. 28, 1847.

**Jau'er**, town of Prussia, in the province of Silesia, on the Neisse. It has large manufactures of linen and gloves, and carries on a very active trade in corn. Pop. 7887.

**Jan'ja**, town of Peru, department of Junin, 108 miles N. E. from Lima. It is beautifully situated on one of the streams tributary to the Apurimac, was the first capital of Peru under the viceroyalty until 1535, and its name has become a synonym in Spanish America for "Arcadia" or "Utopia." Pop. about 14,000.

**Jaun'dice**. This is a greenish-yellow color of the skin which is produced by the presence of the coloring-matter of the bile in the blood. It is not a specific disease, as is generally supposed by the laity, but a symptom which, taken in connection with other symptoms, points to the affection which gives rise to it. We might as well speak of vomiting, headache, etc. as diseases: they are not, but merely prominent symptoms of many varied morbid processes. If jaundice occurs in any great abundance, or persists for a length of time, we find all the secretions tinged with the bile, the urine becomes saffron-colored, and the stools, being deprived of their coloring-matter, are whitish. We may have jaundice produced in two ways—either from

suppression or retention of bile; the former is due to some disease of the liver which incapacitates it for performing its function; therefore the bile, which in the healthy state of the organ is constantly being filtered from the blood, accumulates in it. Jaundice from retention of bile is produced in this way: The bile, having been already formed, is prevented from making its way into the intestines by some obstruction in the bile-ducts; it is therefore reabsorbed, and again makes its appearance in the blood. The obstruction to the ducts may be either external or internal. Externally, we may have tumors of various kinds pressing on the ducts, as cancer of the pyloric end of the stomach, of the duodenum or the end of the pancreas, or a colon impacted with feces. Internally the gall-duct may be plugged up by mucus, or, what is far more common, by a biliary calculus passing through it; this is accompanied by a great deal of pain; indeed, it is said to be the most severe pain that could be felt. Some idea of it may be had from a knowledge of the fact that the common bile-duct is very seldom larger than a goose-quill, and the stones which pass through it are seldom smaller in diameter—sometimes attaining the size of a pigeon's egg. Accompanying the jaundice and pain in these cases we have nausea, vomiting, hicough, flatulence, and in the intervals between the intensity of the pain the patient is exhausted and drowsy. There is generally much more pain felt by the passage of a calculus for the first time than subsequently, as the ducts are generally left distended for its successors. Besides the above forms of jaundice there is also a malignant form, which is analogous to typhoid, yellow, or remittent fever, and is marked by typhoid symptoms from the beginning of the attack, and is accompanied by hemorrhages from the mucous membranes and skin. It almost always ends fatally. In jaundice from suppression the urine only contains those ingredients of the bile which pre-exist in the blood—viz. the bile coloring-matter and cholesterine; in that from retention we also have the bile-salts which have been formed in the liver, and afterwards absorbed and eliminated by the kidneys. To determine the former, nitric acid is generally added; it produces a bright grass-green color with the coloring-matter of the bile. The bile-salts, however, can only be detected by Pettenkofer's test, which is as follows: To the suspected liquid add a few drops of a solution of cane-sugar, and then slowly, drop by drop, sulphuric acid; at first a red color will be produced, which will afterwards change to a lake, and then to a deep purple.

The technical name of jaundice is *icterus*, from the Greek name of the golden thrush, which, according to Pliny, when seen by a jaundiced person would die and the patient recover. Now, however, we treat the affection more scientifically, looking to its origin. Where it is due to suppression little can be done except in cases of acute inflammation of the liver, but in those cases due to obstruction there is more success with it. The indications are to improve the patient's general condition by a proper and nutritious diet. Fats of all kinds should be avoided, as they cannot be digested without the assistance of the bile. Next, we should attend to the constipation from which these patients almost invariably suffer; for this rhubarb, senna, and aloes are the favorites. Opium should be given to relieve the intense pain. After the removal of the obstruction we may hasten the disappearance of the jaundice, and the annoying itching which accompanies it, by steam and alkaline baths.

EDWARD J. BIRMINGHAM.

**Ja'va**, an island in the Malay Archipelago, the third largest of the Sunda group, belonging to the Netherlands, and bounded N. by the Sea of Java, E. by the Strait of Bali, S. by the Indian Ocean, and W. by the Strait of Sunda, which separates it from the island of Sumatra. Area, 49,730 square miles. In the northern part of the island lie some tracts of low, level land, mostly consisting of mangrove-swamps, and presenting a coast unsafe for navigation, and containing very few landlocked harbors, such as those of Batavia and Surabaya, though affording several good roadsteads, where ships may anchor with safety, as the waters of the Java Sea are calm, hurricanes unknown, and storms rare except at the change of the monsoons. Otherwise, the whole island is a theatre of traversed from E. to W. by several ranges of mountains, of which the southernmost forms a rough and broken coastline, washed by a heavy surf. The highest points are Semeru, 12,250 feet, and Slamet, 11,000 feet. These ranges are in geological respects of volcanic formation, active volcanoes and violent eruptions are of frequent occurrence, especially in the south-eastern districts. Here the volcano Papandayan covered in one eruption 17,000 acres of 4 miles radius with a layer of ashes 30 feet thick, and in 1823, Galungcongcaused still greater destruction by a single eruption; 20,000 persons are said to have been killed. The mountains are generally clad to their very tops with splendid forests, and enclose beautiful, exceedingly fertile, and well-watered



valleys, numerous rivers flowing down to the sea from both sides, generally rapid and shallow, but sometimes navigable; as, for instance, the Solo, Kediri, and Tjimanook. Although gold-dust is found in several rivers and coal and rock-salt in some mountain-tracts, and although mineral springs of different kinds abound all over the island, yet the Javanese mountains are devoid of minerals suitable for mining. The volcanoes, however, are remarkable for the amount of sulphur and sulphurous gases they discharge. In a lake near the crater of Taschem, at the E. end of the island, the water is so strongly impregnated with sulphuric acid that fish cannot live in the sea near the mouth of the stream which issues from it; and near Batar, in the Vale of Poison, the exhalations of carbonic acid gas are so strong that birds drop down from the air, killed by them, and the ground is strewn with carcasses of animals which entered the vale unaware of the danger. The climate of Java is unhealthy in the northern marshes, but at a little elevation it is not only healthful, but agreeable. The wet season, with its westerly winds, lasts from October to March, but even during this time dry periods with fair weather occur. At the equinoxes the weather is generally very changeable, with heavy gusts of wind and thunderstorms. But the temperature is remarkably equable; in the lowlands the thermometer seldom rises above 90° or falls below 70°. Vegetable life is developed to an astonishing degree. Rice is the principal cereal, and in places where irrigation can be effected it is raised in two crops annually. Coffee is the staple product of the country, and is cultivated under the supervision of the government in plantations situated at an elevation of 2000 feet. Sugar and spices of superior quality are raised without difficulty. In 1872 the value of the exports of coffee was 38,524,000 florins; of sugar, 43,893,000 florins; and of spices 1,029,000 florins. Cotton is also grown, from which a coarse fabric is made. The largest part of the island is covered with vast forests of the most valuable trees—the fig tree, the dammar pine, and, first among all, the teak tree, which yields the best timber known. Equally abundant is animal life. Buffaloes are generally used in agricultural labor, and are more numerous than oxen and horses. The wild ox and two kinds of wild hogs are common; also the royal tiger, the one-horned rhinoceros, numerous kinds of apes, immense bats five feet across the wings, the peacock, and a great variety of fish.

The inhabitants number 17,298,200, of whom 28,926 are Europeans, 183,758 Chinese, 22,032 Arabs, and the rest natives; the island is thus one of the most densely populated countries in the world. The natives belong to the Malayan race, but in capacity for civilization they surpass all other branches of this family. They are small, yellow, and not very energetic, but patient, cheerful, and endowed with fine sensibilities. They are good agriculturists, probably surpassing all other Asiatic peoples in this branch of industry. They are also skilled in the manufacture of different articles of metal, such as their national weapons and their national musical instruments, being very fond of music. In the fifteenth century they embraced Mohammedanism; before that time Booddhism was their religion, and many Booddhist temples are found in the island, as, for instance, the Boro Budor (which see). In 1511 the Portuguese first visited Java, and in 1595 the Dutch made the first settlements here. In 1677 the whole island became a Dutch colony, and since 1830 it has been governed as a province of the kingdom of the Netherlands. At the head of the government is a governor-general, residing at Batavia and ruling all the Dutch colonies in the East Indies. The island is divided into 24 residencies, two of which, however, Jokjokerta and Surakerta, have been allowed to retain their native princes, though under Dutch supremacy. The revenues of this island bring annually a surplus of \$5,000,000 into the treasury of the Netherlands. The language spoken in the largest part of Java and on some adjacent islands (the Javanese) belongs to the Malayo-Polynesian group of languages, but it is distinguished from the Malay proper and from the Sundese, spoken in the western part of the island. It consists of 20 consonant and 6 vowel sounds, of which latter the *o* is predominant. Its numerous foreign elements, Arabic, Sanskrit, and others, are very freely modified. Its development is rich, but one-sided. It possesses numerous and fine distinctions for real objects, processes, and phenomena, but it has no significations for general or abstract ideas. It has different sets of words, forms, and phrases when used by a superior to an inferior, or by an inferior to a superior, but it has no difference of tone in prose and in poetry. The literature consists of chronicles, religious works, and remodellings of Hindoo poetical creations, but it belongs mostly to a much earlier period, and can be traced back to the first centuries of our era. (See W. von Humboldt, *Ueber die Kawi-sprache*, Sir Stamford Raffles, *History of Java*, and R. Wallace, *The Malay Archipelago*.)

CLEMENS PETERSEN.

**Java**, post-tp. of Wyoming co., N. Y., has 5 churches, some mills, and quarries of fine building-stone. Pop. 1956.

**Jav'elin** [Fr. *javeline*], a short, heavy spear used for throwing with the hand at an enemy. The Roman *pilum* was essentially a javelin, and was the most formidable offensive weapon of those times.

**Jaw'orow**, town of Austria, in Galicia, on the Krahowska, has large paper-mills, valuable fisheries, and in the vicinity some mineral springs which are much resorted to for their medicinal powers. Pop. 7209.

**Jaxar'tes**, or **Sir Darya**, a river of Toorkistan, rises in the Thian Shan Mountains, flows through the valley of Khokan and the Khirghee dominions, and divides at Otrar into two branches, of which the northern and largest, forming the boundary between Russia and Toorkistan, falls into the Sea of Aral, while the southern loses itself in some small lakes in the steppes.

**Jay**, a name given to many birds of the family Corvidæ, sub-family Garrulinae. The typical species is the *Garrulus glandarius*, or common jay of Europe. The blue jay of the Eastern U. S. (*Cyanura cristata*) is a beautiful bird, whose harsh screaming voice is well known. The U. S. have many species representing the genera *Gymnocitta*, *Cyanocitta*, *Nanthusia*, *Prinosorus*, *Psittorhinus*, etc. Many of them are very beautiful birds.

**Jay**, county in E. Indiana, bounded on the E. by Ohio. Area, 370 square miles. The surface is somewhat varied, the soil productive, but in part rather heavy. Cattle, grain, wool, and maple-sugar are leading products. It is traversed by the Cincinnati Richmond and Fort Wayne R. R. Cap. Portland. Pop. 15,000.

**Jay**, post-tp. of Franklin co., Me., on the Androscoggin R. R., 15 miles N. of Auburn. It has 4 churches, 2 free libraries, and some manufactures. Pop. 1490.

**Jay**, post-tp. of Essex co., N. Y., in the Adirondack region. It has many lofty mountains, large beds of iron ore and small ones of graphite. Iron, nails, and lumber are extensively manufactured. Pop. 2496.

**Jay**, tp. of Elk co., Pa. Pop. 534.

**Jay**, post-tp. of Orleans co., Vt., on the Canada line, 55 miles N. of Montpelier. It has 3 churches and manufactures of lumber, leather, etc. Pop. 553.

**Jay** (JOHN), LL.D., b. in New York City Dec. 12, 1745, of Huguenot stock; graduated at King's (now Columbia) College in 1764; was admitted to the bar in 1768; became law-partner with Robert R. Livingston, and married (1774) a daughter of William Livingston. In the agitations caused by the successive encroachments of the British cabinet upon American liberty, Jay first became conspicuous as a member of the "committee of correspondence" appointed May 16, 1774, by the citizens of New York to represent their views upon the questions growing out of the Boston Port bill; was the supposed author of the suggestion emanating from that committee for the convocation of a Continental Congress; was elected a member of that body, and took a prominent part in its proceedings. He was the author of the address to the people of Great Britain adopted by the first Congress (Oct., 1774), and of that to the people of Canada adopted by the second Congress (May, 1775); was a member of the committee of correspondence "with European friends of American liberty," in which capacity he became the channel of secret negotiations with France; was commissioned colonel of the 2d regiment raised in New York City, and in Apr., 1776, was chosen a member of the Provincial Congress of New York, retiring from the Continental Congress in order to lend his counsels to his native State in that critical juncture. Jay was the leading member of the New York Congress; was author of its chief public documents, including the constitution of 1777; and on its dissolution was appointed chief-justice, which office was confirmed to him by the new State legislature. In 1778 he was again elected to the Continental Congress, became president of that body (Dec. 10), and was appointed in the following year minister to Spain, where he arrived in 1780. He remained at Madrid two years, obtaining from the Spanish government some material and moral aid for American independence; was a colleague with Franklin and Adams in the commission which negotiated peace with Great Britain (Nov. 30, 1782), and on returning to America in 1784 was chosen by Congress secretary for foreign affairs—a post which he held for five years, until the establishment of the Federal government under the Constitution (1789). Jay was one of the writers in the *Federalist* in defence of the Constitution, took a leading part in the New York State convention, which, after much opposition, gave its adhesion to the Constitution (1788), and was appointed by Washington (1789) the first chief-justice of the U. S. In 1792 he was the candidate of the Federalists for governor of

New York: was sent as minister to England in 1794, and signed (Nov. 19, the instrument known as "Jay's treaty." By its provisions the eastern boundary of Maine was determined; American citizens recovered above \$10,000,000 for illegal captures by British cruisers, and the western posts held by British garrisons were surrendered; but in consequence of the exclusion of American vessels from Canadian ports, the restriction placed upon the West India trade, and the regulations upon neutrality as between English and French privateers, an unprecedented agitation ensued, and the treaty was violently denounced, but was ratified by Washington, with the approval of the Senate, Aug. 14, 1795. During his absence in England, Jay was elected governor of New York—an office which he held for six years—and in 1801 withdrew from public life, declining a second appointment as chief-justice of the U. S. Supreme Court, for which he was nominated by Pres. Adams and confirmed by the Senate. For the remainder of his life, which extended over more than a quarter of the present century, Jay resided upon his ancestral estate at Bedford, Westchester co., holding aloof from political contests, but taking a lively interest in religious and philanthropic movements. As early as 1785 he had been president of a society in New York for promoting the emancipation of slaves, and it was under his auspices that slavery was abolished in New York in 1799. He was a member of the Episcopal Church, and was widely renowned for strict moral purity, a vigorous and logical intellect, a lofty sense of justice and humanity, disinterested patriotism, and unyielding integrity. D. at Bedford, N. Y., May 17, 1829. (See his *Life*, by his son, William Jay, 1833.)

PORTER C. BLISS.

**Jay (JOHN)**, a son of William Jay, b. in New York City June 23, 1817; graduated in 1836 at Columbia College; became a lawyer in 1839. He is a prominent member of the Protestant Episcopal Church, the Union League, and various historical and other learned societies. Author of many anti-slavery, legal, political, ecclesiastical, and other pamphlets and reports. In 1869 he was appointed U. S. minister to Austria. Returned in 1875.

**Jay (WILLIAM)**, b. at Tisbury, England, May 8, 1769. With slight previous education he commenced preaching at the age of sixteen, and before attaining his majority had delivered more than 1000 sermons. When twenty-two years old he became minister of Argyle chapel, Bath, and held that position sixty-one years, until the year of his death. Mr. Jay was a wonderfully eloquent pulpit-orator. His voluminous writings have been collected in 12 vols. (Bath, 1842-44), and reprinted in America in 3 vols. Of these, the *Morning and Evening Exercises* have enjoyed a wide popularity. He left an *Autobiography*, published since his death, which occurred at Bath Dec. 27, 1840. See Wilson's *Memoir of Jay*, 1851.)

**Jay (WILLIAM)**, LL.D., a son of John Jay (1745-1829), b. in New York City June 16, 1789; graduated at Yale in 1807, and studied law, which he never actively practised. He was prominent in the temperance, anti-slavery, peace, and Bible societies; became in 1818 a judge of the common pleas, and was 1820-42 first judge of Westchester co., N. Y., but lost the place because of his anti-slavery views. He published a *Life of John Jay* (2 vols., 1833), an *Inquiry into the Character of the American Colonization and Anti-slavery Societies* (1833), a *View of the Action of the Federal Government in Behalf of Slavery* (1838), a *Review of the Causes, etc., of the Mexican War* (1846), *War and Peace* (1848), and numerous minor publications. D. at Bedford, N. Y., Oct. 14, 1868.

**Jayne**, an unorganized county of Dakota.

**Jaynes'ville**, post-v. of Bremer co., Ia., on the Cedar Falls and Minnesota R. R.

**Jeaffreson (JOHN CAROL)**, b. at Fralingham, Suffolk, England, in 1831; graduated at Oxford; entered Lincoln's Inn in 1852 as a law-student, and was admitted to the bar in 1859. Besides a number of novels, he wrote *A Book about Doctors* (1860), *A Book about Lawyers* (1866), and *A Book about the Clergy* (1870).

**Jeannerett**, post-v. of Iberia parish, La., on the Bayou Teche, 12 miles from New Iberia.

**Jeannin' (PIERRE)**, b. at Autun, France, in 1540; studied law under Cujas; was counsellor under Charles IX. and Henry III., president of the Parliament of Burgundy in 1579, and of that of Paris under Henry IV.; was the negotiator of the treaty of 1609, which assured the independence of Holland. D. in 1622.

**Jeannon' (PHILIPPE AUGUSTE)**, b. at Boulogne May 10, 1809; studied painting almost without any guidance; obtained a medal in 1833; attracted great attention by his half-touching, half-humorous genre pictures of low life;

and was made director of the national museums in 1848. Though he held this office only one year, he made great improvements in the arrangements of the museum of the Louvre. Of his later works is *The Abandoned Poet of Ambleuse*, now in the Luxembourg. D. Apr. 23, 1877.

**Jeans'ville**, post-v. of Hazel tp., Luzerne co., Pa., on the Lehigh Valley R. R. Has mines of anthracite coal.

**Jebail'**, or **Jubeil**, the modern name of *Gebal* or *Ephlos*, one of the most ancient cities of Phœnicia, noted in mythology for the birth of Adonis, and in biblical history for having furnished the artificers (Giblites) of Solomon's temple. Gebal is thought to have been the metropolis of the Phœnicians before the rise of Sidon, to have taken an important part in the earliest operations of shipbuilding, navigation, and colonization, having founded commercial and mining settlements throughout the Ægean Islands and the coasts of the Black Sea, as also to have introduced into Greece a knowledge of the alphabet. The Greek name *Byblos* is derived from the Egyptian word for papyrus, and perhaps alludes to the earliest cultivation of writing. The Egyptian myths of Isis, Osiris, and Typhon were partially of Phœnician origin, and some of the incidents are located at Byblos. Jebail is now a small village of 600 inhabitants, on the sea-coast 20 miles N. of Beyroot; it contains a castle which was noted in the annals of the Crusades.

**Jebb (JOHN)**, b. at Drogheda, Ireland, Sept. 27, 1775; studied at Dublin University; entered the Church of England, and became bishop of Limerick in 1823. Residing in a district chiefly inhabited by Catholics, Bishop Jebb was noted for his liberal spirit towards them and his maintenance of their rights. He wrote several works on doctrinal theology, but is now remembered chiefly by his *Sacred Literature* (1820), in which he combated some of the views of Dr. Lowth about Hebrew poetry, and elucidated many obscure or difficult biblical topics. D. at Limerick Dec. 7, 1833.

**Jebb (SIR JOSHUA)**, R. E., K. C. B., b. in England about 1793; entered the British army at an early age, and was brought into public notice when serving with his regiment in Australia through being employed to superintend some of Captain McConochie's celebrated experiments for the amelioration of the condition of convicts, by offering them a shortening of their terms of sentence as a premium upon good behavior. Jebb was so reliable and efficient in the execution of this delicate commission that he was requested to prepare plans for the construction and management of convict prisons which might obviate the practical difficulties encountered under the then existing system. In 1840 the Pentonville prison was built according to the plans of Col. Jebb, thus inaugurating in England the *solitary or separate* system of imprisonment. As inspector-general of prisons, enjoying the rank of major-general and the honor of knighthood, Sir Joshua Jebb devoted the remainder of his life to devising improvements in penal law and prison discipline, and d. in London June 26, 1863.

**Jebb (SAMUEL)**, M. D., b. at Nottingham, England, in 1690; studied at Cambridge, and practised medicine at Stratford. He published an edition of Justin Martyr (1719), a Latin collection of writings on Mary, queen of Scots (1725), edited the *Opus Majus* of Roger Bacon (1727), and founded the *Bibliotheca Literaria* (1722-24), a learned magazine to which many eminent classical scholars contributed. D. in 1772.

**Jed'burgh**, town of Scotland, in Roxburghshire, on the Jed, contains some very interesting ruins of a magnificent abbey erected in the twelfth century and destroyed in the sixteenth, and of a castle which was once the residence of the Scottish kings. Pop. about 4000.

**Jeddo**. See YEDDO.

**Jed'do**, tp. of Knox co., Mo. Pop. 1134.

**Jeddo**, post-v. of Orleans co., N. Y. Pop. 124.

**Jeddo**, post-v. of Foster tp., Luzerne co., Pa., on a branch of the Lehigh Valley R. R. It has splendid beds of anthracite coal.

**Jeffers (WILLIAM N.)**, U. S. N., b. in New Jersey Oct. 6, 1824; entered the navy as a midshipman Sept. 25, 1840; became a passed midshipman in 1846, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866, a captain in 1870; served on the E. coast of Mexico during our war with that country, and participated in the capture of Vera Cruz, Alvarado, Tampico, and Tampico. Commanded the Underwriter during the brilliant operations in the sounds of North Carolina in Jan. and Feb., 1862, and the Monitor in the action with Fort Darling on May 15 of that year. Early in 1873 he received the appointment of chief of the bureau of ordnance—an appointment, it may be said, sealed with the approbation of the whole navy, which had long recognized his marked ability in every



branch of his profession, and particularly in ordnance matters, to which Jeffers had given, for many years, especial attention.

FOXHALL A. PARKER.

**Jefferson**, county of N. Central Alabama. Area, 980 square miles. It is in the Black Warrior coal-field, and will probably become a very important coal and iron region, for excellent hematite ores abound. The surface is hilly and rough, with fertile valleys. Cattle, corn, cotton, and wool are staple products. Iron is manufactured. The county is traversed by the Alabama and Chattanooga R. R. Cap. Elyton. Pop. 12,345.

**Jefferson**, county of S. E. Central Arkansas. Area, 900 square miles. It is traversed by the Arkansas River. It is a level and very fertile alluvial plain, well timbered. Live-stock, corn, and cotton are staple products. Cap. Pine Bluff. Pop. 15,733.

**Jefferson**, county of N. Central Colorado, in the foothills of the Rocky Mountains. Area, about 800 square miles. It has excellent farm and grazing land, but needs irrigation. Good lignitic coal, bog iron, and fire-clay abound. It is intersected by the Colorado Central and other railroads. Cap. Golden. Pop. 2390.

**Jefferson**, county of Florida, extending from the Georgia line on the N. to the Gulf of Mexico. Area, 470 square miles. It is well timbered, and has a generous, though varied, soil. Cotton, sugar-cane, corn, rice, and fruit are staple products. The Jacksonville Pensacola and Mobile R. R. intersects the county. Cap. Monticello. Pop. 13,398.

**Jefferson**, county of E. Georgia. Area, 634 square miles. It is level and fertile, and is traversed by the river Ogeechee and the Central R. R. of Georgia. Corn and cotton are staple products. Cap. Louisville. Pop. 12,190.

**Jefferson**, county of S. Illinois. Area, 576 square miles. It is partly prairie and partly forest. The soil is productive. Live stock, grain, tobacco, and wool are staple products. The county is traversed by the St. Louis and South-eastern R. R. Cap. Mt. Vernon. Pop. 17,864.

**Jefferson**, county of S. E. Indiana. Area, 362 square miles. It has the Ohio River on the S. The country near the river is broken by bluffs, but the remainder is quite level. The soil is fertile. Cattle, grain, and wool are staple products. The manufactures include cooperage, carriages, flour, etc. The Madison and Indianapolis R. R. traverses the county. Cap. Madison. Pop. 29,741.

**Jefferson**, county of S. E. Iowa. Area, 432 square miles. It has a very fertile soil, is undulating, and abounds in coal and timber. Cattle, grain, and wool are staple products. It is traversed by the Chicago Rock Island and Pacific and the Burlington and Missouri River R. Rs. Cap. Fairfield. Pop. 17,839.

**Jefferson**, county of N. E. Kansas. Area, 550 square miles. It is a very fertile, high-rolling prairie region, with considerable timber, abundance of limestone, and some coal. Cattle, grain, and wool are staple products. The Atchison Topeka and Santa Fé, the Kansas Central, and other railroads intersect the county. Cap. Oskaloosa. Pop. 12,206.

**Jefferson**, county of Kentucky, bounded on the N. W. by the Ohio River. Area, 600 square miles. It has a varied surface and a fertile and highly cultivated soil. Cattle, grain, and wool are staple products. The manufactures and commerce of Louisville, the principal city of this county and State, are very extensive. They are treated of under the head of LOUISVILLE (which see). The county is traversed by various railroads centring at Louisville, the capital. Pop. 118,953.

**Jefferson**, parish of Louisiana, extending from Lake Pontchartrain, near New Orleans, southward to Barataria Bay. Area, about 250 square miles. It is intersected by the Mississippi River, and contains numerous lakes, bayous, and swamps. Rice, corn, and sugar-cane are the staple products. It is traversed by Morgan's Louisiana and Texas R. R. Cap. Carrollton. Pop. 17,767.

**Jefferson**, county of Mississippi, having the Mississippi River for a part of its western boundary, separating it from Louisiana. Area, 500 square miles. It has a fertile soil. Cotton and corn are staple products. Cap. Fayette. Pop. 13,848.

**Jefferson**, county of Missouri, bounded on the E. by the Mississippi River. Area, 504 square miles. It is very fertile, excepting some tracts in the western part. It abounds in metallic wealth. Lead is found here extensively. Cattle, grain, tobacco, and wool are staple products. The county is traversed by the St. Louis and Iron Mountain R. R. Cap. Hillsborough. Pop. 15,380.

**Jefferson**, county in Montana, W. of the Missouri River. Area, 2720 square miles. It contains rich agricul-

tural and pastoral resources, and gold-mines are found on the tributaries of the Missouri and Jefferson rivers. Cattle, grain, butter, and lumber are staple products. Cap. Radersburg. Pop. 1531.

**Jefferson**, county of Nebraska, bounded on the S. by Kansas. Area, 576 square miles. The county is partly flat and partly high rolling prairie. The soil is fertile, especially along the streams. It is well adapted to wheat and to pasturage. Iron ore is found. Timber is not abundant. The county is traversed by the St. Joseph and Denver City R. R. Cap. Fairbury. Pop. 2440.

**Jefferson**, county of New York, having Lake Ontario on the W. and the St. Lawrence River on the N. W. It includes a part of the Thousand Islands in that stream. Area, 1868 square miles. Its surface is quite level near the lake and river, but much higher in the eastern part. Much of its diversified surface is very fertile. Cattle, wool, hay, grain, and dairy products are the great staples. Iron ore abounds. The manufactures include iron, machinery, castings, agricultural and other tools, leather, paper, cotton and woollen goods, flour, lumber, malt, cooperage, and many other articles. The fisheries are important. The county is traversed by the Rome Watertown and Ogdensburg, the Utica and Black River, and other railroads. Cap. Watertown. Pop. 65,415.

**Jefferson**, county of Ohio, bounded on the E. by the Ohio River, which separates it from West Virginia. Area, 350 square miles. It is a pleasant, hilly, and very fertile region, abounding in coal. Cattle, wool, and grain are staple products. Carriages, wagons, clothing, and a great variety of other goods are manufactured. The county is traversed by the Pittsburg Cincinnati and St. Louis R. R. Cap. Steubenville. Pop. 29,188.

**Jefferson**, county of W. Central Pennsylvania. Area, 500 square miles. It is quite rough and hilly, and abounds in bituminous coal and iron ores. The soil is fertile, especially in the valleys. Timber is abundant. Cattle, grain, and wool are staple products. Lumber and leather are extensively manufactured. Cap. Brookville. Pop. 21,656.

**Jefferson**, county of E. Tennessee, having the Holston River on the N. W. Area, about 225 square miles. It is traversed by French Broad River and the Virginia and East Tennessee R. R. Iron ore abounds. It is mountainous, with fertile valleys and picturesque scenery. Cattle, grain, wool, and tobacco are staple products. Cap. Dandridge. Pop. 19,476 in 1870, since which time its area has been reduced.

**Jefferson**, county of S. E. Texas, having Sabine Lake and river on the E. and N. E., and the Gulf of Mexico on the S. Area, 900 square miles. The surface near the coast is open prairie, affording fine pasturage. The rest of the county is in the main heavily timbered. Live-stock, cotton, rice, lumber, and some tobacco are exported. The county is traversed by the Texas and New Orleans R. R. Cap. Beaumont. Pop. 1906.

**Jefferson**, county of N. W. Washington Territory, having the Pacific Ocean on the W. and Hood's Canal and Puget Sound on the E. Area, some 1500 square miles. It is partly mountainous, and is covered with enormous trees. Lignitic coal is found. Mount Olympus is 8138 feet high. Much of the soil is very fertile. Lumbering and fishing are at present the chief interests. Cap. Port Townsend. Pop. 1268.

**Jefferson**, county of E. West Virginia, having the Potomac River on the N. E., and bounded on the S. E. and S. W. by Virginia. Area, 260 square miles. It is a part of the Shenandoah Valley, and is a fertile, rolling limestone region. Cattle, grain, and wool are staple products. The county is traversed by the Baltimore and Ohio and the Winchester and Strasburg R. Rs. Cap. Shepherdstown. Pop. 13,219.

**Jefferson**, county of S. E. Wisconsin. Area, 576 square miles. It has a fertile limestone soil. Cattle, grain, wool, and tobacco are staple products. The manufactures include carriages, cooperage, flour, malt liquors, furniture, lumber, saddlery, etc. The county is traversed by the Chicago and North-western and the La Crosse and Milwaukee R. Rs. Cap. Jefferson. Pop. 34,040.

**Jefferson**, a v. and tp. of Marengo co., Ala., 8 miles N. W. of Linden. Pop. 233; of tp. 2445.

**Jefferson**, tp. of Boone co., Ark. Pop. 1649.

**Jefferson**, tp. of Calhoun co., Ark. Pop. 194.

**Jefferson**, tp. of Desha co., Ark. Pop. 773.

**Jefferson**, tp. of Independence co., Ark. Pop. 777.

**Jefferson**, tp. of Jackson co., Ark. Pop. 1976.

**Jefferson**, tp. of Newton co., Ark. Pop. 334.

**Jefferson**, tp. of Ouachita co., Ark. Pop. 782.

**Jefferson**, tp. of Saline co., Ark. Pop. 169.  
**Jefferson**, tp. of Sevier co., Ark. Pop. 347.  
**Jefferson**, post-v., cap. of Jackson co., Ga., 18 miles N. W. of Athens.  
**Jefferson**, post-v. and tp. of Cook co., Ill., 7 miles N. W. of Chicago, on the Chicago and North-western R. R. Pop. of tp. 1813.  
**Jefferson**, tp. of Stephenson co., Ill. Pop. 546.  
**Jefferson**, tp. of Adams co., Ind. Pop. 494.  
**Jefferson**, tp. of Allen co., Ind. Pop. 1445.  
**Jefferson**, tp. of Boone co., Ind. Pop. 1675.  
**Jefferson**, tp. of Carroll co., Ind. Pop. 947.  
**Jefferson**, tp. of Cass co., Ind. Pop. 1285.  
**Jefferson**, post-v. of Clinton co., Ind. (Washington tp.) Pop. 253.  
**Jefferson**, tp. of Elkhart co., Ind. Pop. 982.  
**Jefferson**, tp. of Grant co., Ind. Pop. 1398.  
**Jefferson**, tp. of Greene co., Ind. Pop. 1348.  
**Jefferson**, tp. of Henry co., Ind. Pop. 1234.  
**Jefferson**, tp. of Huntington co., Ind. Pop. 1227.  
**Jefferson**, tp. of Jay co., Ind. Pop. 1640.  
**Jefferson**, tp. of Kosciusko co., Ind. Pop. 711.  
**Jefferson**, tp. of Miami co., Ind. Pop. 1370.  
**Jefferson**, tp. of Morgan co., Ind. Pop. 1081.  
**Jefferson**, tp. of Newton co., Ind. Pop. 1606.  
**Jefferson**, tp. of Noble co., Ind. Pop. 1293.  
**Jefferson**, tp. of Owen co., Ind. Pop. 2018.  
**Jefferson**, tp. of Pike co., Ind. Pop. 2188.  
**Jefferson**, tp. of Pulaski co., Ind. Pop. 171.  
**Jefferson**, tp. of Putnam co., Ind. Pop. 990.  
**Jefferson**, tp. of Sullivan co., Ind. Pop. 1251.  
**Jefferson**, tp. of Switzerland co., Ind. Pop. 3268.  
**Jefferson**, tp. of Tipton co., Ind. Pop. 1738.  
**Jefferson**, tp. of Washington co., Ind. Pop. 1532.  
**Jefferson**, tp. of Wayne co., Ind. Pop. 1785.  
**Jefferson**, tp. of Wells co., Ind. Pop. 1773.  
**Jefferson**, tp. of Whitley co., Ind. Pop. 1263.  
**Jefferson**, tp. of Adair co., Ia. Pop. 362.  
**Jefferson**, tp. of Allamakee co., Ia. Pop. 1015.  
**Jefferson**, tp. of Bremer co., Ia. Pop. 766.  
**Jefferson**, tp. of Buchanan co., Ia. Pop. 918.  
**Jefferson**, tp. of Butler co., Ia. Pop. 613.  
**Jefferson**, tp. of Clayton co., Ia. Pop. 2245.  
**Jefferson**, tp. of Dubuque co., Ia. Pop. 1550.  
**Jefferson**, tp. of Fayette co., Ia. Pop. 639.  
**Jefferson**, post-v. and tp., cap. of Greene co., Ia., 50 miles N. W. of Des Moines, on the Coon River and the North-western R. R.; has a bank, 22 stores, 4 churches, a fine court-house, a good graded school, and a weekly newspaper. Pop. of v. 779; of tp. 1828.  
 SWALM & RHODES, EDS. "BEE."  
**Jefferson**, tp. of Harrison co., Ia. Pop. 694.  
**Jefferson**, tp. of Henry co., Ia. Pop. 1438.  
**Jefferson**, tp. of Johnson co., Ia. Pop. 900.  
**Jefferson**, tp. of Lee co., Ia. Pop. 1059.  
**Jefferson**, tp. of Louisa co., Ia. Pop. 846.  
**Jefferson**, tp. of Madison co., Ia. Pop. 655.  
**Jefferson**, tp. of Mahaska co., Ia. Pop. 1174.  
**Jefferson**, tp. of Marshall co., Ia. Pop. 691.  
**Jefferson**, tp. of Polk co., Ia. Pop. 832.  
**Jefferson**, tp. of Poweshiek co., Ia. Pop. 900.  
**Jefferson**, tp. of Ringgold co., Ia. Pop. 527.  
**Jefferson**, tp. of Taylor co., Ia. Pop. 542.  
**Jefferson**, tp. of Warren co., Ia. Pop. 1012.  
**Jefferson**, tp. of Wayne co., Ia. Pop. 704.  
**Jefferson**, tp. of Jackson co., Kan. Pop. 1542.  
**Jefferson**, tp. of Jefferson co., Kan. Pop. 1680.  
**Jefferson**, post-tp. of Lincoln co., Me., 18 miles N. N. E. of Wiscasset. Pop. 1821.  
**Jefferson**, post-v. and tp. of Frederick co., Md., 8 miles S. W. of Frederick City. Pop. of v. 27; of tp. 1491.  
**Jefferson**, tp. of Cass co., Mich. Pop. 1047.  
**Jefferson**, post-tp. of Hillsdale co., Mich. Pop. 1973.  
**Jefferson**, tp. of Houston co., Minn. Pop. 372.  
**Jefferson**, tp. of Winona co., Minn. Pop. 640.  
**Jefferson**, tp. of Andrew co., Mo. Pop. 1605.

**Jefferson**, tp. of Cedar co., Mo. Pop. 1040.  
**Jefferson**, tp. of Clarke co., Mo. Pop. 843.  
**Jefferson**, tp. of Cole co., Mo. Pop. 1839.  
**Jefferson**, tp. of Daviess co., Mo. Pop. 1059.  
**Jefferson**, tp. of Grundy co., Mo. Pop. 874.  
**Jefferson**, tp. of Linn co., Mo. Pop. 1810.  
**Jefferson**, tp. of Maries co., Mo. Pop. 1123.  
**Jefferson**, tp. of Monroe co., Mo. Pop. 2147.  
**Jefferson**, tp. of Osage co., Mo. Pop. 1390.  
**Jefferson**, tp. of Polk co., Mo. Pop. 480.  
**Jefferson**, tp. of Saline co., Mo. Pop. 3002.  
**Jefferson**, tp. of Scotland co., Mo. Pop. 3297.  
**Jefferson**, tp. of Shelby co., Mo. Pop. 867.  
**Jefferson**, tp. of Wayne co., Mo. Pop. 371.  
**Jefferson**, post-tp. of Coos co., N. H., in the White Mountain region. It has extensive manufactures of lumber and starch. It is a place of summer resort. Pop. 826.  
**Jefferson**, tp. of Morris co., N. J. Pop. 1430.  
**Jefferson**, post-v. and tp. of Schoharie co., N. Y., 5 miles N. of Stamford, the nearest railroad station. The town of Jefferson is hilly, has 2 churches, a weekly newspaper, various stores, and manufactures of shoes, cabinet-ware, etc. Principal business, farming and dairying. Pop. 1712.  
 A. W. CLARK, ED. "JEFFERSONIAN."  
**Jefferson**, post-v. and tp., cap. of Ashe co., N. C., near New River, 45 miles S. of Marion, Va. Chief business, agriculture and mining. It has 1 hotel, 2 academies (male and female), a weekly newspaper, stores, shops, etc. Pop. 1228.  
 R. M. DICKEY, ED. "MOUNTAIN MESSENGER."  
**Jefferson**, tp. of Guilford co., N. C. Pop. 1045.  
**Jefferson**, tp. of Adams co., O. Pop. 2268.  
**Jefferson**, post-v. and tp., cap. of Ashtabula co., O., 13 miles S. of Lake Erie, on the Oil City branch of the Lake Shore R. R., in a rich grazing and dairy country; has 2 banks, 16 stores, 2 foundries, various shops, a weekly newspaper, 6 public schools, and 2 hotels; was the home of J. R. Giddings, and is (1874) that of B. F. Wade. Pop. of v. 869; of tp. 1712.  
 W. C. HOWELLS, ED. "ASHTABULA SENTINEL."  
**Jefferson**, tp. of Brown co., O. Pop. 1267.  
**Jefferson**, tp. of Clinton co., O. Pop. 1445.  
**Jefferson**, tp. of Coshocton co., O. Pop. 1059.  
**Jefferson**, v. of Neave tp., Darke co., O. Pop. 107.  
**Jefferson**, v. of Bloom tp., Fairfield co., O. Pop. 76.  
**Jefferson**, tp. of Fayette co., O. Pop. 2532.  
**Jefferson**, tp. of Franklin co., O. Pop. 1405.  
**Jefferson**, tp. of Greene co., O. Pop. 1277.  
**Jefferson**, tp. of Guernsey co., O. Pop. 904.  
**Jefferson**, tp. of Jackson co., O. Pop. 3002.  
**Jefferson**, tp. of Knox co., O. Pop. 1308.  
**Jefferson**, tp. of Logan co., O. Pop. 1634.  
**Jefferson**, a v. and tp. (W. JEFFERSON P. O.) of Madison co., O., on the Little Miami R. R. Pop. 577; of tp. 1888.  
**Jefferson**, tp. of Mercer co., O. Pop. 1557.  
**Jefferson**, tp. of Montgomery co., O. Pop. 3350.  
**Jefferson**, tp. of Noble co., O. Pop. 1278.  
**Jefferson**, tp. of Preble co., O. Pop. 1953.  
**Jefferson**, tp. of Richland co., O. Pop. 2251.  
**Jefferson**, tp. of Ross co., O. Pop. 1013.  
**Jefferson**, tp. of Scioto co., O. Pop. 559.  
**Jefferson**, tp. of Tuscarawas co., O. Pop. 1058.  
**Jefferson**, tp. of Williams co., O. Pop. 1564.  
**Jefferson**, tp. of Allegheny co., Pa. Pop. 2066.  
**Jefferson**, tp. of Berks co., Pa. Pop. 1133.  
**Jefferson**, tp. of Butler co., Pa. Pop. 1234.  
**Jefferson**, tp. of Dauphin co., Pa. Pop. 843.  
**Jefferson**, tp. of Fayette co., Pa. Pop. 1381.  
**Jefferson**, post-tp. of Greene co., Pa. Pop. 1322.  
**Jefferson**, tp. of Luzerne co., Pa. Pop. 776.  
**Jefferson**, tp. of Mercer co., Pa. Pop. 1292.  
**Jefferson**, tp. of Somerset co., Pa. Pop. 766.  
**Jefferson**, tp. of Washington co., Pa. Pop. 889.  
**Jefferson**, a b. of South Cadorus tp. (CONANTS P. O.), York co., Pa.,  $\frac{1}{2}$  a mile S. of Jefferson Station, a post-v. on the Hanover branch of the Northern Central R. R. P. 327.  
**Jefferson**, post-tp. of Chesterfield co., S. C. Pop. 1101.  
**Jefferson**, city, cap. of Marion co., Tex., situated at



the head of navigation on the Big Cypress Bayou, which connects with Red River, on a section of the Texas and Pacific R. R., which also forms part of the direct line of the International R. R., which was completed in 1874 from Cairo, Ill., to Hearne in Central Texas. Jefferson is the largest town in North-eastern Texas, being the centre of a river commerce which has acquired considerable importance since the civil war. It now sends to New Orleans 275,000 bales of cotton annually, besides large quantities of hides, cattle, beef in barrels, tallow, wool, and bois d'arc seed. Twenty thousand wagons annually arrive at Jefferson from the interior counties, with which the commerce amounts to more than \$10,000,000. Vast beds of iron and coal are found in the vicinity. Jefferson was settled in 1843. It has 7 churches, 3 newspapers, 1 national bank, and numerous manufactories. Pop. 4190 (1870), since largely increased.

**Jefferson**, tp. of Alexandria co., Va. Pop. 1256.

**Jefferson**, tp. of Loudon co., Va. Pop. 3255.

**Jefferson**, tp. of Kanawha co., West Va. Pop. 1635.

**Jefferson**, tp. of Lincoln co., West Va. Pop. 508.

**Jefferson**, tp. of Nicholas co., West Va. Pop. 649.

**Jefferson**, tp. of Pleasants co., West Va. Pop. 407.

**Jefferson**, tp. of Green co., Wis. Pop. 1673.

**Jefferson**, post-v. and tp., cap. of Jefferson co., Wis., on the Chicago and North-western R. R., Wisconsin division, 26 miles N. N. E. of Janesville, at the junction of Rock and Crawfish rivers. It has 1 manufactory of furniture, 3 of brick, 1 of woollens, and 1 of flour; 1 weekly newspaper, 2 graded-school houses, 4 hotels, a national bank, a savings bank, a fire department with steam fire-engine, and is the seat of Jefferson Liberal Institute. The town is mainly built of cream brick, made here. It is in a very fertile region. Pop. 2176: of tp. 4408.

A. SANBORN, PUB. "BANNER."

**Jefferson**, tp. of Monroe co., Wis. Pop. 764.

**Jefferson**, tp. of Vernon co., Wis. Pop. 1108.

**Jefferson** (JOSEPH), b. at Philadelphia Feb. 20, 1829, descended from several generations of actors; appeared on the stage in his boyhood in comic parts; has acted in England and Australia with great success. Jefferson produced at the Adelphi Theatre, London, in 1865, his celebrated play of *Rip Van Winkle*, which has kept the stage ever since, and procured him a wide reputation.

**Jefferson** (THOMAS), LL.D., third President of the U. S., b. in Albemarle co., Va., Apr. 13 (S. S.), 1743. His family, of Welsh extraction, was settled in Virginia before 1619, in which year his ancestor was a member of the assembly, the first legislative body ever convened in America. His father, Peter Jefferson, a surveyor and planter, was a man of extraordinary physical strength, and sound intelligence, a public-spirited citizen and valuable man, who served his county as public surveyor, as colonel, and as a member of the legislature. Peter Jefferson married, in 1738, Jane, daughter of Isham Randolph, and granddaughter of the founder of the Virginia Randolphs, by whom he had nine children, Thomas being his third child and eldest son. In 1757, Peter died, leaving a widow and eight children, the oldest seventeen years, the youngest twenty-two months, Thomas being a schoolboy of fourteen. The family inherited 1900 acres and 30 slaves, from the product of which Thomas was enabled to attend William and Mary College and study law, thus fulfilling the fondest wish of his father and obeying one of his last injunctions. He loved to think that this was his father's dying command, and he used to say in his old age that if he had had to choose between the estate or the education his father had given him, he would have chosen the education. He entered college in 1760, remained two years, began the study of the law at Williamsburg under George Wythe in 1763, and in 1767, being twenty-four years of age, he was admitted to the bar. As a student he was industrious, resolute, moral, and intelligent. He was fortunate in his mathematical professor, Small, a friend of Erasmus Darwin; also in the learned George Wythe, who directed the legal studies of Chief-Justice Marshall and Henry Clay. Under the influence of these liberal minds he investigated the sources of law, the origin of liberty, and the gradual establishment of equal rights, extending his researches into remote antiquity, and becoming one of the most accomplished young men of his time. He acquired skill upon the violin, sometimes practising three hours a day, and was a close observer and student of nature. He obtained at once a large and profitable practice at the bar, which he held for eight years, until he was drawn into public life by the conflict between the colonies and Great Britain. From 68 cases in his first year, he was employed in 430 cases in his fourth, and his income at the bar is estimated

at 2500 sterling per annum, by which he increased his estate to 5000 acres of land. He married, Jan. 1, 1772, Martha Skelton, a young, beautiful, and childless widow, daughter and heiress of a leading lawyer of Virginia, John Wayles, whose death the next year doubled Jefferson's estate. Elected a member of the house of burgesses in 1769, he served in that body till the Revolution, a firm supporter of liberal measures, and noted for his disapproval of slavery. With Patrick Henry and the Lees he was a leader of the party in opposition to the British king, though strongly attached to the mother-country. He took his seat as a member of the Continental Congress June 21, 1775, the day on which the news of the battle of Bunker Hill reached Philadelphia and Washington left that city to take command of the army at Cambridge. Seldom joining in debate, for he was no orator, he acquired great influence by his courtesy, his readiness in composition, his knowledge of law and usage, his general information, his moderation of tone, and his warm devotion to the country's cause. After serving on several leading committees and drawing important papers, he was chosen to draft the Declaration of Independence, which, after three days' debate and extensive amendment, was adopted and signed on Thursday afternoon, July 4, 1776. In September of the same year he resumed his seat in the Virginia legislature, where, in conjunction with George Wythe and James Madison, he spent three years in adapting the laws of Virginia to the new order of things, and in other patriotic labors. He effected the abolition of entail and primogeniture, and drew the law—the first ever passed by a legislature or adopted by a government—which secured perfect religious freedom. His scheme for the establishment of common schools and for the abolition of slavery, though warmly supported by the liberal members, failed. June 1, 1779, he succeeded Patrick Henry as governor of Virginia, an office which he resigned after holding it two years, during which he ably co-operated with Washington in defending the country. One of his own estates was ravaged and plundered by Cornwallis, and his house at Monticello was held for some days by Tarleton's cavalry. Jefferson himself narrowly escaping capture. Sept. 6, 1782, his wife died, leaving three children of six to which she had given birth. Distracted with grief, he now accepted an appointment as plenipotentiary to France, which he had declined in 1776. Before sailing he served for some weeks in Congress at Annapolis, where he succeeded in carrying a bill establishing our present system of decimal currency—one of the most useful of his public services. Reaching Paris in June, 1784, he remained until October, 1789. "You replace Dr. Franklin," said the Count de Vergennes to the new minister. "I succeed," was Mr. Jefferson's reply: "no one can replace him." He was filled with horror at the condition of France, and declared that a government of nobles and priests was a government of wolves over sheep. The most miserable person in the U. S. he thought happier than nineteen out of twenty Frenchmen, and he attributed the general misery chiefly to the bad government.

He was an active and vigilant minister. Besides performing the usual duties of his place, he published his *Notes on Virginia*, sent to the U. S. seeds, plants, and shrubs, enriched Buffon's collection with American specimens, forwarded literary and scientific news, and gave useful advice to La Fayette and the other revolutionary leaders. Nov. 18, 1789, he landed in Virginia, having obtained a six months' leave for the purpose of bringing his daughters home, one of whom was engaged to be married to Thomas Mann Randolph, afterwards governor of Virginia. Jefferson was met soon after his arrival by a letter from Pres. Washington appointing him secretary of state. He accepted the place, and entered upon its duties at New York in Mar., 1791, residing at 57 Maiden lane, and held the office until Jan. 1, 1794, when he resigned. During his tenure of this office the two political parties became sharply defined, and Jefferson, who was in the warmest sympathy with the French revolution and strongly democratic in his feelings, was recognized as the leader and candidate of the Republican party. His colleague, Alexander Hamilton, became his decided and aggressive political opponent. "We were pitted against each other," Jefferson once wrote, "every day in the cabinet like two fighting-cocks." In 1796 he was elected Vice-President of the U. S., and was sworn in Mar. 4, 1797. In 1800 he was elected to the Presidency, and being inaugurated Mar. 4, 1801, he entered upon a part of his career which will ever be regarded with interest by republicans of every land. He selected an able and accomplished cabinet: James Madison of Virginia, state; Albert Gallatin of Pennsylvania, treasury; Henry Dearborn of Maine, war; Robert Smith of Maryland, navy; Gideon Granger of New York, post-office. Administering the government in unbroken harmony with his

ministers, he gradually won to his support a majority of the people so great that he deemed the opposition scarcely strong enough to adequately criticize and admonish the party in power. He waged a successful war against the piratical Algerines, in which the navy of the U. S. won great distinction and formed the gallant officers whose exploits in the war of 1812 were so remarkable; Louisiana was purchased of Napoleon; the public debt was greatly reduced; the western country was explored by Lewis and Clark and by Pike; the system of precedence was abolished, and a rational etiquette substituted. He attempted by the embargo to introduce a better method than that of war to enforce the national rights. Having declined urgent solicitations to accept a nomination for a third term, he retired to private life Mar. 4, 1809, and spent the remainder of his days at his beautiful seat, Monticello, cheered by the society of his eldest daughter and a large number of affectionate grandchildren. Many of his later years were employed in founding the University of Virginia, now an important institution. He died on the fiftieth anniversary of the Declaration of Independence, a few hours before his contemporary and friend, John Adams. Mr. Jefferson was tall, well-formed, straight, and uncommonly strong. He had sandy hair, a ruddy complexion, and a tranquil, benevolent expression of countenance. His temper was perfect; his manners were natural and easy. He loved his country and his kind, and spent a long life in honorable and useful labors, public and private, beloved by all who knew him as he was. He was one of the best-informed men of his day, and all his habits and instincts were those of a student and observer. (For fuller information, see his *Works*, 9 vols. 8vo; *Memoirs and Correspondence*, by his grandson, T. J. Randolph, 4 vols., 1829; *Biographies*, by George Tucker, 2 vols., 1837, by H. G. Randall, 3 vols. 8vo, 1858, by his granddaughter, Sarah N. Randolph, 1 vol., 1871, and by James Parton, 1 vol., 1874.)

JAMES PARTON.

**Jefferson Barracks**, post-v. of St. Louis co., Mo., on the Mississippi River, 9 miles below St. Louis, and on the St. Louis and Iron Mountain R. R., is the site of extensive U. S. barracks.

**Jefferson City**, cap. of Missouri and seat of justice of Cole co., on the S. bank of the Missouri River, 125 miles W. of St. Louis, and near the geographical centre of the State. It is on the Missouri Pacific R. R., and by ferry transfer with Cedar City, on the opposite side of the river, it is the S. W. terminus of the Chicago and Alton R. R. Its site is elevated and pleasant, and the town is well built. Among the public buildings are the State capitol, the executive mansion, State armory, penitentiary, 8 churches, 2 public-school buildings, Lincoln Institute, a normal school for colored youth, and a female seminary. There are 2 large flouring-mills, manufactory of farm implements, a foundry, and many minor industrial interests, 1 State and 2 national banks, weekly newspaper, and a State library. It is the seat of Jefferson City College (Protestant Episcopal). It is in a healthful region, which has great mineral and agricultural wealth, coal, iron, and glass-sand abounding. Pop. 4420, much increased since the U. S. census.

P. T. MILLER, Ed. "PEOPLE'S TRIBUNE."

**Jefferson College**. See WASHINGTON AND JEFFERSON COLLEGE.

**Jeffersonia** (*J. diphylla*), a vernal plant of the order Berberidaceae, popularly known as twin leaf, from its two-parted leaves, which rise in a tuft from the roots. The flowers are white, resemble those of blood-root, and appear in early spring. The *Jeffersonia* is indigenous to the Northern Central States of the U. S., but is cultivated in England. The root has been recommended as a specific for rheumatism, but the medicinal quality is somewhat doubtful.

**Jeffersonton**, post-v. and tp. of Culpeper co., Va., 109 miles N. W. of Richmond, on the Rappahannock. Pop. 400; of tp. 2953.

**Jeffersonville**, post-v., cap. of Twiggs co., Ga., 15 miles S. from Gordon.

**Jeffersonville**, post-v. of Lamar tp., Wayne co., Ill., on the Springfield and Illinois S. W. eastern R. R., 6 miles N. by W. of Fairfield; founded 1857 in the fertile La Mare Prairie; has 2 churches, a park, a weekly newspaper, 2 hotels, flour and saw mills, etc.

R. A. MOSS, Ed. "WAYNE CO. CENTRAL."

**Jeffersonville**, city and tp. of Clarke co., Ind., on the Ohio River, opposite Louisville, Ky., with which it is connected by a fine railroad bridge. It is the terminus of the Jefferson Madison and Indianapolis R. R., and is on the Ohio and Mississippi R. R., Louisville division; a branch of the former road extends thence to New Albany. The falls of the Ohio here afford a noble water power. The town has good shipping facilities, 2 large shipyards, 11

churches, locomotive and car works, and the machine-shops of the first-mentioned railroad. It contains the Southern State penitentiary, is the seat of an extensive government depot of supplies which cost \$200,000, has 2 national banks, 2 large flour-mills, a fine high-school building, a weekly and a daily newspaper. Pop. of city, 7251; of tp. outside city limits, 3012. R. DAILY, Ed. "NEWS AND DEMOCRAT."

**Jeffersonville**, N. Y. See CALLICOON.

**Jeffersonville**, post-v. of Jefferson tp., Fayette co., O. Pop. 212.

**Jeffersonville**, or **Tazewell Court-house**, a v. and tp., cap. of Tazewell co., Va., in a mountain-region, 28 miles N. of Marion, has 3 churches, a high school, a weekly newspaper, 2 hotels; is in a fine blue-grass region. Chief business, cattle-raising and farming. Pop. 3682.

J. C. NEELY, Ed. "NEWS."

**Jeffrey** (FRANCIS), LORD, b. at Edinburgh Oct. 23, 1773; was educated at Glasgow, Edinburgh, and Oxford, and in 1794 was passed an advocate at Edinburgh, but his literary tastes and Whig principles rendered his progress in his profession slow. In 1802 he was one of the founders of the *Edinburgh Review*, of which he became the leading spirit, and was for twenty-six years the principal editor; in 1813 visited New York and married Miss Charlotte Wilkes, his second wife; won wide fame by the ability and severity with which he opposed the new schools of poetry which sprang up in Great Britain. Acquiring a brilliant though tardy reputation at the bar, he was made dean of the Faculty of Advocates 1829; lord advocate, with the title of Lord Jeffrey, 1830; sat in Parliament for Perth 1830, for Malton 1831, for Edinburgh 1832. Regarding Jeffrey's work as a critic, the sentence of time has been adverse; for, though his abilities were undeniable, his judgment was often overmastered by prejudice; but as a jurist he was just and able; as a man he was beloved even by his literary adversaries. D. at Craigmook Jan. 26, 1850.

**Jeffreys**, tp. of Marion co., S. C. Pop. 2005.

**Jeffreys** (GROVER), BARON, b. at Acon, Denbigh, Wales, in 1648; studied law in the Middle Temple; was called to the bar in 1669; and practised chiefly at the Old Bailey, where he acquired the ferocious brutality which then distinguished that court, and which characterized him through life; was common sergeant of London 1671; affected Puritanism, but was knighted in 1677 and made solicitor to the duke of York; recorder of London 1678-80; king's sergeant and chief-justice of Chester 1680; baronet 1681; was crown counsel against Lord Russell, and became chief-justice of the king's bench 1683; sentenced Algernon Sidney 1683; tried Baxter and Titus Oates 1685; received a peerage 1685, in which year he held the Bloody Assize for the trial of Monmouth's adherents, of whom he caused 320 to be hung and 841 to be sold into slavery in the colonies, for which service he was made lord chancellor; was a party in nearly all the misdeeds of James II.; was seized by a mob and confined in the Tower 1688, and d. there Apr. 18, 1689.

**Jeffries** (JOHN), M. D., b. at Boston, Mass., Feb. 5, 1744; graduated at Harvard in 1763; studied medicine at London and Aberdeen; returned to Boston to practise his profession; and, accompanying the British forces on their withdrawal to Halifax in 1776, he was appointed surgeon-general by Gen. Howe. In 1779, Dr. Jeffries became surgeon-major to all the British forces in America, but soon retired to England, where he devoted much attention to scientific experiment, especially upon atmospheric phenomena. In 1785 he crossed the Channel from Dover into France in a balloon, a feat which attracted much attention from the learned societies of Paris. In 1789, Dr. Jeffries returned to Boston, where he resided until his death, Sept. 16, 1819. Dr. Jeffries delivered in 1789 the first public anatomical lecture ever given in New England, but a great popular sentiment existing against dissections, he was compelled by mob violence to discontinue his course of instruction.

**Jehoshaphat**, the fourth king of Judah, was the son of Asa, whom he succeeded in 912 B. C. and reigned to 887 B. C. Although he was utterly defeated by the Syrians in the battle of Ramoth-gilead, and although his first expedition to Ophir was foiled by the wreck of his fleet, his reign was nevertheless generally very fortunate. He worked energetically and successfully to extirpate idolatry, he kept the nations on the borders in awe, and agriculture and commerce prospered under his rule. The name of Jehoshaphat means "Jehovah's judgment," hence the figurative expression of the prophet Joel, "the valley of Jehoshaphat."

**Jehovah** [Heb.] occurs only four times in the Authorized Version of the Bible, but the Hebrew word (יהוה) for which it stands is used hundreds of times, being usu-



ally represented in our Bible by "Lord," or "the Lord," printed in small capitals, to distinguish it from other words similarly translated. This singular phenomenon arises from the fact that while the consonants of the name (the Hebrew alphabet having originally had no signs for vowels) have been faithfully preserved by transcription, the Jews for ages have refrained from *pronouncing* the name on account of its sacredness; so that the original pronunciation has been lost. Whenever the word occurs they substitute for it, in reading, 'יהוה' *Adonai*; and to indicate this the Masoretic punctuators connected with the consonants יהוה the vowels of 'יהוה'. But when these two words are found together, יהוה is punctuated with the vowel-points of 'יהוה' (God). This practice must be one of long standing, inasmuch as we find in the Septuagint (the Greek translation of the Old Testament dating from the second or third century B. C.) *kyrios* uniformly put for יהוה. This example has been followed in most of the versions. There are now no respectable scholars who suppose that the form יהוה ("Jehovah") represents the original sound of the name. From Exodus iii. 14, 15, where אֲנִי, the first person imperfect of יהוה, "to be," is identified with יהוה from the form which the word assumes in proper names compounded with it (especially יהוה at the end of such names); and from ancient testimony respecting the pronunciation, it is now generally conceded by scholars that probably the verb had originally *yahveh* instead of ' *iyodhi* for its second radical, and that the third person singular imperfect was יהוה (Yahveh or Yahweh), and that this is the proper form of the sacred name. As to its significance, since it expresses *existence* emphatically as the characteristic of God, we may say that it denotes the *perfection of existence*. Hence, eternity, self-existence, sovereignty, unchangeableness, and especially personality, are conceptions fairly to be inferred as embodied in the name. In the Old Testament generally יהוה is the term used when God's *personal* relation to his people is emphasized. Jehovah, rather than Elohim, is God as *revealing* himself, as a *lawgiver*, as inspiring *prophecy*, as the *faithful* one, as the object of *worship*, as the *living* God, as the *rewarder* of good and *punisher* of evil. In general, Elohim may be called the God of nature, and Jehovah (Yahveh) the God of revelation. (On this subject the principal writers are Hengstenberg, *Authenticity of the Pentateuch*; Reiske, *Philosophisch-historischer Abhandlung über den Gottesnamen Jehova*; Tholuck, in the *Literarische Anzeiger* (1832); Reiland's collection of essays entitled *Deus Existentium Philologiae de vera Pronuntiatione nominis Jehova*; E. Ballantine, on the *Import of the name Jehovah*, in the *Biblical Repository*, vol. iii.) C. M. MEAD.

**Jehu** [Heb. *Yehú*; meaning uncertain], the eleventh king of Israel, and founder of the fourth dynasty in the northern kingdom; reigned 28 years, from B. C. 883 to 855. In his youth, Jehu was one of the guards of Ahab, and in the reigns of Ahaziah and Jehoram had become one of the chief military leaders. In the account of the vision which appeared to Elijah at Horeb in the time of Ahab, that prophet was commanded to anoint Jehu king of Israel as instrument of the divine vengeance upon idolatrous Israel (1 Kings xix. 16, 17). This command was disobeyed, and Jehu did not come to the throne until nearly or quite twenty years later, when he was anointed by one of the prophets under Elisha's directions, and proceeded to the massacre of King Joram, his mother Jezebel, his guest Ahaziah, king of Judah, seventy brothers of Joram, forty-two brothers of Ahaziah, and, in general, of all the prophets, priests, and worshippers of Baal. The reign of Jehu was not marked by any further remarkable events, so far as can be learned from the biblical record, but the name occurs on the black obelisk from Nineveh, now in the British Museum, as one of the tributaries to the Assyrian empire. The dynasty of Jehu occupied the throne of Samaria for four generations.

**Jeisk**, or **Eisk**, town of Russia, in the territory of the Kuban Cossacks, on the Sea of Azof, was founded in 1848 as a port for the rich produce of the surrounding country, and has grown very rapidly since. Pop. 16,747.

**Jejeebhoy** (Sir JAMSETJEE), BART., b. at Bombay, India, July 15, 1783, belonged to that Parsee race which is the present representative of the ancient Zoroastrians and Fire-worshippers of Persia. He commenced life in poverty, made several commercial voyages to China, and succeeded so well as to be able in 1822 to release all the debtors held in prison in Bombay by paying their debts. In recognition of his princely benefactions he was knighted by Queen Victoria in 1842, and made a baronet in 1857. In 1856 a statue was voted to him by the citizens of Bombay. Sir Jamsetjee d. at that place Apr. 14, 1859, and on Aug. 1 after his death the statue was placed in the town-hall.

His estate was valued at \$4,000,000: his charitable foundations, widely distributed through Western India, were estimated to have cost \$1,500,000, most of them set in operation during his life.

**Jekaterinburg.** See YEKATERINBOURG.

**Jekaterinodar.** See YEKATERINODAR.

**Jekaterinoslav.** See YEKATERINOSLAV.

**Jelalabad'**, town of Afghanistan, is situated near the Cabool, on a fertile plain 2200 feet above the sea, in lat. 34° 25' N. It is poorly built; its trade is entirely in the hands of the Hindoos; its population varies according to the season from 3000 to 10,000. A single English brigade under Sir Robert Sale defeated here a large Afghan force in Mar., 1842.

**Jelatma**, or **Jelatom.** See YELATOM.

**Jeletz.** See YELETZ.

**Jel'lachich von Buzim** (Count JOSEPH), b. at Peterwaradin, on the so-called military frontier of Hungary, Oct. 16, 1801, was a son of Baron Franz Jellachich, a field-marshal in the Napoleonic wars; entered the army at an early age; spent many years on the Turkish border in military service; became in 1842 colonel of the first Banat border regiment, and when the Magyar revolution broke out in 1848 threw his great influence with the Slavic populations into the scale in favor of the Austrian empire. At the request of a Slavic committee, Jellachich was appointed to the chief command of the southern districts of the empire, under the mediæval title of ban of Croatia, Slavonia, and Dalmatia. This title theoretically gave him an almost independent sovereignty, which he hastened to use by assembling a Slavic diet, being consecrated in the banate by the bishop, and organizing the southern Slavonians against the Hungarians. The emperor became alarmed at his proceedings, and at the instance of the Hungarian cabinet, which he was still trying to propitiate, issued a decree depriving Jellachich of his new rank, and summoning him to answer for his conduct. But the sagacious ban of Croatia understood the situation; he not only disregarded all inconvenient orders from Vienna, but after a personal visit to the imperial family invaded Hungary in September, effected a junction with Windischgrätz, aided in the reconquest of Vienna, and participated in the important campaigns of the ensuing year. (See HUNGARY and KOSSUTH.) Jellachich gave no proof of great tactical ability, but the weighty influence he exerted upon the events of the time was rather political than military. He was well educated, and had a profound knowledge of the tendencies and aspirations of the heterogeneous mass of nationalities composing the Austrian empire. In 1850, Jellachich published a volume of poems; commanded in 1853 an army of observation on the Bosnian frontier; received the rank of count in 1855; and d. at Agram May 20, 1859.

**Jelly-Fish.** See ACALEPHE.

**Jemappes'**, town of Belgium, in the province of Hainaut. Here the raw levies of the first French republic under Dumouriez won a decisive victory over the Austrian army, Nov. 6, 1792. It has extensive manufactures and large coal-mines in the vicinity. Pop. 11,164.

**Jem'ison** (ROBERT, JR.), a son of William Jemison, a wealthy planter, b. and bred in Georgia; in early life removed to Alabama, where he was long a prominent Whig member of the legislature. He was made president of the State senate in 1863, and soon after entered the Confederate Senate, though a strong anti-secessionist; was the founder of the financial system of Alabama (1847), of the State insane asylum, and of the Alabama and Chattanooga R. R.; resided in Tuscaloosa, and d. Oct. 16, 1871.

**Je'na**, town of Germany, in the grand duchy of Saxe-Weimar-Eisenach, on the Saale. Its university, founded in 1558, was 1787-1806 the most celebrated scientific institution of Germany. Schiller, Schlegel, Oken, Schelling, and Fichte were professors here, and more than 1000 students heard their lectures. On Oct. 14, 1806, Napoleon totally defeated the Prussian army on the heights outside of Jena, which battle for many years decided the fate of Northern Germany. Pop. 6984.

**Jengis Khan.** See GENGHIS KHAN.

**Jenisei.** See YENISEI.

**Jen'kins**, tp. of Mitchell co., Ia. Pop. 587.

**Jenkins**, tp. of Jefferson co., Neb. Pop. 442.

**Jenkins**, tp. of Luzerne co., Pa. It has mines of anthracite coal. Pop. 2505.

**Jenkins** (ALBERT G.), b. in Cabell co., Va., Nov. 10, 1830; educated at Jefferson College, Pa., and at the Law School, Cambridge, but without entering upon the practice of his profession directed his attention to agriculture; member of Cincinnati national convention 1856, and member



of the 25th and 36th Congresses: appointed brigadier-general in the Confederate army in 1861, he served with the division of A. P. Hill; subsequently in command of cavalry brigade in the Gettysburg campaign, in the Shenandoah Valley, and West Virginia; in the campaign of 1864 was killed at Dublin, Va., May 7, 1864.

G. C. SIMMONS.

**Jenkins (CHARLES J.)**, b. in the district (now county) of Beaufort, S. C., Jan. 6, 1805. His father moved to Jefferson co., Ga., 1816, and Charles, the son, was educated partly at the Georgia University and partly at Union College, Schenectady, N. Y., where he graduated in 1824; studied law, and opened an office in the city of Augusta, Ga. In 1830 was elected to the legislature; in 1831 was elected attorney-general of the State, which position he resigned before the expiration of his term of office, and was again returned to the legislature in 1836, which position he continuously held from 1836 to 1850, ranking amongst the ablest and most eloquent of the House during all that period, and being Speaker thereof whenever his party was in the majority. In politics he was reared in the Jeffersonian State's Rights school, but supported Harrison for President in 1840, and Clay in 1844. He was a member of the Union convention of the State in 1850, and as chairman of the committee on resolutions was the author of the celebrated Georgia platform adopted by that body. In 1860 he was appointed one of the judges of the supreme court of the State to fill the vacancy occasioned by the resignation of Hon. Linton Stephens. This position he held until the close of the war. He was a member of the constitutional convention of the State called under the proclamation of Pres. Johnson in 1865, in which body he acted a prominent part, and in the same year was elected governor of the State without opposition under the new constitution so formed. This position he held until he was superseded by Gen. Thos. H. Ruger of the U. S. army, who was appointed provisional governor of Georgia in 1868 under the reconstruction acts of Congress. He also has been one of the most active and influential members of the board of trustees of the State University since 1839. A. H. STEPHENS.

**Jenkins (THORNTON A.)**, U. S. N., b. Dec. 11, 1811, in Virginia; entered the navy as a midshipman Nov. 1, 1828; became a passed midshipman in 1834, a lieutenant in 1839, and was employed in the office of the Coast Survey from Oct., 1834, to Apr., 1842; promoted to be commander in 1855, a captain in 1862, a commodore in 1866, and rear-admiral in 1870; retired from active service Dec. 11, 1873. Served at sea in the Mediterranean, N. and S. Atlantic, and coast of Africa 1842-45; sent to Europe in 1845, under instructions of the secretary of the treasury, to examine the systems of lighthouse illumination, and the general management of the aids to navigation service in the different commercial nations of Europe; returned in 1846 and submitted an elaborate report; served on the E. coast of Mexico during our war with that country to its end, and took part in the capture of Tuspan and Tabasco. Commanding a hydrographical party of the Coast Survey 1848-51, he framed the organic law which was passed in 1852 under which the present lighthouse establishment has been created and is now administered; Sept., 1858, commanded the sloop-of-war Preble in our expedition against Paraguay, and subsequently (1859-60) on the coasts of Central America and the E. coast of Mexico; commanded sloop-of-war Wachusett in James and Potomac rivers 1862; sloop-of-war Onondaga and second division of Admiral Farragut's fleet off Mobile 1862-63; fleet-captain and chief of staff to Admiral Farragut 1863-64; commanded, temporarily, sloop-of-war Richmond under the guns of Port Hudson, and senior naval officer in command at the surrender of that place to the army and navy, July, 1863; wounded on board the sloop-of-war Monongahela in action with the enemy's land forces on the right bank of the Mississippi at College Point, below Fort Donelson; commanded the sloop-of-war Richmond and the second division of Admiral Farragut's fleet blockading Mobile 1863-65; from 1865 to 1869 chief of the bureau of navigation; in 1850-58, 1860-62, and 1869-71, naval secretary of the lighthouse board; from 1871 to the date of his retirement in command of our fleet in the East Indies. The character and services of this eminent officer are best shown by the following extract from Rear-admiral Farragut's official report of the battle of Mobile Bay, dated Aug. 12, 1864: "Before closing this report there is one other officer of my squadron of whom I feel bound to speak, Capt. T. A. Jenkins of the Richmond, who was formerly my chief of staff, not because of his having held that position, but because he never forgets to do his duty to the government, and takes now the same interest in the fleet as when he stood in that relation to me. He is also the commanding officer of the second division of my squadron, and as such has shown ability and the most untiring zeal. He carries out

the spirit of one of Lord Collingwood's best sayings: 'Not to be afraid of doing too much; those who are, seldom do as much as they ought.'" FOXHALL A. PARKER.

**Jenks**, tp. of Forest co., Pa. Pop. 118.

**Jenks (JOSEPH)**, b. at Hammersmith, near London, came to Lynn, Mass., about 1645; was the first founder who worked in brass and iron in America, and probably the first inventor. He received from the Massachusetts general court, May 6, 1646, a patent "for the making of engines for mills to go by water," and for making scythes and other edged tools, with a new-invented saw-mill, of which latter process he patented an improvement in May, 1655. Jenks is said to have made the dies for the silver coinage of the colony in 1652; he contracted in 1654 with the selectmen of Boston "for an engine to carry water in case of fire;" and in 1667 asked the general court for aid in wire-drawing. Jenks's works were on the river Saugus at Lynn, where he d. in 1683.

**Jenks (WILLIAM)**, D. D., LL.D., b. at Newton, Mass., Nov. 25, 1778, graduated at Harvard in 1797, and became a teacher; was pastor of a Congregational church at Bath, Me., 1805-23; professor of English and Oriental literature in Bowdoin College 1815-18; and afterwards became a teacher in Boston, where he founded the Seamen's Bethel; was pastor of the Green Street church, Boston, 1826-45. D. Nov. 13, 1866. He was a member of many learned and benevolent societies, and the author of several works, among which is a *Comprehensive Commentary*, once highly popular.

**Jen'ner**, tp. of Somerset co., Pa. Pop. 1703.

**Jen'ner (EDWARD)**, M. D., F. R. S., b. at Berkeley, Gloucester, Eng., May 17, 1749, the son of a vicar; studied surgery at Sudbury and London, where he was a pupil of John Hunter, 1771-73; acquired the friendship of Sir Joseph Banks, who procured him the appointment of naturalist on Cook's second expedition; but he retired to his native town in 1773, and became a surgeon-apothecary; received in 1792 his degree from St. Andrew's, Scotland; sent to the Royal Society a paper on the cuckoo, which gained him a fellowship in the society. In 1796 he made his first successful arm-to-arm inoculation with the virus of cowpox as a preventive to infection with smallpox. The first idea of this measure had been conceived by him some twenty years before, when he learned that the Gloucestershire peasants considered accidental cowpox (acquired in milking cows) a preventive of smallpox. Observation having convinced him of the truth of the popular belief, in 1770 he communicated his opinion to Hunter, who advised him to continue his observations. In 1798 he announced his discovery, now established by abundant observations, but was almost universally denounced by physicians and clergy, often in the severest language. He published a series of *Inquiries* (1798, 1799, 1800) upon the subject. The importance of his discovery was finally conceded, and he received in all some £37,000 in grants from Parliament and other sources as testimonials to the value of his labors. Personally, he was kindly, unselfish, and philanthropic. D. at Berkeley Jan. 26, 1823.

**Jen'ner (Sir WILLIAM)**, BART., F. R. S., b. at Chatham in 1815; was educated at University College, London, in which he became in 1848 professor of pathological anatomy, and in 1857 of chemical medicine. In 1861, Dr. Jenner was appointed physician to the queen, and attended Prince Albert in his last illness. He is a member of numerous scientific societies, has contributed largely to medical literature, and was the first to establish the difference in kind between typhus and typhoid fevers. He was created a baronet in 1868, and a knight commander of the Bath in 1872, in recognition of his services to the prince of Wales during a dangerous illness.

**Jen'nings**, county of S. E. Indiana. Area, 375 square miles. It is hilly and well timbered, but has a productive soil. Cattle, grain, wool, and lumber are staple products. The county is traversed by the Ohio and Mississippi, the Madison and Indianapolis, and other railroads. Cap. Vernon. Pop. 16,218.

**Jennings**, tp. of Crawford co., Ind. Pop. 2081.

**Jennings**, tp. of Fayette co., Ind. Pop. 836.

**Jennings**, tp. of Owen co., Ind. Pop. 801.

**Jennings**, tp. of Scott co., Ind. Pop. 1278.

**Jennings**, tp. of Putnam co., O. Pop. 1059.

**Jennings**, tp. of Van Wert co., O. Pop. 914.

**Jennings (THOMAS REED)**, M. D., b. in Steubenville, O., 1805; graduated at Washington College, Pa., and studied medicine in Baltimore. He came to Tennessee in 1828, where, during the invasion of Asiatic cholera in 1832, he obtained a large practice, which he retained till the late war. He opened dissecting-rooms in Nashville 1838, and was the



first who taught anatomy in Tennessee. For three years he was a senator in the legislature of Tennessee, and declined a nomination to Congress. In 1854 he was elected professor of the institutes of medicine and clinical medicine in the University of Nashville, and in 1856 filled the chair of anatomy. The class then increased from 220 to 419, and in 1859 reached to 456, being the largest class ever assembled W. of the mountains. D. suddenly at Narragansett, R. I., July 7, 1874. Dr. Jennings possessed a fine taste for literature; yet he was devoted to his profession, in which few succeeded better. Coming to Nashville a poor boy, he not only kept up an elegant establishment and liberally assisted his immediate relatives, but accumulated a large fortune by his practice. As a physician he had no superior in Tennessee.

PAUL F. EVE.

**Jen'ny**, post-tp. of Marathon co., Wis. Pop. 215.

**Jen'yins** (SOAME), b. in London in 1704; was educated at Cambridge; entered Parliament for Cambridgeshire in 1742, and was appointed in 1755 one of the commissioners of the board of trade and plantations. Jen'yins was a poet, a wit, and a politician, but is now chiefly remembered for his work on the *Evidences of Christianity*, published in 1776, which has been often reprinted, has elicited an unusual amount of criticism, and exerted a considerable influence. Though now obsolete, Jen'yins's little work was long reputed the best argumentative presentation of the Christian evidences. D. at London Dec. 18, 1787.

**Jeph'thah**, the ninth judge of the Israelites, was a natural son of Gilead of the tribe of Manasseh. After the death of his father he was expelled from his home by his brothers on account of his illegitimate birth, and he withdrew to the land of Tob, where he became the chief of a band of brigands. Later on, when the tribes beyond the Jordan resolved to oppose the Ammonites, they invited Jeph'thah to become their commander, and he received the invitation on the condition that he should remain their ruler if he defeated the Ammonites. The victory over the Ammonites was complete, and hence he ruled the country for the rest of his life—from 1256 to 1250 B.C. But a great sorrow came over his house. When setting forth against the enemy he made a solemn vow to the Lord that if he returned home victorious he would offer up for a burnt-offering whatsoever first "came forth from the doors of his house" to meet him. On his return his daughter, an only child, "came first out of the doors of his house" with her companions to greet him with timbrels and dances. At this sight he rent his robes and cried out loudly in despair, but his daughter, when she heard about his vow, encouraged him "to do with her according to this vow," and so he did. Up to the twelfth century of our era it was universally understood, both by Jewish and Christian commentators, that Jeph'thah actually sacrificed his daughter, and there was among all readers only one feeling of admiration for the daughter and of horror at the conduct of the father. But since the twelfth century several commentators have attempted to mitigate the tragical impression of the narrative by proving that Jeph'thah only condemned his daughter to celibacy and perpetual service at the tabernacle of Shiloh. Thus interpreted, however, the narrative does not read quite naturally.

**Jequitinhon'ha**, a river of Brazil, rises in the province of Minas Geraes, enters the province of Bahia, and falls after a course of about 750 miles, first northern, then north-eastern, into the Atlantic in lat. 15° 50' S., near the town of Belmonte. Its upper course runs through a mountainous region, and its rocky bed is here embarrassed by rapids and cataracts, of which that called Salto Grande, on the boundary of Minas Geraes and Bahia, is one of the most magnificent falls of Brazil. Its lower course is broad and smooth, but rather shallow, and its mouth is obstructed by sandbars. Nevertheless, as the whole lower course from the mouth to Salto Grande is navigable for small steamers, and as one of its arms, the Poassu, communicates by a navigable channel with the river Pardo, the Jequitinhonha will probably become of great importance for the exportation of the rich products of Minas Geraes.

**Jer'boa** [Arab.], a name of numerous small rodent mammals of the rat family (by many referred to a smaller family, the Dipodidae), and remarkable for their progression, which is accomplished by long leaps in the air, after the manner of kangaroos. They are all Old-World species, and some of them are very destructive to crops. The Egyptian jerboa (*Dipus sagitta*) is the typical species.

**Jer'dan** (WILLIAM), F. S. A., b. at Kelso, Scotland, in 1782; studied law, came to London in 1804, and became a writer for the *Morning Post* and other newspapers. On May 11, 1812, he was instrumental in arresting Bellingham, the murderer of the prime minister Spencer Percival. In 1817 he became editor of the *Literary Gazette*, and re-

mained in charge of that influential journal for thirty-four years. In 1821 he was one of the founders of the Royal Society of Literature. On his retirement from editorship a pension of £100 was granted him, and a flattering testimonial was signed by many of the leading public men of the day. Mr. Jerdan wrote four volumes of biographical sketches for *Fisher's National Portrait Gallery of Eminent Personages of the Nineteenth Century*, wrote for the annuals, reviews, and magazines, published his *Autobiography* (4 vols.) in 1852-53, and a supplement entitled *Men I have Known* in 1866. A judicious selection from his memoirs was edited by Mr. R. S. Stoddard in the *Brief-Lives Series* (New York, 1874). D. at Bushey Heath, Hertfordshire, July 11, 1869.

**Jeremi'ah** [Heb., "raised up by the Lord"], the second of the greater prophets of the Hebrew canon, began his work in the thirteenth year of King Josiah (ch. i. 2); i.e. about 628 B.C. He survived the fall of Jerusalem (588), so that his work lasted for over forty years. He was b. at Anathoth in Benjamin (ch. i. 1; xxix. 27). His father was a priest. During Josiah's reign occurred the invasion of the Scythians (Herod. i. 103-106; see Jer. v. 6, 8, 9). This prophet's life, therefore, covered the catastrophe of the history of Judah. He had to contend against bigotry, obstinacy, and dogmatism, and to endure persecution. He was imprisoned for speaking words of warning and opposition to the prevailing policy. His warnings fell on ears deafened by fanaticism, and when all was lost, even the hope of retaining some native authority, though under Chaldean supremacy, he fled to Egypt, where he died. The version of his book which appears in the Septuagint differs very much from the Masoretic text. The Hebrew contains one-eighth more than the Greek, and the order of the chapters varies. This fact has excited the interest of biblical scholars, but no explanation has yet been suggested. Jeremiah also wrote the book of LAMENTATIONS (which see).

**Jer'mie** (JAMES AMIRAUX), D. D., b. in 1800 in England; graduated at Trinity College, Cambridge, in 1824, having obtained the Norrisian, the Hulsean, and the Members' prizes; became a fellow of Trinity; took holy orders in 1830, and was soon appointed professor of classical literature in the East India College at Haileybury, holding that post twenty years. In 1833 he was chosen Christian advocate for the University of Cambridge, in 1849 regius professor of divinity, and in 1864 dean of Lincoln. Dr. Jer'mie was considered to be one of the most learned divines of his time. He published a *History of Rome from Constantine to the Death of Julian*, and a *History of the Church in the Second and Third Centuries*, both in the *Encyclopædia Metropolitana*; *Christianity in the Middle Ages* (1857), and many other occasional productions, besides editing the sermons of the Rev. Prof. William Archer Butler (1855). Dr. Jer'mie preached Latin sermons in St. Paul's in 1852 and 1868 before the convocation of the province of Canterbury; also in French in Westminster Abbey in 1862, during the Exposition of that year. He resigned his professorship in 1870, and in the same year gave £1000 to the University of Cambridge to found two annual prizes for the study of biblical Greek.

**Jerez' de la Fronte'ra**, generally called simply **Jerez** or **Xeres**, is a large, rich, and elegant town of Spain, in the province of Cadiz, on the Guadalete. The plain in which it stands is hilly, extremely fertile, densely peopled, and very carefully cultivated; it produces the celebrated Xeres wine (sherry). The town itself is old and surrounded with walls, but its streets are wide and lined with handsome houses; its public buildings are elegant, and it contains many educational and benevolent institutions. Its trade in wheat and wine is very important, about 16,000 quarters of wheat and 2,000,000 gallons of wine being exported annually. Pop. 28,898.

**Jerfalcon**. See GYRFALCON.

**Jer'icho**, one of the most flourishing towns of ancient Palestine, was situated a few miles N. E. of Jerusalem. Its capture and destruction by the Israelites on their conquest of Canaan is related in Joshua vi., and its rebuilding and rapid progress in 1 Kings xvi. 34 and 2 Kings ii. 4. At the time of Christ it was a splendid city, the residence of Herod the Great, but during the Crusades it was completely destroyed, and it was never rebuilt. Its site is now occupied by a small and miserable village.

**Jericho**, post-tp. of Chittenden co., Vt., 26 miles N. W. of Montpelier. It has 5 churches, and manufactures of pumps, boxes, castings, agricultural tools, and other goods. Pop. 1757.

**Jericho, Rose of** (*Anastasia Hieracanthina*), a prostrate, branching annual, of the cruciferous family, inhabiting the deserts of Egypt and Palestine. After death the softer green parts disappear, leaving the ligneous frame-

work; this rolls up into a ball in drying, is uprooted by the winds, and rolls away. When wetted the branches expand hygrometrically, so that the plant seems to revive; hence its name, derived from the Greek *ἀναστάναι*, "resurrection."

**Jerked Beef** [Chilian, *charqui*], a form of dried beef prepared quite extensively in the pastoral regions of North and South America and Australia. The flesh of the ox is taken off in thin strips and dried, either with or without salt. It will keep, when well prepared, for a very great length of time, and if well cooked is very palatable. Cuba is the principal market for jerked beef or *tasajo*.

**Jeroboam**, the name of two kings of Israel. **JEROBOAM I.**, the founder of the kingdom, was a son of Nebat. By Solomon he was made superintendent of public works, but having been informed by the prophet Ahijah that according to divine appointment he should become king over the ten tribes, he entered into conspiracies, and was compelled to flee to Egypt (980 B. C.). When Solomon died (975 B. C.) he returned and headed the deputation appearing before Rehoboam; and when the demands of the deputation were refused the ten tribes separated from Judah and Benjamin and chose him for their king. He took up his residence at Shechem, and the most prominent tendency of his government was to make the breach between the two kingdoms as wide and deep as possible. For this reason he forbade his subjects to resort to the temple at Jerusalem, and established shrines at Dan and Bethel, where "golden calves" were set up as symbols of Jehovah. D. 908 B. C.—**JEROBOAM II.** was the fourteenth king of Israel, the son and successor of Jehoash, and reigned 823-782 B. C. He carried on successful war against the Syrians, from whom he took the cities of Damascus and Hamath; Ammon and Moab were also conquered. But he kept up the idolatry of the golden calves.

**Jerome**, tp. of Midland co., Mich. Pop. 355.

**Jerome**, post-tp. of Union co., O. Pop. 1462.

**Jerome of Prague**, b. about 1375, was descended from a noble Bohemian family of the name of FALCISCH; studied in his native city, in Paris, Cologne, Heidelberg, and Oxford, and attracted everywhere great attention by his learning and brilliant gifts. While at Oxford he became acquainted with the writings of Wycliffe, and he espoused the ideas of the English Reformer with his whole heart. On his return to Prague he found that these ideas were well known there, and he immediately allied himself to the Bohemian reform party under the leadership of Huss (which see). In learning and eloquence he surpassed Huss, but he lacked his wisdom; he was violent, and even rude. The relics he threw down to the ground and trod on them, and in a dispute with a monk he once threw his adversary into the Moldau. When he heard that Huss had been imprisoned in Constance he immediately hastened to the rescue of his friend. But having failed in procuring a safeguard, and finding himself unable to do anything to aid Huss, he determined to return home, when (Apr. 25, 1415) he was seized at Hirschan in Silesia, put in chains, and delivered over to the council. The great indignation which the execution of Huss (July 6, 1415) excited made the council hesitate in the case of Jerome. He was kept in a mean dungeon, and received for a long time no other food than bread and water. Thus, worn out both in body and mind, he recanted his opinions on the doctrine of transubstantiation (8 pt. 11, 1415); but this did not satisfy the council. He was subjected to new examinations on still more serious accusations, and he declared himself ready to answer any questions on the condition that the hearing should be public. On May 23 and 26, 1416, the examination took place, and he ended by disclaiming in a most passionate manner his former recantation, declaring it the greatest sin he had committed in his life. His condemnation was now sure to follow. On May 30 he was sentenced and burned at the stake, and his ashes were strewn on the Rhine. (See Krummel, *Geschichte der Bohemischen Reformation* (1867); and Czerwenka, *Geschichte der Evangelischen Kirche in Böhmen* (1869).)

**Jerome**, SAINT (SYMPHONIOS EUSEBIOS HIERONYMUS), b. about 345 at Stridon, a town on the confines of Dalmatian and Pannonia; received a very careful education; travelled in Gaul; was baptized, and lived for some years at Treves and Aquileia; went in 373 to the East, where he visited Antiochia, and retired in 374 to the desert of Chabers, where he spent four years in ascetic practices and studies, especially of the Hebrew language. Having been ordained a presbyter by Bishop Paulinus of Antioch, he repaired to Constantinople in 379 to hear the celebrated Gregory Nazianzen, and while here he translated into Latin the chronicle of Eusebius and the homilies of Origen on Jeremiah and Ezekiel. In 382 he returned to Rome, where he lived in intimate connection with Bishop Damasus until Damasus's

death in 384. In Rome he made a great impression by his passionate praise of asceticism and monastic life. Many became his enemies, but many others, especially among the rich and noble ladies, became his firm adherents; and one of these, Paula, followed him in 384 to Bethlehem, where she built four convents—three for nuns and one for monks, over which latter she placed St. Jerome; he d. here about 420. During his residence in Rome he commenced, at the instigation of Damasus, a critical revision of the Latin translation of the Bible, the Vulgate; and this work, which he finished in Bethlehem, is his chief work and the foundation of his great fame. But besides he wrote a great number of controversial papers against Helvidius, Jovinianus, Vigilantius, Rufinus, and the Pelagians, and several exegetical relating to the Old Testament. The best edition of his works is that by Vallarsi (11 vols., Verona, 1733-42). (See Zöckler, *Hieronymus, sein Leben und Wirken*, 1865.)

**Jerôme Bonaparte**. See BONAPARTE (JERÔME).

**Jeromeville**, post-v. of Mohican tp., Ashland co., O. Pop. 328.

**Jer'old** (DOUGLAS WILLIAM), b. in London Jan. 3, 1803, the son of the manager of a theatre; became midshipman in the navy 1813-15, and was apprenticed in 1816 to a printer. His first play, *More Frightened than Hurt* (1818), after some years of neglect, was very successful. He wrote lyrics and criticisms for the journals which attracted much attention. The comedy *Black-Eyed Susan* (1822) established his reputation. *Rent Day* (1830), *Mead of Character* (a collection of republished tales, 1838), *Bubbles of the Day* (1842, a comedy), *Time works Wonders* (1843), *The Candle Lectures* (first published in *Punch*, with which he became connected in 1841), and numerous other plays, sketches, and tales, widely extended his fame as a humorist and a powerful delineator of character. He twice failed as a publisher of newspapers, and once as a theatrical manager, but his connection (1852-57) with *Lloyd's Weekly* was very successful. Mr. Jerrold was a man of great kindness and generosity, but possessed a gift of repartee which often became terribly caustic. D. in London June 8, 1857.

**Jerrold** (WILLIAM BLANCHARD, eldest son of Douglas Jerrold, b. in London, England, in 1826; studied for an artist, and illustrated some of his father's articles, but later gave his attention to literature. In 1849 he married a daughter of Laman Blanchard; has long been prominently connected with the London press. Among his works are several comedies and farces, *The Desecration of the Family* (1847, a novel), *Swedish Sketches* (1852), *Imperial Paris* (1855), *Life of Douglas Jerrold* (1858), *At Home in Paris* (1864), *The Cockneys* (1871), and other works. Also *London* (1872), illustrated by Doré, and *Life of Napoleon III.* (1874-75). He has given special attention to the condition of the poor in Paris and London.

**Jerry** (REV. JOHN L.), b. in North Carolina May 11, 1793, the son of a Revolutionary soldier who served under La Fayette, and imbibed his father's spirit. When a missionary in St. Augustine, a priest threatened him with punishment if he did not desist preaching; pointing to the American flag, he said, "No Inquisition where that flag waves!" At one time, when he had no money to pay his fare, he retired for prayer, and on returning to mount his horse and pursue his journey, he found a doubloon, which kept him going till he obtained relief. He entered the South Carolina conference in 1818, and was a revered member of the Florida conference at the time of death, July 11, 1859.

T. O. STEVENS.

**Jersey**, the largest of the Channel Islands, situated in the English Channel, 13 miles W. of the coast of France and 35 miles S. of the coast of England. Area, 59,480 acres, of which 25,000 acres are under cultivation. Pop. 56,078, of whom 13,000 are English and 2000 French; the natives speak a kind of Norman French, as the island originally belonged to the French province of Normandy. The ground is high and rocky, but presents many fertile valleys, which on account of the fine, mild, and equable climate are well adapted for the cultivation of fruits. Large quantities of peaches, apricots, apples, pears, grapes, and melons are annually exported to London. The export of fisheries form another extensive branch of industry. Ship-building is also important. The island, on account of its climate, is a great resort for people of delicate health. Principal towns, St. Helier and St. Aubin.

**Jersey**, county of S. W. Illinois, lies on the Mississippi River on the S. and the Illinois on the W. Area, 350 square miles. It is partly timbered and partly prairie; coal is mined. The soil is fertile; cattle, grain, and wool are staple products. The county was named by the Chicago and Alton R. R. Cap. Jerseyville. Pop. 14,000.

**Jersey**, post-v. and tp. of Licking co., O. Pop. of v. 101; of tp. 1253.



**Jersey City**, cap. of Hudson co., N. J., on the right or W. bank of the Hudson River, at its entrance into New York Bay, and opposite the southern portion of New York City, with which it is connected by six ferries. Jersey City is the terminus of thirteen railroads—the Erie, the Pennsylvania, the Central of New Jersey, etc. The Morris Canal connects it with Eastern Pennsylvania. It is the terminus of the Antwerp, Rotterdam, and Cardiff steamship lines, and the seat of considerable foreign commerce, but owing to its being a part of the New York customs district, no separate returns are obtainable. At Jersey City are located large stockyards and slaughter-houses for the daily supply of the New York City market; this business, formerly at Communipaw, is now carried on in the N. part of the city, near the river front, where a very extensive abattoir was recently built, and opened in 1874; it is supplied by branches from the Pennsylvania and the Erie railroads. Manufacturing establishments are very numerous, the most important being the Lorillards' tobacco-works, U. S. Watch Co., glass, crucible, graphite pencils, iron, steel, zinc, tin, and copper, and boiler works, foundries, machine-shops, and locomotive-works, potteries, oakum, and a large business in soap and candles and refining molasses and syrup. The city is well supplied with water from the Passaic River at Belleville. There are 2 gas companies, 3 national banks, 2 State and 8 savings banks, 4 insurance companies, 7 newspapers (2 German), 44 schools, about 60 churches, and a fair number of religious and benevolent societies and institutions. Jersey City is in reality a suburb of New York City, its population consisting largely of the overflow from that vast metropolis. At the beginning of the century there was no settlement on Paulus Hook, as the locality was then called. A company was chartered in 1804 which laid out the grounds of Paulus Hook into streets and squares, but the growth of the place was insignificant until half a century later. It was but a village in 1820, when it was incorporated as the "City of Jersey," and it was still only a village when it was reincorporated in 1838 as "Jersey City" and provided with the machinery of a mayor and common council. Even in 1850 the population was but 6856. By the annexation of the township of Van Vorst (1851), of the cities of Hudson and Bergen (1870), and of the village of Greenville (1872), the growth of Jersey City during the third quarter of the century (1850-75) was largely assisted. Pop. in 1860, 29,227; in 1870, 82,546.

Z. K. PANGBORN, ED. "JERSEY CITY EVENING JOURNAL."

**Jersey Shore**, post-b. of Lycoming co., Pa., beautifully situated on the left bank of the W. branch of the Susquehanna, near the Philadelphia and Erie R. R. It has scenery of great attractiveness, is in a fertile region, has 5 churches, graded public schools, a high school, bank, and weekly newspaper. Chief industries, farming, lumber-trade, and tobacco business. Pop. 1394.

S. S. SEELEY, ED. "HERALD."

**Jerseyville**, city, cap. of Jersey co., Ill., on the Chicago and Alton R. R., Jacksonville branch, 50 miles N. of St. Louis. It has 4 large flour-mills running day and night, 2 foundries, 2 hotels, a large manufactory of ploughs and reapers, besides manufactures of carriages and other goods, 8 churches, and a fine public-school building. The city stands on elevated ground, is handsomely built, and has wide and finely shaded streets. It has much enterprise. It has 2 weekly newspapers. Pop. 2576.

W. H. EDGAR, ED. "REPUBLICAN."

**Jeru'salem**. I. THE NAME.—The name *Jeru'salem*\* is the Greek form (Ἱερουσαλὴμ), as found in the Septuagint, of the Chaldee *Jerush'lem*. In the New Testament it is written both as in the Septuagint and also *Jerosolyma* (Ἱεροσόλυμα), the evangelists, with the exception of Luke, using almost exclusively this latter form, while in Luke (including the Acts) and in the Epistles the former form is generally preferred. The Hebrew name is *Ierushalaim*, *Yerushalain*, or *Yerushalayim* (the full form is יְרוּשָׁלַיִם). The dual termination seems to indicate some ancient twofold division of the city, and, from the difficulty in determining any Hebrew root for the word, we may suppose that the name was Canaanitish, or even belonging to a race anterior to the Canaanites, to which the Hebrews added the dual ending for topographical reasons. We may otherwise conjecture that the dual ending is an accident, brought about by the resemblance of the original word to a Hebrew dual, or that the old language had a dual like the Hebrew. That the name should be changed to *Shalem* (Salem) in poetry, Ps. lxxvi. 2) is in accordance with the Hebrew love of paronomasia. If Salem in Gen. xiv. 18 be Jerusalem, we may account for the word Salem there in the same way,

for verses 18, 19, 20 seem to be a poetic insertion between verses 17 and 21. This poetic use of the word can be no argument for the word Salem or "peace" as belonging to the original name, any more than the fact of the Greek word *ιερός* being found in its Greek translations is an argument for the later idea that Hierosolyma meant the "holy Solyma."

II. THE HISTORY.—*First Period* (B. C. 1450 B. C. 1048).—The first appearance of the place in history (if we leave out the Salem of Melchizedek) is in Joshua xv. 8, where it is called the "shoulder" (*ketheph*) of the Jebusites (as in ch. xviii. 16, an admirable description of the projection of Mount Zion, as it appears from the boundary line of Judah and Benjamin, there described as running along the S. side of the city. The Jebusites held it as their special stronghold, and hence the name Jebus (*i. e.* the Jebusite city) is given it in Judges xix. 10, 11, and 1 Chron. xi. 4, 5. The Jebusites seem to have been territorially one of the smallest of the Canaanitish nations, but from their position one of the strongest. Their king, Adoni-zedek, was slain by Joshua at Makkedah after the battle of Beth-horon (Josh. x.). After Joshua's death the Israelites made their first assault upon the city. The tribes of Judah and Simeon succeeded in taking it and setting it on fire (Judges i. 8) when on their way to complete the settlement of their lot. This capture of the city must have been but partial (as Josephus says), for the tribe of Benjamin, to which it was assigned, left the Jebusites in quiet possession of a part of the city, the upper city (*ἡ καθ' ἑμπεδον*) on Zion (Judg. i. 21). For nearly four centuries the citadel of Jerusalem remained in the possession of the Jebusites, during which time we may well believe that its Canaanitish inhabitants thoroughly fortified it, adding to its natural strength all that the art of that day could suggest. During those centuries we cannot suppose a state of war to have continued between the Jebusites and the Israelites, but that some sort of peaceful intercourse was maintained, in which Jerusalem, or the chief part of it, was tacitly understood to belong to the Canaanitish tribe. During all this long period the central capital was at Shiloh, except, as in Saul's reign, Gibeah, his residence, may claim the precedence. It may be that the fact of Saul's capital, Gibeah, being only 4 miles N. of Jerusalem was one inducement to David to seek to set up his throne in the Jebusite stronghold. It would be more central than Hebron, where he had begun his reign, and it would also be in the tribe of Benjamin, which had under Saul been the royal tribe, while its strength would make it far more desirable than Gibeah or than Shiloh. Indeed, the latter city was probably already destroyed by the Philistine invasion. (See Jer. vii. 12.) Whatever the motive may have been, David in the eighth year of his reign organized an attack upon Jerusalem when the enthusiastic adhesion of all Israel to his government rendered success most probable. The diversion in the direction of the house of Saul would have seriously interfered with such a project earlier in David's reign. Joab, David's chief captain, took a conspicuous part in the siege (1 Chron. xi. 6), which was marked by self-confidence on the part of the Jebusites and daring valor on the part of Israel. The strong citadel was taken, and called afterward "the city of David." We may be very sure that this citadel was Zion, and that "Millo" was its bluff front on the valley of the Son of Hinnom. From David's conquest of Jerusalem dates its fame. Before that time we have no reason to suppose it of any more consequence than any well-placed stronghold, but now the concentrated royalty of the twelve tribes made it the seat of power and glory, and for 460 years, until Nebuchadnezzar destroyed it, it stood forth as one of the conspicuous capitals of the world, vying at one time, in some respects, with Nineveh, Babylon, Tyre, and Thebes.

*Second Period* (1048 B. C. to 586 B. C.).—David immediately turned his attention to the reconstruction and strengthening of his new city, and when this work was accomplished had the ark of God, which had been for a century at Kirjath-jearim (ever since the great Philistine invasion of Eli's time and most probably the destruction of Shiloh), conducted with great pomp and jubilation to the royal city and placed in a new tabernacle especially prepared for it, the old Shiloh tabernacle being at Gibeon, 5 miles N. of Jerusalem (2 Chron. i. 3, 4). David may have already had in his mind the construction of a grand temple in place of the old tabernacle, and therefore have preferred to bring the ark to Jerusalem, where the future structure would be reared, rather than carry it to the old tabernacle at Gibeon. The rest of the tabernacle furniture was doubtless at Gibeon. The brazen altar, we are expressly told, was there. This position of the ark on the large citadel-hill (Zion) continued for forty years, making the name Zion a favorite name for the city, especially when viewed as a *holy city*, a centre of worship. The consoli-

\* The *J* represents the Greek aspirated *I*. It might be represented by *Hi*; *e. g.* Hierusalem, Hierosolyma.



dation and strengthening of the whole Israelitish commonwealth in David attracted the attention of his powerful neighbor, the king of Tyre, who did him the high honor of building the royal palace in Jerusalem with material and workmen from the Phœnician kingdom (2 Sam. v. 11). David's conquests over the Syrians, Moabites, Ammonites, Philistines, Amalekites, and Edomites extended the territory of his empire to the Euphrates on the N. E. and to the Red Sea and Mediterranean on the S. and W., making his dominion the most conspicuous of the world at a time when the Assyrian empire had fallen into feebleness between its exaltation under the first Tiglath-pileser and its renewed glory under Asshur-izir-pal. During this period of David and Solomon, Egypt, the other great monarchy, seems to have been in a like low plight with Assyria, previous to the accession of the new and powerful dynasty of Shishak. From Hiram's conduct we may readily see that the Israelitish kingdom out-topped Tyre, so that the throne of David and Solomon must have represented the grandest empire then existing on the earth. Of this empire Jerusalem was the central seat, which naturally, under such influences, began to assume an extent and grandeur corresponding with its important position. Especially under Solomon, in his peaceful reign, did the city grow into magnificence. What war had before done, commerce now accomplished, and Jerusalem received a vast stream of wealth from its active relations with many rich and distant countries. Egypt, Arabia, Tyre, Ophir (India?), and perhaps Tarshish (Spain?), are especially spoken of as connected with Jerusalem by important commercial ties at this time, by which this capital became an entrepôt of trade for all the subject kingdoms of Syria (1 Kings x. 29). With the enormous wealth thus acquired, and that laid up by his father, Solomon erected the temple on the rocky height opposite Zion, which David had prepared for the purpose, having purchased the site from Araunah the Jebusite.\* The sharp ridge of the height was taken off and the surface levelled, vast vaults being erected to support extensions of the level, and on this grand, conspicuous area of nearly 1000 feet square one of the most costly shrines the world has ever seen was erected by the magnificent monarch. With both men and materials from Tyre (the centre of mechanical art) he raised the massive structure (whose wall-stones, still bearing the Tyrian marks, astonish the explorer), completing the work in seven years. He also erected a palace of corresponding grandeur for himself, which occupied thirteen years in its construction. Another superb edifice, erected for state occasions and called the House of the Forest of Lebanon (perhaps because of its many cedar pillars), was constructed at the same time. The walls of the city also received his attention. These were extended around suburbs, increased in height, strengthened with towers, and probably increased into fortresses at such points as Milo and Ophel, where already fortresses existed. A palace was built for Solomon's queen, the daughter of the Egyptian monarch, and doubtless his thousand wives and concubines called for an enormous outlay in architecture. The whole apparatus of the Solomonian court was on a style of unparalleled extravagance and splendor. This grandeur of Jerusalem seems to have been in accordance with man's wish, and not God's appointment, except as God yielded to man. It was man who insisted on the monarchy instead of a theocratic republic, and it was man who conceived the idea of the gorgeous temple. God permitted both, but they seduced Israel from its simplicity and destroyed its separateness from the nations, so important for its great spiritual mission. Commercial intercourse with the nations, by which the wealth was secured, and royal pomp which sought the wealth, brought into the country the idolatry and immorality of other lands, with all the recklessness and oppression that follow human aggrandizement, so that just when the nation seemed to be most exalted it was preparing its ruin. It is remarkable that (in accordance with the prophetic declaration, that the Babylonian captivity should last long enough for the land to make up its lost sabbatical years—Lev. xxvi. 34, compared with 2 Chron. xxxvi. 21), if we count backward from the year B. C. 518 (the end of the seventy years), the seventy sabbatical years, or 490 years, we reach A. C. 1008, the period of Solomon's top of glory. Here we see that in the worldliness of this magnificent reign the keeping of the sabbatical year began to be disregarded. Solomon was succeeded by Rehoboam, a foolish *porphyrogenitus*, who soon began to experience the evil results of his father's extravagant policy. The kingdom was divided. Jeroboam, returning from Egypt, where

he had been an exile protected by Shishak, the Pharaoh during the later years of Solomon, became king of the northern realm, and Jerusalem was left the metropolis of the tribes of Judah and Benjamin only, and of the subject countries at the S. and E. This fearful schism in the nation and the tempting treasures of Jerusalem brought Shishak (perhaps through Jeroboam's influence) from Egypt against the Holy City. This enterprising and illustrious monarch made his attack upon the kingdom of Judah in the fifth year of Rehoboam with an enormous host of Egyptians and foreign auxiliaries. The glory of Jerusalem had for two generations eclipsed that of Egypt; Egypt would now have its revenge. The fortified cities of the Judean kingdom fell one after another. Although they are not specified, we may readily suppose that Gath, Maresah, Lachish, and Bethlechem, among those places which Rehoboam had lately fortified against Egyptian attack (2 Chron. xi. 6-10), were overcome by Shishak to clear his way to Jerusalem. In the city had assembled all the dignitaries of the realm, who, at the word of the prophet Shemaiah, humbled themselves with the king before God, and so averted the evil. The Egyptian seems not to have entered the city,† but a treaty was made, most humiliating to Judah, by which the kingdom became tributary to Egypt, and the treasure accumulated in the temple and royal palace was delivered up to Shishak, who also carried off the 500 shields overlaid with gold which Solomon had placed as ornaments in his stately House of the Forest of Lebanon. The gold of these shields alone represented a sum of \$720,000—a sum of vast magnitude in those days. Abijah, the successor of Rehoboam, by his great victory over the kingdom of Israel, helped Jerusalem to recover from this blow, but it was not till the year B. C. 941, more than thirty years after Shishak's disastrous raid, that Jerusalem regained her independence and dignity by the complete overthrow of the Ethiopian Zerah (supposed to be Pharaoh Usarken I.) at the battle of Maresah, as far as which point he had penetrated, with an army like that of Shishak's, against Asa, Rehoboam's grandson. This great victory filled the kingdom with joy, restored treasure to Jerusalem, drew many Israelites of the northern kingdom to the city, and caused a reform in the religious condition of the people, who had been led astray from Solomon's day. It is sad to see how soon afterward Asa took the new treasure, which he had placed in the temple in lieu of that which Shishak had seized, and gave it as a bribe to Benhadad, king of Syria, that he might attack Bascha, king of Israel. The prosperity which Asa brought to Jerusalem continued for fifty years—a period of national power and dignity that was to be followed by the evils of a close alliance with idolatrous Israel in the union of Jehoshaphat's family with the corrupt family of Ahab and the Tyrian Jezebel. Jehoram, Jehoshaphat's son and Asa's grandson, married Athaliah, daughter of Ahab and Jezebel. Through her the abominations of idolatry again filled the royal city. Jehoram began his reign by murdering his six brothers. He ended it with the successful revolt of Judah's dependencies, and a fearful onslaught of the Philistines and Arabians upon Judah itself, in which the enemy carried off many of the king's wives and all his sons but one, with all the treasure which they found in one of his country palaces.‡ When Jehoram had died, and his son Ahaziah had been slain by Jehu, Athaliah immediately slew her grandchildren (one only, Joash, escaping the massacre), and for six years wielded her usurped authority. Thus, for fifteen years the prevalence of Baal worship in Jerusalem caused the temple to fall into decay. Indeed, Athaliah's family had even defaced the holy shrine and carried off the sacred vessels for use in the service of Baal's temples. The piety and patriotism of Jehoinda, who had preserved the infant prince Joash, put an end to these enormities by slaying the guilty queen and the priests of Baal, and restoring the worship of Jehovah. But when the old Jehoinda died at the remarkable age of 130 years, and was honored by a burial among the kings, a state policy led King Joash to restore idolatry and to slay Jehoinda's sons (among them Zechariah, the high priest) in the very court of the temple while they were protesting against this fearful apostasy. This event shows how deeply seated in the public regard was the idolatry which first Solomon and then Jehoram had fostered, and which the people doubtless connected with their grandeur before the nations. Not long after, Hazael, the energetic king of Syria, besieged and took Gath, and then turned toward Jerusalem, defeating the Ju-

\* Josephus says that Shishak entered the city without a battle, but it thus had been the case, we should have seen a more thorough ruin of the city. Where Josephus refers to this sacred narrative he is often very inaccurate.

† No mention is made of the Egyptian fleet, as in 2 Chron. xxi. 17. Hence, we may suppose the royal family were sojourning elsewhere.

\* He was probably the very Jebusite king whom David had conquered thirty years before. The Hebrew words of 2 Sam. xxiv. 21, literally translated, are, "Araunah the king gave the whole to the king."



dean army on the way and making havoc everywhere, when Joash purchased deliverance for the royal city only by giving up to Hazael all the sacred vessels which had been accumulated since Asa's day, 100 years before, together with all the ecclesiastical and royal treasure in the city. Although this invasion of Judah was most disastrous to the country, involving immense loss of treasure and the death of all the prominent nobles who attempted to stop the progress of the Syrian king, yet the record gives no countenance to the idea that Jerusalem was captured either by him, by the Philistines in Jehoram's day, or by Shishak in Rehoboam's day. Its capture from the Jebusites by King David was thus far the only seizure of the famous stronghold. The first actual capture of the city after David's conquest was made by the Israelitish monarch Joash, who had been provoked to war by Amaziah, king of Judah, son of the Jerusalem Joash. The king of Israel, after defeating Amaziah at Beth-hemesh, appeared before Jerusalem, and probably through the Jewish king, whom he held as prisoner, obtained entrance into the city, which he plundered, and 400 cubits length of whose wall he levelled. This was about the year 826 B. C., more than two centuries after David's conquest of the Jebusite stronghold. Uzziah, Amaziah's successor, in his long and prosperous reign repaired the injury done to the walls of the city and added to its fortifications. It was in this reign that the great earthquake occurred which is referred to as a memorable epoch by the prophets Amos (i. 1) and Zechariah (xiv. 5), and which is by Josephus connected with the king's sacrilege (*Ant.*, 9. 10. 4). If we disregard the statement of Josephus, we may believe that this extensive building of the walls and fortifications may have been suggested by the ruin caused through this grievous visitation. In the reign of Jotham, Uzziah's son, the "high gate" of the temple was built (perhaps the predecessor of the "beautiful gate" of Herod), and the wall of Ophel was erected. If Ophel was the southern spur of Moriah, as seems quite proven, it is hardly possible that it was not fortified to some extent from Solomon's day. Jotham probably added to its fortifications or rebuilt those that had been destroyed. This enterprising king also erected fortresses throughout the kingdom. Ahaz, Jotham's son, sustained fearful defeats from Rezin, king of Syria, and Pekah, king of Israel, so that he called upon Tiglath-pileser, king of Assyria, to come to his aid. This alliance was purchased by despoiling the temple and royal palace in a far more wholesale manner than it had been done by Rehoboam, Asa, or Joash. Ahaz, in his infatuation with the Assyrian alliance, removed the brazen altar, built a new one of heathen pattern in its place, and defiled the temple itself with idolatrous rites. Hezekiah, succeeding his father Ahaz, immediately restored everything to its original service, purified the temple, and celebrated the Passover with unusual solemnity. During Hezekiah's reign occurred the formidable invasion of Sennacherib, king of Assyria, against which Hezekiah prepared the city with wonderful industry and in the most thorough manner. Although the kingdom was devastated, the city was saved, yet with a new stripping of temple and palace as a tribute to the great conqueror. (See Sennacherib's own account in the Nineveh records.) This was the sixth time within three centuries that the treasures of Jerusalem had been seized. Manasseh, Hezekiah's son, had a long and eventful reign. He brought back all the idolatries which his father had removed, even putting an image of Baal in the temple itself. Esar-haddon, king of Assyria, who reigned in Babylon, subjected the kingdom of Judah, as his father Sennacherib had done, and managed to seize the person of Manasseh and carry him captive to Babylon. On humbling himself before God, he was released from his captivity, returned to Jerusalem, and added to the fortifications of the city on the N. W. and S. E. But it was not till the reign of Josiah, Manasseh's grandson, that the idolatrous objects in and around Jerusalem were thoroughly removed. Under an impulse caused by the discovery of a copy of the Mosaic Law (a discovery which shows the lamentable condition of the nation during the preceding reigns), Josiah not only purified the temple precincts, which were filled with vessels consecrated to Baal and Ashtoreth and to the heavenly bodies, and where houses of abomination had been erected, but he also defiled Tophet in the valley of the Son of Hinnom, where the Moloch-worship had been held, destroyed the altars which had been erected in the royal quarters, and made utter havoc of all the idolatrous shrines in the vicinity of Jerusalem which Solomon had erected, and which had been allowed to stand for 400 years, perhaps because of their architectural beauty. At the end of a thirty-one years' reign the body of Josiah was brought from the fatal battle-field of Megiddo (where the king had foolishly met Pharaoh-necho in his march against the Oriental empire), and buried in Jerusalem amid the lamenta-

tions of all the nation. Then followed the sad reigns of Josiah's three sons and one grandson. Jehoahaz, the first (though not the oldest), succeeded his father, taking precedence of Jehoikim, perhaps because of the latter's inclination to an Egyptian alliance. In three months the victorious Necho dethroned him and carried him captive to Egypt, putting Eliakim or Jehoikim in his place. A few years after, the Oriental empire of Nebuchadnezzar asserted its supremacy over Egypt, and Jehoikim was obliged to become a vassal to that distinguished monarch. Three years later he rebelled against the Babylonian, and brought upon him the full force of Nebuchadnezzar's fury. The conqueror seems to have seized the person of the king to carry him to Babylon, and then to have permitted him to ransom himself by the delivery of much of the treasure of the temple. At Jehoikim's death a new siege of the city by Nebuchadnezzar occurred, and the city was saved only by the delivery to Nebuchadnezzar of the young king, Jehoiachin, Jehoikim's son, with his mother, wives, and court, and all the treasure that could be gleaned from the temple and the palace. At this time also the Babylonian monarch made a vast deportation of the higher classes, as well as the craftsmen, to Babylon. The manner in which this is narrated in the sacred story seems to show that the city was not entered by the victorious monarch. Nebuchadnezzar placed Mattaniah, Josiah's youngest son, on the throne, changing his name to Zedekiah. This weak and foolish king, trusting in an Egyptian alliance, dared to rebel against Babylon, and brought upon Jerusalem its destruction by Nebuchadnezzar in the year B. C. 586. After a siege of eighteen months, famine and superior numbers conquered the holy city. The walls were levelled, the temple and royal palace and the whole city were burned, and everything worth carrying off became plunder to the exasperated Nebuchadnezzar. Zedekiah's sons were slain before his face at Riblah on the Orontes, and then his own eyes were put out, and he was carried away to Babylon to adorn the monarch's triumph. Another deportation marked this epoch, so that only some of the poor of the land were left to be vine-dressers and husbandmen.

*Third Period (586 B. C.—70 A. D.).*—Jerusalem lay waste until the Persian monarchy absorbed the Babylonian, and the Persian hostility to idolatry produced a friendship between the new empire and the monotheistic Jews. One of Cyrus's first acts was to send back all the Jews who wished to Jerusalem with riches and honor. Less than 50,000 returned, however, an exile of from fifty to seventy years from Palestine having rooted the vast majority to their Oriental homes. This return, under Zerubbabel of the royal house (but not as king) and Joshua the high priest, occurred probably in the year B. C. 536, and had largely a religious character. The rebuilding of the temple was the first object sought, and the work went on whilst Cyrus reigned. But during the reigns of Cambyses and Smerdis the enemies of the Jews succeeded in obtaining a royal veto on their enterprise. Darius Hystaspis, in his vigorous restoration of the policy of Cyrus throughout the empire, permitted the Jews to finish their temple, and in the sixth year of his reign (B. C. 516) the new structure was completed and dedicated.\* It was the Holy City once more. The new temple, somewhat smaller than its predecessor, was also inferior in costly adorning to the structure of Solomon, but still it was a rallying-point for the scattered Jews. We may suppose that many found their way from year to year from their distant places of exile to dwell again by the hallowed precinct, themselves and their city now for ever purged from idolatry. In the year B. C. 457, Ezra the priest brought a train of 5000 Jews (nearly 2000 males) from the land of exile to Jerusalem, and acted as guide and teacher to the feeble restoration. In B. C. 445, Nehemiah visited Jerusalem and aroused the despondent people to build the walls of the city, which had been prostrate for 140 years. With wonderful enthusiasm and rapidity, in the face of threats from the neighboring hostile tribes, the people went to work, and in fifty-two days finished the great undertaking. Nehemiah acted as the Persian governor, and by his earnest piety and fearless conduct did much to establish the purity of the Jewish commonwealth.† The first Persian interference with the Jewish province (for such it now was) arose from the murder of Joshua by his brother Johanan, the high priest, in the temple, in the year B. C. 366. These two were grandsons

\* Josephus makes a second return from Babylon under Darius Hystaspis, with Zerubbabel as leader. This return (he says) numbered 4,677,690 souls. He of course considers the Sheshbazzar of Ezra i. 11 as a different man from Zerubbabel.

† Josephus puts both Ezra and Nehemiah in Xerxes' time (B. C. 485-465). But the Artaxerxes of Ezra and Nehemiah could not have been the Xerxes of history, for Xerxes reigned only twenty years, but in Neh. v. 14 we find Artaxerxes' thirty-second year mentioned. Artaxerxes Longimanus reigned forty years.

of Eliashib, the high priest, whom Nehemiah was obliged to rebuke (Neh. xiii. 7), and Johanan, the murderer, was son-in-law of Sanballat, the Samaritan governor (Neh. xiii. 28). Bagosus (Bagoas), the Persian general, by reason of this fearful murder defiled the temple by entering it, and laid a tax for Johanan's lifetime (which proved to be seven years longer) of fifty drachmas for each lamb used in the daily sacrifice. Johanan's two sons, Jaddua and Manasseh, held jointly the high priesthood after their father's death, until Manasseh was tempted to go off to the Samaritans, who, under Alexander's sanction, erected their own temple on Mount Gerizim, and made Manasseh their high priest. During Jaddua's high priesthood Alexander overthrew the Persian monarchy. His remarkable reception at Jerusalem by the high priest, his entrance into the temple to attend the offering of sacrifices, his delight at finding the record of Daniel predicting the overthrow of Persia by the Greeks, and his confirmation of the Jews in their own peculiar laws, are all graphically related by Josephus. Alexander's visit was in B. C. 332, and the Seleucid empire dates from B. C. 312. The period between Alexander's death and the settlement of the empires of Syria and Egypt was a chaotic and stormy one. Ptolemy Lagi acquired possession of Jerusalem by a trick, and enslaved many thousands of the Jews, carrying them into Egypt. For more than a century Judaea was a tributary province of Egypt under the high priesthood of Onias, Simon the Just (who extensively repaired and enlarged the temple and the walls), Eleazar, Manasseh, Onias III. and Simon II. In the time of Simon the Just large donations were bestowed upon the temple by Ptolemy Philadelphus, in whose reign and by whose order (according to the received story) the Greek (Septuagint) translation of the Hebrew Scriptures was made for the Alexandrian library. After the battle of Raphia (B. C. 217), Ptolemy Philopator, who had then defeated Antiochus the Great, attempted to enter the *naos* of the temple, but was opposed by Simon II., the high priest: eighteen years after which Antiochus wrested Jerusalem from the Egyptian empire. With a brief exception of a year, in which the Egyptians again held the city, Jerusalem remained a province of Syria until the Maccabean revolt. During these thirty-five years Simon II. (who was grandson of Simon the Just) died, and Onias III. became high priest, in whose administration the city was greatly disturbed by the quarrels of the Josephine family, a priestly family that had become rich through political favors received from Egypt. In B. C. 175, Antiochus IV. (Epiphanes) succeeded to the throne of Syria, and began deliberately to plan the extinguishment of all the peculiarities of the Jewish people. He was determined to make Jerusalem a Greek town. On the death of Onias he put Onias's brother, Joshua, into the high priesthood, changed his name to the Greek "Jason," introduced Greek games, put the temple service into relation with that of idolatrous shrines, and in every way undermined the integrity of the Jewish character and religion. At length a younger brother, also named Onias, changed in his turn his name to "Menelaus," and persuaded Antiochus (who was really to sow dissensions) to make him high priest in place of Jason. Dissensions continued between the two Hellenizing brothers till Jason died. Antiochus now came to the city and stripped it of all its treasures and carried away a multitude of captives. In B. C. 168 he followed this by sending an army to Jerusalem, which entered on the sabbath day, made havoc of the inhabitants, and breached the city walls. The temple was dedicated to the Olympian Jupiter, swine's flesh was offered upon the altar, and the defilement of the temple made complete. All the Jewish ritual was forbidden, and fearful punishments were visited on those who dared to uphold their ancient faith. This extreme policy of the Syrian monarch served to defeat its object. Under the guidance of the Asmonean family (so called from the priest Chashmon, an ancestor) the Jews organized a general revolt. In B. C. 165 they entered Jerusalem and defiled the temple anew, the citadel being still held by the Syrians. The next year the monster Antiochus died of a loathsome disease. Under his successor fortune wavered between the Jews and the Syrians till the death of Judas called Maccabaeus (the "Hammer") in B. C. 161. Alcimus, high priest, was a tool of the Greco-Syrian monarch, and strengthened himself in the citadel of Jerusalem until his death. Jonathan and Simon, brothers of Judas, were now the leaders of the revolt, and, taking advantage of a disputed succession to the Syrian throne on the part of Demetrius and Alexander Balas, Jonathan became high priest by Alexander's ap-

pointment, and then received for Jerusalem extraordinary gifts and privileges, including its thorough fortification. After Jonathan's death Simon became high priest, and captured the citadel (B. C. 142), which had held out against the Jews for more than twenty years. The citadel was razed and its hill lowered, and a new fortress, the Baris, built to command its site. The enterprising Asmonean then entered into alliance with the spreading power of the Romans, which had already overwhelmed Macedonia. John Hyrcanus succeeded his father Simon in the high priesthood, and successfully resisted an elaborate siege of the city by Antiochus Sidetes, who was compelled to grant him honorable terms and withdraw his army. Hyrcanus afterward accompanied Antiochus in his war with the Parthians. In B. C. 107, Hyrcanus died, and was succeeded by his son Aristobulus, who assumed the title of king. The history now becomes a series of fierce and bloody strifes. Aristobulus kills his brother. Another brother, Alexander Jannaeus, who succeeds Aristobulus, is a cruel tyrant, and reigns for a quarter of a century, engaged equally in fighting the Syrians and destroying the Jews of the Pharisean party. His two sons quarrel for the throne, and this quarrel brings Pompey, the Roman general, into the Jewish history. He takes the part of Hyrcanus against Aristobulus. The latter holds the temple, and Pompey besieges it, capturing it at last by assault and the slaughter of 12,000 Jews. The Roman victor made Hyrcanus high priest (but no longer was the title of king allowed), destroyed the city walls, and carried off Aristobulus to Rome. This occurred in the year B. C. 63. Antipater, an Idumean, became the chief adviser of Hyrcanus, and this crafty foreigner made such interest with Julius Caesar that he received the procuratorship of Judaea, while Hyrcanus was allowed to assume the title of ethnarch. In B. C. 43, Antipater was murdered, and great disturbances arose. Antigonus, son of Aristobulus and nephew of Hyrcanus, came to Jerusalem with a Parthian force, and by stratagem brought the Parthians into the city, seized Hyrcanus, cut off his ears that he might be no longer high priest, and imprisoned Phasaclius, Antipater's son, who committed suicide in his prison. Herod, another son of Antipater, who had endeavored to resist the attack of Antigonus, escaped, and soon organized a Roman attack upon the usurper. At this time Herod married Mariamne, Hyrcanus's granddaughter. Herod's siege of Jerusalem lasted five months, when the city was stormed and a fearful slaughter followed; Antigonus was slain. Herod now determined to hold all power in his own hands, his marriage with Mariamne furnishing a slim claim to the Asmonean succession. He put out of the way all Asmoneans who might be claimants of the throne, his own wife Mariamne and her old grandfather falling victims at length to his cruelty; he cultivated the friendship of the Romans, enlarged the Baris into the grand fortress of Antonia, constructed a magnificent palace, built a theatre, and instituted games in honor of Caesar. Herod sought to win the esteem of the Jews themselves by building a new temple, rivaling the original of Solomon in its richness and grandeur. For thirty-two years this extraordinary despot, plausible and politic, though remorselessly cruel, held firm sway over Judaea as king, beautifying the city and restoring its importance, loved by none, feared by all—maintaining peace and thrift in his kingdom, and showing a boldness and strength in his administration seldom equalled. In the year B. C. 4 of the common reckoning Herod died, a few months after the birth of our Lord in Bethlehem. Ten years later his son and successor, Archelaus, was deposed and Judaea made a Roman province. Pontius Pilate was the fifth Roman procurator of the province, under whose administration our Lord was crucified. The Roman government of Judaea was strong, and on the whole peaceful, for many years, except as the Jewish horror of Gentile defilement of the temple and Holy City produced from time to time collisions between the citizens and soldiers. These troubles were generally ended by a prudent yielding on the part of the Romans, until in A. D. 41, Herod Agrippa, grandson of Herod the Great, was made king of all Palestine by the emperor Claudius. This last Jewish monarch † built a strong wall to enclose the suburbs on the N. of Jerusalem, thus more than doubling the size of the city. On his death at Caesarea (a visitation for his blasphemy), Rome again made Judaea a province, and a list of reckless procurators followed till the final fall of the Holy City. Cumanus, Felix, Albinus, and Florus were conspicuous for their utter disregard of Jewish customs and prejudices. Indignant outbreaks, developing into riots and insurrections, occurred from time to time, the nation meanwhile becoming thoroughly demoralized.

\* Josephus says that Johanan's son, Manasseh, was Sanballat's son-in-law, but this is highly improbable. He also makes Sanballat to be living at Alexander's invasion, 113 years after he opposed Nehemiah.

† His son Agrippa, although made king of Chelone and the northern tetrarchies, and though he successfully rebuffed the northern tetrarchs, seems never to have used royal power in Judaea.



until, in the year 66, Cestius Gallus, the prefect of Syria, was obliged to interfere and attempt, with the aid of the high priest and a peace party, to put down the insurgents. Gallus was severely beaten, and Rome now began the war in earnest. First, Vespasian, and afterwards his son Titus (both becoming emperors at length), conducted the war. The terrible dissensions among the Jews, the unspeakable sufferings of the besieged, the agony of the nation shut up within the walls of Jerusalem, the destruction of more than 1,000,000 Jews (including all the sick and old), the enslaving of all the youth, the entire demolition of the city, so as to leave no sign of its former occupancy,—all this forms one of the gloomiest pages in the annals of man.

*Fourth Period (70 A. D. to this time).*—In Hadrian's reign (A. D. 118-138) we next hear of Judæa in an attempt of formidable dimensions to rebuild the city of Jerusalem and establish the Jewish polity. Of this attempt Bar Cochba was the enterprising leader, who for three years kept the power of Rome at bay, until the insurrection was entirely quenched in the blood of hundreds of thousands. Hadrian's exasperation at this event made him first raze everything he could find on the site of Jerusalem, and then build a new city on the spot, which he peopled with Romans and called *Ælia Capitolina*. On the old temple site he erected a temple to Jupiter Capitolinus, and placed his own statue on the site of the holy of holies. No Jew was allowed to enter the new city, and this prohibition continued in effect till the empire became Christian, when permission was given them to weep by the W. temple-wall (where probably, in spite of the frequent and wholesale destructions, some few stones occupied their old place)—a custom continued until this very day. Constantine restored the old name, *Jerusalem*, although the Hadrianic name of *Ælia* is found in use for centuries afterward. His mother, Helena, devoted herself to recovering the lost sites of Christian importance in Jerusalem and elsewhere in the Holy Land, and erected costly churches on these supposed sites.

Julian (A. D. 363) attempted to rebuild the Jewish temple and restore the Jewish worship as a part of his design against Christianity, but the work was hindered and stopped by subterranean fires breaking out among the workmen, as Ammianus, an unprejudiced witness, asserts. For the first Christian centuries of the empire Jerusalem occupied the position of a venerable and sacred relic, to which pilgrims constantly found their way. Bishops presided over the Church there, and emperors from time to time built or repaired the holy edifices. The first disturbance of this peaceful condition was when the Persian monarch, Chosroes II., took the city by storm in 614, destroyed the churches, and slew the ecclesiastics. Fourteen years afterward the Greek emperor Heraclius, victorious over the Persians, restored the churches and re-established the Christian dominion in Jerusalem. But it was only for a short period. In 637, Omar made Jerusalem the first grand conquest of the rising Mohammedan power. From that day to this Jerusalem has been a Mohammedan city, except during the brief interval in which the crusaders held it. Omniades, Abbassides, and Fatimites took their turns in ruling it from Damascus, Bagdad, and Cairo as their capitals; Christians were more or less persecuted from time to time, and the Church of the Holy Sepulchre was repeatedly destroyed and rebuilt; but Christian pilgrims continued to visit the Holy City, paying tribute to the Moslem rulers for the privilege. In 1099, after a Turkish tribe had had a brief possession of the city, and had shown unusual severity to the Christians, but had now been supplanted by the Egyptian khalif, the crusaders appeared before Jerusalem. In six weeks the city was in their hands and Godfrey of Bouillon elected its king. It remained in the hands of the Christians till Salah-ed-din (Saladin), the sultan of Egypt, reconquered it in 1187. Thrice afterward the city was for a short time in Christian hands. In 1517 it fell into the hands of Selim, the Turkish conqueror of Egypt, and remains in possession of his successor, the sultan, to this day.



Jerusalem in her decay.

**III. TOPOGRAPHY.**—From the history of Jerusalem, briefly given above, it may readily be seen that its internal topography cannot be very accurately determined. Especially were the demolitions by Titus and Hadrian so complete that all traces of detail, even in the general surface of the ground, must be well nigh impossible. Hills were lowered and valleys filled up, and buildings reared upon ruins and of material afforded by other ruins. This, with the ordinary changes and decays of 3000 years, must make the internal topography of the city a puzzling problem. With the outer topography of the city the conditions are different. The eastern, southern, and western limits are accurately defined by the deep ravines of the Kedron and the Bene-Hinnom, and beyond these the Mount of Olives, the Hill of Evil Council, and the western heights remain as David must have seen them, so far as their natural features go. On the N. there are no such marked topographical features. From Scopus the descent to the city is gradual, and it was in this

direction that the suburb existed which Herod Agrippa enclosed with a wall. The modern city walls, built only 300 years ago by Suleiman (Solymán the Magnificent), probably enclose the area of the ancient city of David's day, with the exception of the southern portion of Zion and Ophel, which are now without the walls. The positions of Zion and Moriah (of which latter Ophel is the southern extension) seem to be thoroughly determined. Mr. Ferguson's startling and ingenious theory that the ancient Zion was the temple hill, where the temple, the city of David, Baris, Aera, and Antonia stood, has too much to contend with it in uniform tradition, in spite of the few problems that this theory solves.\* Josephus tells us (*Ant.*, 13. 6. 7)

\* The name Zion came in use as the sacred name of Jerusalem in David's day, when the ark was under a tent on Mount Zion, making it the "holy hill," before Moriah received the temple and the title.

that Simon the Asmonean destroyed the citadel (*τὴν ἀκρὰν*) to the foundation, and then lowered the hill on which it had stood, so that the temple could be higher than it: and this work, he tells us, occupied three years. As the hill generally known as Zion is higher than the temple-hill, this fact recorded by Josephus does not prove that the modern Zion is not the ancient Zion, but that the *ἀκρὰ* of Simon was not upon Zion. The citadel, and indeed the main city, when David conquered Jerusalem, was certainly the modern Zion. In later days a new citadel was formed on the northern hill or lower city (*Λαρά*), then much higher than now, which was afterwards superseded (when Simon had reduced its hill) by the Baris, and afterwards Antonia, nearer to the temple. Josephus calls the new part of the city enclosed by Agrippa's wall "Bezetha" (*ἡ ἐκὶ χαλκῶς δι' ἐκκλησίαν Βεζεθὰ τὸ νεώτερον ἀπὸ τοῦ*), and yet speaks of it as a *δόλος* (forest). As a *δόλος* we should suppose the hill N. of the temple hill was intended—a hill which is high and well defined: but from the other words of Josephus, and the meaning of the word *Bezetha* (new town), we should suppose all that was encircled by Agrippa's wall from Hippicus to the Kedron was meant. Probably the name *Bezetha* was given to the whole, and the hill, as being contained within it, was also known by the name.

Such is our best arrangement of the general divisions of the city. Let us now follow the ancient walls. We may suppose that Nehemiah, in restoring the walls, followed the old foundations and rewalled the same area which constituted the city in David's day. In the rebuilding, as recorded by Nehemiah (chap. iii.), Eliashib the high priest is first mentioned as leading the workers at the sheep-gate, and at the wall as far as the Tower of the Hundred (Ha Meah) and the Tower of Hananeel. These places we must, of course, find in the temple region, for there the high priest would be set. Moreover, the passage in Jeremiah (xxvi. 38-40) seems to be a reference to the temple precincts rather than to the whole city, and the Tower of Hananeel is there prominent. The description in Nehemiah follows the wall from the centre of the E. side of the city, northward. The sheep-gate must have been in the centre of the temple-precinct wall, and perhaps derived its name from the sheep brought in by that gate for sacrifice. If the *προβατικὴ* of John v. 2 be the sheep-gate, and the Pool of Bethesda be the Fountain of the Virgin with its intermittent flow, then we should suppose the sheep-gate to be further S., but the Pool of Bethesda may have been within the temple-precinct, and the present Fountain of the Virgin may receive to-day the intermittent effects which in former times showed themselves in another pool, now filled up. We are inclined to think that this "sheep-gate" is the same as the Mishneh or "second (gate)" of Zeph. i. 10 and the "college" of 2 Kings xxii. 14, where the prophetess Huldah lived. In this case the "fish-gate" would be the first gate (see Zeph. i. 10), and would represent the N. E. corner of the city, opposite the Mount of Olives. Between the "fish-gate" and the "sheep-gate" would stand the Tower of Hananeel and the Tower of Meah for the Hundred. The "old gate" would be found next, as we follow the N. wall north-westward. The course would be along the "second wall" of Josephus, for the first or old wall seems to have been the northern fortification of Zion. The "old gate" may be really the "Jeshanah gate" (by leaving the adjective untranslated), and may be the gate leading to Jeshanah (2 Chron. xiii. 19, and Joseph. Ant. iii. 13. 12), a town near Bethel. The "gate of Ephraim" comes next in Nehemiah (not in his account of the building, but in his record of the dedication xiii. 39), and may have occupied the site of the present Damascus gate. Then follows "the broad wall" (some local peculiarities of the wall, perhaps for defence sake), and then we reach the "tower of the furnaces," which may have stood over the western valley as the towers of Hananeel and the Hundred overlooked the eastern. The "valley gate" would correspond with the present Jaffa gate. Near this was the dragon-well (Neh. ii. 13). The "dung gate" (if our suppositions above are correct) would be a thousand cubits S. of the Jaffa gate (Neh. iii. 13); that is, on the south-western part of Zion over against the Birket-es-Sultan. The "fountain-gate" would lie on the opposite side of Zion, facing the Pool of Siloam. The "stairs that go down from the city of David" would be found between the fountain-gate and the S. W. temple corner. They were probably an ascent from the king's gardens to the Davidic palace on Zion. The "sepulchres of David," the "made pool" ("king's pool" in Neh. ii. 14), and the "house of the mighty" were probably at the corner of Zion over against the S. W. temple corner, where the wall crossed the Tyropeon. The "armory" is in this neighborhood, at the very corner where the wall turns abruptly southward to encircle Ophel. The "house of the high priest" and the "house of Azariah" are near this. After turning the extreme corner of Ophel southward we reach "the tower which

lieth out from the king's high house," which may be the extra tower discovered by Capt. Warren's subterranean explorations (*Recovery of Jerusalem*, p. 229), as he himself suggests. It may have been built out in order to guard the "Fountain of the Virgin." The "water-gate" would be so called in relation to this fountain. By this water-gate on Ophel was a broad street or square where assemblies could be held in the immediate vicinity of the temple (Neh. viii. 1, 3, 16). Near by was the "horse-gate," famous as the spot where Athaliah was put to death. This gate was probably at this division between the Solomonian palace (S. E. of the temple) and the precinct of the temple itself. The gate "Miphkad" may mark some angle of the walls connected with the division, as a special corner is here mentioned (iii. 32) before we reach the sheep-gate again.

This view of the walls of Nehemiah's time will help us in our survey of the city in our Lord's day. Between those periods there had been much demolition and rebuilding in the city, as a glance at the brief history above will indicate, but we may believe that until the destruction of the city by Titus the general outline of the fortifications was the same. It will be seen by our sketch of the walls, as described by Nehemiah, that we find no difficulty in having the "stairs from the city of David" and "the sepulchres of David" mentioned after "Siloam;" an order which Mr. Fergusson thinks quite staggering to the old hypothesis of Zion and the city of David. The difficulty that Mr. Fergusson finds with the places enumerated in the last sixteen verses of the third chapter of Nehemiah arises from his overlooking the wall around Ophel. His own explanation, that the first sixteen verses refer to the city of Jerusalem, and the last sixteen to the city of David (his Zion or the temple-mount), is by no means natural.

The late researches of Capt. Wilson and Capt. Warren have thrown much light upon the question of the original temple-area. The discovery by the latter officer of immense stones *in situ* at the base of the S. E. corner of the present Haram wall, lying in the rocky foundation scarped to receive them, 80 feet below the present surface, and marked with the Phœnician quarry marks in paint, destroys Mr. Fergusson's theory that the temple-area extended from the present S. W. corner of the Haram but 600 feet E., this S. E. corner being 900 feet E. The vaults under this south-eastern portion of the area seemed to him too slight to have supported the stoa, and Josephus's assertion that the temple-area was only a stade square, and thirdly the apparently unchanged position of the stones at the south-western corner, confirmed his view. But Capt. Wilson and Warren have proved that the south-eastern corner is unchanged, while the south-western has undoubtedly been added, as the real bed of the Tyropeon valley lies nearly 100 feet E. of the S. W. corner and under the Haram, while a new bed for that valley has been cut out of the rock, to prevent the moisture passing under the temple-area. This doubtless was the new portion enclosed by Herod. (Jos. B. J., i. 21. 1.) About 600 feet N. of the S. W. corner is Wilson's arch, the beginning of the causeway across the Tyropeon, and for twenty-three feet S. of this Capt. Warren found the old Haram wall *in situ*. The inference from these discoveries is that the S. W. angle of the Haram wall was built by Herod in his reconstruction of the temple. The temple of Solomon, therefore, in all probability, occupied the site of the mosque of Omar (Kubbet-es-Sukhrāh), while the palace of Solomon occupied the south-eastern portion of the Haram, from which was communication by road and bridge. Robinson's arch, or rather beneath Robinson's arch, the valley having been filled up with rubbish twenty feet deep before the new pavement and Robinson's arch were constructed by Herod) to the lower city on the plateau below and E. of the upper city. The causeway over Wilson's arch was of a later date, but doubtless marked the old and direct communication between temple and city. Herod's Stoa Basilica ran along the southern wall, but whether it extended to the S. E. corner of the Haram is uncertain. Perhaps Fergusson's argument is correct there, and the vaults beneath could not have supported it at that corner. However, as Capt. Warren shows, all the vaults known as Solomon's stables at the S. E. of the Haram are of modern construction, and there may have been in Herod's day a substructure quite sufficient for the support of Herod's stoa, so that the "pinnacle" *πρυτανεῖον* of the temple may have lain exactly at the S. E. corner overhanging the Kedron. Beneath the present Haram surface are tanks and subterranean passages and aqueducts in great numbers. See *Recovery of Jerusalem*, ch. vii., and accompanying plan from Wilson and Warren, which at least seem to prove that the present area very largely coincided with the old temple-area. But a com-

\* The Fortress of Baris, afterwards called by Antonia, stood probably in the north-western portion of the Haram, occupying perhaps about 500 feet square.



plete survey when Moslem fanaticism shall no longer be a hindrance will be necessary for any satisfactory arrangement of details.

The next point of special interest in the topography of Jerusalem is the site of the Holy Sepulchre and Calvary. The commonly received site lies about 400 feet N. of a line running from the Jaffa gate to the mosque of Omar (Kubbet-es-Sukhrab or "Dome of the Rock"), and about 300 feet W. of the street leading N. to the Damascus gate. That this site is the same selected by the empress Helena, although the edifices on the site have been many, is pretty clear, but whether Helena selected the true site three centuries after the crucifixion, and after Jerusalem had been so completely reduced to chaos by Truss, and then by Hadrian, is by no means so clear. The chief objection is, that the site must have been within the walls of the city in our Lord's day. The controversy here depends greatly on fixing the position of the gate Genuath in the first wall (which ran from the neighborhood of the Jaffa gate to the W. wall of the temple), from which gate the second wall (the main city wall) took its course northward. Now, the old arch near the S. end of the bazars, which has been called the gate Genuath, is proved to be a comparatively recent structure, and the ruins near the present church of the Holy Sepulchre, which have been called fragments of the second wall, are proved to be portions of a church. (See *Recovery of Jerusalem*, pp. 9, 213.) If the Kasr Jalud, which stands on the highest point of the city, and is built of huge bevelled stones, like those of the foundations of the temple, be the ancient Hippicus, then the present site of the Holy Sepulchre is altogether wrongly fixed. But the Kasr Jalud may be Psephinus in the Agrippa wall, built after our Lord's day to include the northern suburbs. Another argument against the common theory is the necessity of extending the area of the city as much as possible to give it the size of so renowned a capital. Even by putting the Kasr Jalud in the original wall, we can only make the city to include about 200 acres. Its circumference would be only 2½ miles, and the population of a city of this size could not have been more than 25,000. (*Fergusson*.) The great suburb included in Agrippa's wall was twice the area of the old city, and if we crowd that as much as the old city, we shall have only 75,000 for the population of Jerusalem at its destruction by Titus. These numbers are extreme numbers, and we should probably reduce them largely to reach the truth. They certainly form a strong argument against still further contracting the "second wall" and putting the present site of the Holy Sepulchre outside of the city. And yet the

An ingenious but not convincing argument has been put forth by the late Mr. Fisher Howe of Brooklyn in favor of the remarkable hillock over the grotto of Jeremiah, N. E. of the Damascus gate. The probabilities seem to point to some location on the ledge overhanging the Kedron, outside the St. Stephen's gate, for this has always been a place of graves, is close to the city walls, and is near to the prætorium of Pilate, which was in the fortress of Antonia at the N. of the temple. We have to leave the discussion in this state of incertitude.

The other points of topographical interest are Zion, the Tyropœon, the towers, and the pools. Zion (ἡ ἀνω πόλις of Josephus) is the high broad hill which lifts itself by an abrupt front 400 feet above the southern valley, its plateau extending from this brow 2400 feet to the Jaffa gate road, where a valley ran eastward from the gate to the Tyropœon. Along this northern brow the "first wall" was built. The width of this plateau at its broadest is about 1600 feet from the western valley to the Tyropœon. This height embraced nearly one-half of the ancient city. On the E. of it, beyond the Tyropœon, was the temple mount, 100 feet lower, and on the N. was the part of the city called Acra, which (some think) extended to the N. W. as far as the present Kasr Jalud, where the ground rises to a height of 73 feet above the top of Zion. Although, in that case, this one point of Acra was higher than any other point in the city, yet the main portion of Acra was lower than either Zion or the temple mount (after Simon had reduced its height), and was the "lower city" of ancient times: this latter appellation also including the valley of the Tyropœon. Zion was the seat of the citadel which David stormed, and its broad, elevated summit became the "city of David." Here were the royal palaces and tombs of David's line, connected by a bridge with the Solomonian palace 1 Kings vii. 1 and the temple on Moriah. Here also Herod built his palace, including the magnificent buildings called in honor of his friends Caesar and Agrippa. On its north-eastern corner was the Xystus, or gymnasium, connected with the temple by another bridge, probably where Wilson's arch now is, the southern bridge being now marked by Robinson's arch. The height of Zion above the Mediterranean is 2387 feet. The Mount of Olives rises only 200 feet higher.

The Tyropœon ("valley of the cheesemongers") ran between Zion and Moriah southward into the Hinnom valley and the Kedron valley at their junction, the junction of the three forming the rich soil of the "king's garden" (Neh. iii. 15; Joseph., *Ant.* 7. 14. 4). The Tyropœon continued in two branches northward, one toward the present Damascus gate, and the other toward the Jaffa gate. The latter seems to have been the recognized continuation of the Tyropœon. The depth of the valley increased rapidly as it reached southward, and at the south-western corner of the temple-area the bed of the valley was 90 feet below the present surface.

One of the most prominent objects in Jerusalem is the old tower in the midst of the citadel near the Jaffa gate, 56 feet 6 inches on one face, and 70 feet 3 inches on the other. It has been generally supposed to be Hippicus (Joseph., *B. J.*, 5. 4. 3). Whichever one of the Herodian towers this was, its style of building tempts us to believe that Herod only rebuilt an ancient tower, and that we may have here "the tower of David built for an armory" (Cant. iv. 4). If this be Hippicus, we may suppose Phasaelus and Mariamne lay to the E., and that the Kasr Jalud, 1200 feet to the N., is Psephinus.

The pools (so called) in and by Jerusalem which now attract attention are Birket Mamilla, Birket Sultan, the Pool of Siloam, and the Fountain of the Virgin without the walls, and Birket Israil (or Es-Serain) and the Pool of Hezekiah within the walls. The Birket Mamilla is supposed to be the "upper pool" (Isa. vii. 3; 2 Kings xviii. 17). It lies 2000 feet W. of the Jaffa gate. The Birket Sultan is a section of the great western valley dammed up for more than 500 feet. The Pool of Siloam (Neh. iii. 15; John ix. 7) is in the mouth of the Tyropœon at its junction with the Hinnom and Kedron. It was probably used to irrigate the "king's garden." It is connected by a long, rude, and crooked subterranean passage with the Fountain of the Virgin on the other side of Ophel, from which the water flows "softly" (Isa. viii. 6). This subterranean aqueduct is connected with extensive rock-hewn caverns, which were doubtless part of the fortifications of Ophel. (See the deeply interesting account of their discovery by Capt. Warren in his *Recovery of Jerusalem*, pp. 190-198.) The Fountain of the Virgin is a pool on the eastern side of the Ophel rock, to which is a descent of twenty-eight steps. The pool is lower than the bottom of the valley without, and is excavated deeply within the rocky wall. The water comes into it from the direction of the temple, but has never been traced. It has a periodic and sudden



Jerusalem at the time of King Herod. (Sketch showing approximately the location of the rock.) 1, Temple of Solomon; 2, Palace of Solomon; 3, Added on by Herod; 4, Exheda (the tower built by Antonia); 5, Antonia (the Castle); 6, Cloisters joining Antonia to Temple; 7, Xystus; 8, Agrippa's Palace; 9, Zion and Acra; 10, Lower Pool of Gihon, or Anygdon; 11, Herod's Palace; 12, Bethesda, or Struthion; 13, Bridge built by Herod; 14, the Lower City, called sometimes Akre; 15, British cemetery, A. D. 1870.

arguments are far from conclusive. If we knew where the gate Genuath was, all would be known. If the present site is erroneously fixed, where are we to find the true site?

rise of a foot in height, the periods varying from two or three times a day to once in two or three days. This periodic troubling of the water seems to mark the Fountain of the Virgin as the Pool of Bethesda, unless we may rather suppose a pool farther up on the temple mount formerly received this intermittent flow. The requirements of the sheep gate as we have seen seem to put Bethesda farther N. The Barker Israel, just inside of the St. Stephen's gate and N. of the Haram (supposed by Dr. Robinson to be the trench of Antonia), is the damming up of the valley that runs E. of Bezetha in a southeastern direction, originally under the north eastern corner of the Haram, into the Kedron. It is 260 feet long, 150 feet broad, and 70 feet deep. The Pool of Herodiah (*Lappuleia* of Josephus) is N. of the Jaffa gate street and to the S. W. of the church of the Holy Sepulchre. It is supplied by an aqueduct from the Barker Mamalla. It lies among the houses of the Christian quarter. It is 240 feet long and 144 feet wide. It seems to be properly designated. (See 2 Kings xx. 20; 2 Chron. xxxii. 30.) A system of wells and aqueducts in the Kedron ravine below Jerusalem (the En-Rogel of antiquity) presents features of peculiar interest. One of several ancient aqueducts still conducts the water from Solomon's Pools beyond Bethlehem to the city.

For further details of modern discovery in the topography of the city we refer to the reports of Capts. Wilson and Warren, which have settled so many questions and so greatly excited public interest and expectation.

Jerusalem is in lat.  $31^{\circ} 46' 35''$  N. and lon.  $35^{\circ} 18' 30''$  E., lying on the very summit of the great mountain-ridge which extends from the plain of Esdraelon to the southern desert, the ridge itself being higher farther S. near Hebron, where it reaches an elevation of 3000 feet above the Mediterranean Sea. At Jerusalem (Mount of Olives) the elevation is 2700 feet. The highest part of the city itself is 2600 feet (Kasr Jalud). From the Mount of Olives the descent is rapid to the Jordan valley. In 10 miles one descends 3700 feet. Westward the descent is more gradual to the plain along the Mediterranean coast, about 2500 feet in 15 miles.

HOWARD CROSBY.

**Jerusalem**, tp. of Yates co., N. Y., on Kenka or Crooked Lake. It contains 5 churches and several villages. It was first settled by Jenima Wilkinson and her followers, called Wilkinsonians, or Friends, the latter name being employed by themselves. The sect is now extinct. Pop. 2612.

**Jerusalem**, post-tp. of Davie co., N. C. Pop. 1544.

**Jerusalem**, post-v. of Malaga tp., Monroe co., O. Pop. 91.

**Jerusalem**, post-v., cap. of Southampton co., Va., 75 miles S. S. E. of Richmond and 7 miles from Newsom's Dépôt, on the Seaboard and Roanoke R. R. It is on the Nottoway River. Pop. of tp. 2061.

**Jerusalem Artichoke**, a species of sunflower (*Heli-anthus tuberosus* of Linnaeus, or *Helianthus*), which bears subterranean tubers of the same nature as potatoes. The tubers got the name of artichokes from a resemblance in taste to the true Artichoke (which see), while the name "Jerusalem" is a curious English corruption of *girasole*, Italian for "sunflower." The plant probably reached England by way of Italy or Spain. The French name is *topinambour*. It has been cultivated in Europe ever since the beginning of the seventeenth century, and doubtless came from America, the native country of the whole sunflower genus. It is generally said to be of Brazilian origin, but there is no historical evidence of it; it is not known to occur either there or in any part of South America, and it has all the characters of a plant of a warm temperate climate. Moreover, it is so much like a species of sunflower (*H. doronicoides*) indigenous to the Valley of the Mississippi, which bears long and narrow tubers, that it may well be regarded as a probable variety of this species, altered and fixed by cultivation. The tubers, boiled or stewed, are of delicate flavor and are much esteemed in Europe. In the U. S. they are more commonly pickled or used as food for swine.

A. GRAY.

**Jerusalem Cherry**, the popular name of two species of *Solanum* cultivated as ornamental house-plants (*Pseudo-cappensis* and *Cape-cherry*), first introduced into England from the island of Malabar about the close of the sixteenth century. It may be propagated either from seeds or cuttings, grows only two or three feet high, and bears berries about the size of cherries. It is uncertain how it came by the name Jerusalem.

**Jerusalem Plantation**, tp. of Franklin co., Me. Pop. 32.

**Jervis** (Sir John), b. at Menford, England, Jan. 9, 1734; entered the navy at ten years of age; became post-captain in 1760, rear-admiral in 1787, and admiral of the blue in 1795. He distinguished himself in several naval engage-

ments, chief among which was the celebrated action in which he defeated a Spanish squadron of twice his strength (Feb. 14, 1797) off Cape St. Vincent, in reward of which Jervis was created earl of St. Vincent and received a pension of £3000. He was first lord of the admiralty 1804-04, and d. Mar. 15, 1823.

**Jervois** (Col. Sir William F. D.), R. E., K. C. M. G., b. in 1821; educated at the Royal Military Academy at Woolwich. After receiving his commission in the royal engineers in 1839, he served in Africa (1841-48), in the Kaffir war (1846-47), receiving from Sir Harry Smith, governor and commander-in-chief of South Africa, his commendation as "one of the most able, energetic, and zealous officers he had ever exacted more than his share of duty from." Made captain in 1847, he received the brevet of major in 1851; in 1856 he was appointed assistant inspector-general of fortifications, and subsequently deputy director of fortifications. In this capacity he prepared in 1858, by direction of the secretary of state for war, a memoir relating to the general defence of the country, in which a system of fortifications for the security of the vital points was proposed in detail, and a plan for the defence of London was suggested. The commission appointed in 1859, of which Maj. Jervois was secretary, adopted the arguments and principles contained in the memorandum submitted by him to the secretary of state for war in the previous year. The report of the royal commission referred to, and approved by, the permanent defence committee, has since been carried into effect. This report, the first formulated expression in England of principles governing sea-coast defence, is not only in its governing principles and details of application, but in the arguments by which they are sustained, in striking harmony with the reports of our own board of engineers which inaugurated our system of defence against maritime invasion. The English discussion was, however, coeval with the introduction of rifled ordnance, the application of iron for defensive purposes both in ships and fortifications, and the subsequent advance in size and power of artillery. The eventual combat between the Monitor and Merrimack in Hampton Roads, Mar. 8, 1862, shook the public confidence in England, and the royal commission was reassembled to report on the defences of Spithead, to which Parliament had made heavy grants of money; and a special committee on the same subject, of which Maj. Jervois was also secretary, reported in 1864. The result of these reports was the adhesion of the British government to the principles contained in the first report. Promoted to be lieutenant-colonel in 1862, he became a full colonel in 1867. As a member of the special committee on the application of iron to defensive purposes (1861-64), he has taken a prominent part in these important questions, and has been active in designing and superintending the execution of works of fortification both at home and abroad. In 1863 he was nominated a companion of the Bath, and appointed knight commander of the order of St. Michael and St. George. In 1875 he succeeded Sir Andrew Clarke, Col. R. E., as governor of the Straits Settlements, comprising Singapore, Penang, and Malacca.

J. G. BARNARD.

**Jesi**, a town of Italy. See IEST.

**Jessamine**, the common English name for species of *Jasminum*, a genus of erect or climbing shrubby plants, natives of the Old World, of which several species are cultivated for ornament, the flowers being both beautiful and fragrant. The common species are *Jasminum officinale* (white jessamine) and *J. odoratissimum* (yellow jessamine), and in conservatories *J. Sambac* of tropical India, which exhales a powerful fragrance at evening. The jessamine family is now regarded as a tribe of the olive family (order Oleneceae), and is distinguished from the other regular monoptalous flowers by having stamens fewer than the lobes of the corolla. The so-called jessamine of the Southern U. S. is of another order. (See JASMINE, YELLOW.) A. GRAY.

**Jessamine**, county of E. Central Kentucky. Area, 250 square miles. It is a beautiful, undulating region, with a good soil, based upon cavernous limestone. Grain and live-stock are staple products. It is traversed by the Kentucky Central R. R. Cap. Nicholasville. Pop. 5000.

**Jesse** (Edward), b. at Hutton Crinwick, York, Eng., Jan. 14, 1780; was deputy surveyor of the royal parks and palaces at Windsor, Richmond, and Hampton Court. His fondness for outdoor exercises and for animal life was strongly fostered by the nature of his occupations, and caused him to observe and record many curious facts in natural history. He published a number of very entertaining and popular works, among which were *Gleanings in Natural History* (3 vols., 1842), *An Anglo's Rambles* (1836), *Anecdotes of Dogs* (1846), and *Restless in Natural History* (1863). He also published several topographical handbooks upon Windsor and the royal palaces, besides



editing Izaak Walton's *Angler* and Gilbert White's *Sol-borne*. Mr. Jesse removed to Brighton in 1862, where he became so useful a citizen that his bust was placed in the Pavilion by popular subscription in 1865. D. at Brighton Mar. 28, 1868.

**Jesse** (JOHN HENEGAGE), b. in England about 1815, was a son of Edward, noticed above; wrote numerous volumes of memoirs illustrating English history during the eighteenth century. D. in July, 1874.

**Jesso.** See Yesso.

**Jessore'**, town of British India, the capital of a district of the same name in the presidency of Bengal. The district comprises 3512 square miles of the centre of the Ganges delta, and is as fertile as unhealthy. Its capital is situated 66 miles N. E. of Calcutta, and has a college in which both English and Hindoo literature are taught. Pop. of district, 400,000.

**Jesson Land**, tp. of Sibley co., Minn. Pop. 749.

**Jessulmeer'**, or **Jaysulmir**, one of the Rajpoot states under English protection, in Western Hindostan, situated between 26° and 28° N. lat. and 69° and 72° E. lon. It comprises 9700 square miles of very poor soil, and has 74,400 inhabitants. Its capital, of the same name, is a well-built city with 35,000 inhabitants. Water is very scarce in its vicinity, and must be provided for by immense tanks. The fortress contains the palace, 6 temples, 8 wells, and its walls are ornamented with gilded towers and pinnacles.

**Jes'sup**, post-v. of Buchanan co., Ia., on the Iowa division of the Illinois Central R. R.

**Jessup**, tp. of Susquehanna co., Pa. Pop. 804.

**Jessup** (WILLIAM), LL.D., b. in Southampton, Suffolk co., N. Y., June 21, 1797; graduated at Yale in 1815; removed to Montrose, Pa., in 1818; was admitted to the bar in 1820; was strongly interested in the missionary and temperance causes and in popular education; was presiding judge of the eleventh judicial district of Pennsylvania 1838-51. D. at Montrose, Pa., Sept. 11, 1868.

**Jessup Lake**, in Orange co., Fla., 12 miles S. of Enterprise, communicates with St. John's River by a navigable outlet. The lake is clear, has a sandy bottom, and abounds in fish and game birds. The shores are high bluffs. There are good wharves constructed here. It is the seat of Lake Jessup colony. The surrounding region is beautiful, well-timbered, and fertile. There are several medicinal springs in the neighborhood.

**Jes'uits**, or **The Society of Jesus**, a religious order of the Roman Catholic Church, which, although entirely destitute of any original religious idea, and merely confining itself to practical purposes—missionary, educational, political, commercial, always of a subordinate, often of a doubtful nature—has played a more conspicuous part in the history of the Christian Church than any other religious order, and exercised a most powerful, though only in some cases a beneficial, influence. It was founded by **IGNATIUS LOYOLA** (which see), and established by Pope Paul III. Sept. 27, 1540. Its organization it received from its founder and first general, but its true character from his successor. It was Loyola's idea to form a monastic order with a definite practical purpose. To the vows, common to all religious orders, of chastity, poverty, and obedience, he added that of missionary activity; and as he was a military man by profession, and entirely without originality or spontaneity, he conferred upon the religious order he founded his military ideas of organization, of training, subordination, and implicit obedience. But under its second general, **James Laynez** (1558-65), the order freed itself to a great extent from its monkish apparel. Its missionary task retreated to the background, and its principal object became the maintenance of the absolute dominion of the pope against Protestantism, kingdoms, universities, ecumenical councils, bishops, or anything which showed an independent tendency. Its position was most exceptional. It enjoyed at once all the privileges of the mendicant orders and the secular clergy. It held its property free of taxes either to king or Church, and its members were independent not only of the jurisdiction of the state, but also of that of the bishops; they acknowledged no other authority than that which emanated from their general. The priestly office was conferred upon them in full, as far as regards its power, but not with all its duties and restrictions. They had unlimited power of dispensation and indulgence, and they could administer the sacraments even in a period of interdict. At the same time, they were not separated very conspicuously from the world either in dress or manners. They had the education of the world, and they took part very freely in the enjoyments of the world; prayer and fasting were not the most striking characteristics of a Jesuit. With this most favorable position with

respect to the outside world, the society combined a most rigorous internal organization. The authority of the general was absolute, and the training of the members such as to make the enforcement of this authority unfeeling. They were divided into four classes—novices, scholastics, coadjutors, and professed. After a short preparation the novice spends two years in spiritual exercises, in prayers, meditations, fasts, and ascetic practices, in serving the sick and the poor, living all the while under the closest supervision. If after the lapse of these two years he finds himself, and is found by the elder members of the order, capable of becoming a suitable instrument—that is, capable of giving up all individuality of will and all independence of intellect—he enters the class of scholastics, where he undergoes a long and severe training in theology, philosophy, philology, and science. Every advancement from one class to another is exceedingly difficult. Only men of decided talents and rare energy are able to reach the highest class, that of professed, whose members elect the general among themselves. But even with the humblest and least gifted members of the society the moral training is perfect. It is in some respects very simple. It consists in nothing but implicit obedience to the rules of the order and the authority of the general. But it must be perfect or else no membership is granted. Every passion, every sympathy, every talent, every tendency, which possibly could come into collision with the purposes of the society is crushed or burnt out of the soul. The order was thus able to work with the unfeeling certainty of a machine, and in a loose and rather disorderly state of society, like that of Europe in the sixteenth, seventeenth, and eighteenth centuries, its power could not but be immense.

At the death of Loyola the society numbered 1000 members in 12 provinces; at the celebration of its first centennial jubilee, 13,112 members in 32 provinces; at the time of its suppression, one century later, 22,589 members, 24 professed houses, 669 colleges, 176 seminaries, 61 novitiates, 335 residences, and 275 missionary stations in heathen or Protestant countries. In Italy, Spain, Portugal, and Austria the order took root immediately. To the higher classes of society the Franciscans had become offensive by their coarseness and vulgarity, and the Dominicans troublesome by their bluntness and rigorism. The easy and elegant Jesuit was just what was wanted. His eloquent casuistry threw a veil over any vice or crime, and very soon every monarch, prince, and nobleman had a Jesuit for confessor; which circumstance gave the order an enormous social and political influence. In the Thirty Years' war it was Father Lamormain, the confessor of Ferdinand II., who defeated Wallenstein, and it was the Jesuits who kept alive the league between Austria and Bavaria. To the middle classes they recommended themselves by their excellent schools and their learning. In many countries they actually controlled all education; at the Roman Catholic universities of Germany—Cologne, Munich, Treves, Augsburg, etc.—they held chairs a few years after the establishment of the order. Still more decided was their success as missionaries to the pagans. They penetrated into Japan in 1549, and into China in 1584; in the former country they possessed 3 colleges, 8 residences, and 3 professed houses in 1613, and in 1692 the number of their converts in the Chinese province of Kiangsu is said to have been more than 100,000. They had flourishing stations in Cochinchina, Tonquin, Hindostan, Ceylon, Madagascar, and on the coast of Africa. In Paraguay they christianized the whole nation, and formed a civilized society whose prosperity and rapid progress excited general admiration. Brazil, Mexico, and North America are also in debt to them, for they carried civilization with them wherever they went. In the Protestant countries, however, they never got a foothold, though they tried very hard in England and Sweden. In France their situation was generally precarious. The Sorbonne, the bishops, and even the Parliament, were opposed to them, and very slow in admitting them. After the attempt of Chatel, a former pupil of theirs, on the life of Henry IV. in 1594, they were even expelled, though only for a short time; in 1603 they were allowed to return. Richelieu and Mazarin showed them considerable favor, and under the reign of Louis XIV. they gradually grew in power. But just at this time they met with their first heavy reverse of fortune. In their contest with Janzenius they were the losers in spite of their great dexterity in theological dispute, and when, in 1656, Pascal published his *Lettres Provinciales*, a blow was inflicted on them from which they never recovered. The looseness of their morals, the egotism of their aims, the falseness of their actions, were thoroughly unmasked by this book. They became odious and subjects of general suspicion. Under these unfavorable circumstances, and while driven onward in an opposite direction by their own antecedents, they clashed against the general enlightenment of the eighteenth cen-



tury, which they could neither adopt nor suppress; and this became their ruin. An insurrection in Paraguay against Portugal, in which the Jesuits were implicated, gave Pomhal an opportunity in 1758 of bringing them before the courts. While the trial was going on an attempt was made to assassinate the king, and (Sept. 3, 1759) a royal decree expelled the society from the Portuguese dominions and confiscated their property. In France not only public opinion, but also the court, especially Madame de Pompadour and the prime minister, Choiseul, were against them, and a scandalous lawsuit in which they became entangled caused a general outburst of indignation. They had a missionary and commercial station on the island of Martinique. Thence their procurator, Father Lavalette, consigned two vessels to a house in Marseilles. The vessels were captured by the English, and when Father Lavalette was unable to meet the bills which he had drawn on the credit of the delivery of the costly cargo, a case was brought into the courts of Marseilles against the order, and decided in favor of the plaintiff. The order tried to escape from paying the debt by appealing to the Parliament of Paris, and pleading that Father Lavalette had acted without orders from the general and against his instructions. In the course of the trial other scandalous affairs became known, and in 1764 a royal decree expelled the society from France. Apr. 2, 1767, all the Jesuits in Spain and in the Spanish colonies were arrested at the same hour and sent to the papal dominions; and July 21, 1773, a papal bull dissolving the whole order, on the request of France, Spain, Portugal, Parma, Naples, and Austria, was issued. Its property was confiscated, but in most countries its members received annuities and were allowed to live as private persons. Frederick II. of Prussia showed them much kindness, and Catherine II. even permitted them to exist as a society in Russia under the head of a vicar-general. In 1801, Pope Pius VII. confirmed this branch of the order, and immediately after the fall of Napoleon (Aug. 7, 1814) he re-established the society in its old form. During the exhaustion and reaction which prevailed throughout Europe between 1815 and 1848 the Jesuits succeeded in penetrating into all countries, with or without the acknowledgment of the governments; but the general conditions of civilized life have so entirely changed character in the last century the order has been compelled to alter its method of proceeding. Science was once its weapon—it now appeals to ignorance; court intrigue was formerly its arena—it now mixes in political party machinations. But although the means are changed, the aim is still the same—to stop the progress of civilization and enslave mankind under the sceptre of the pope; and the Syllabus and the dogma of infallibility are among its latest achievements. CLEMENS PETERSEN.

#### Jesuits' Bark. See CINCORVA.

**Jes'up**, post-v. and cap. of Wayne co., Ga., at the intersection of the Macon and Brunswick and the Atlantic and Gulf R. Rs. Pop. about 250. W. G. McABOE.

**Jesup** (MORRIS KERCHUM), b. at Hartford, Conn., June 21, 1830; locating in New York City, became member of the Chamber of Commerce in Feb., 1863; president of the Five Points House of Industry since 1870; was president of the Young Men's Christian Association 1871-75; is treasurer of the university and one of its council; vice-president and treasurer of the City Mission, and manager of the Presbyterian Hospital.

**Jesup** (THOMAS SIDNEY), b. in Virginia in 1788; entered the army in 1808; served as acting adjutant-general to Brig. Gen. Hull 1812; brevetted colonel for gallantry at Chippewa and Niagara, rose to quartermaster-general, with rank of brigadier-general, May, 1818; took command of the army in the Creek nation, Ala., and in Florida 1836; wounded in action with Seminoles Jan., 1838, and returned to duty in his department. D. June 10, 1860.

**Jesus Christ**. This name is not compound, but consists of the proper name Jesus, and the official designation Christ—Jesus the Christ. Jesus is the Greek form of the Hebrew Joshua or Jehoshua, and means Jehovah his salvation, or the salvation of Jehovah. Christ is equivalent to the Hebrew Messiah, and means the Anointed. The name Jesus is applied to several persons in the Scriptures, and was probably not an uncommon one.

Into the theological questions connected with the person of Jesus Christ we do not enter, nor do we attempt any interpretations of his words, nor discuss any disputed points in regard to the relative authority of the several Evangelists. Those seeking information on these points are referred to the special works named at the end of this article. There is, and doubtless will continue to be, much difference of opinion among harmonists in regard to the chronological order of events in his life, but there is general agreement as to the most important facts. Jesus was born in Bethlehem, a small Judean town already famous as the birth-

place of King David, and about 6 miles S. of Jerusalem. The home of his mother, Mary, was Nazareth in Galilee, but she had come to Bethlehem with her husband, Joseph, a descendant of David, in obedience to a decree of enrollment and taxation which seems to have required Joseph's presence at the original home of his family. Mary is thought to have been, like Joseph, descended from the royal house of Judah. The date of the Nativity is uncertain. (See CHRISTMAS.) Jesus was born miraculously of a virgin mother by the power of the Holy Ghost. On the eighth day after his birth He was circumcised, and on the fortieth day he was taken to the temple, when the customary offerings of purification were made by his mother. The visit of certain "wise men," or magians, who came probably from Persia, to the infant at Bethlehem with gifts proper for a king, and the inquiries made by them previously at Jerusalem for a newly-born king of the Jews, excited the jealousy of Herod, then ruling over Judea and the neighboring territories under the protection of the Romans, and he issued orders for a massacre of young children at Bethlehem. Jesus was taken by divine direction to Egypt in time to escape the destruction which threatened him, and the holy family remained out of Herod's jurisdiction until his death a short time after. Joseph seems to have intended to rear the child at Bethlehem, as the city of David, but another warning from Heaven caused him to return to Nazareth. Twelve years later Joseph and Mary took Jesus with them to Jerusalem to keep the Passover, and he then showed that he was already conscious of a divine mission. He lived at Nazareth, however, for eighteen years longer, and probably assisted Joseph at his trade, that of a carpenter. Joseph is not mentioned again in the Gospels, and is supposed to have died before Christ entered on his public labors.

When Jesus was about thirty years old his kinsman, John, the son of Zacharias, began to announce the near approach of the kingdom of God, and to call his countrymen to prepare for it by a moral reformation, and by accepting baptism at his hands as a sign of the remission of sin. Jesus appeared among the throngs which gathered about John the Baptist at the Jordan, and insisted on being baptized by him. After John had reluctantly administered the rite to one whom he felt by a kind of prophetic instinct, as it would seem, to be holier than himself, he was shown that Jesus was the Messiah, the Son of God. He announced him as such to those about him, among whom were probably some representatives of the Sanhedrim, or ecclesiastical senate of the Hebrews, sent from Jerusalem to inquire into John's own work and claims. After his baptism Jesus withdrew, under a divine impulse, into the wilderness, where he encountered and overcame a series of temptations addressed to him by Satan. A few of John's disciples now attached themselves to Jesus, and accompanied him to Galilee. The first of his miracles was wrought at Cana, a few miles from Nazareth, where water was changed into wine. Soon after he began his public ministry, in the proper sense, in Jerusalem, at the Passover. He announced himself to the heads of the nation there as a messenger of Heaven by expelling from the temple court those who had been allowed to carry on traffic in it for the convenience of worshippers. One member of the Sanhedrim, Nicodemus, became at this time a secret adherent of the new prophet. For a few months Jesus carried on a work in Judea similar to that in which John the Baptist was engaged, and seemed to be co-operating with the latter in the effort to bring about a national repentance. Attempts being made to create dissensions between his followers and those of John he retired to Galilee. It is probable that some time was now passed by Christ in comparative seclusion, and that his disciples were for a while dismissed. The latter are not said to have been with him when he next presented himself at Jerusalem, on the occasion of a feast. If, as is probable, though many think otherwise, this feast were the Passover, it marked the close of the first year of Christ's ministry, during which he had constantly in view an impression to be made on the men of influence and authority at Jerusalem. At this visit Jesus raised an issue with the Jewish hierarchy by disregarding the traditional interpretation of the fourth commandment, and offended them still more by the way in which he spoke of his own relation to God. From this time, at any rate, he had a body of powerful and implacable enemies in Judea, who never ceased to watch and oppose him.

Near the time of this second Passover, John the Baptist was imprisoned by Herod Antipas, whom he had rebuked for his adulterous marriage with his brother's wife Herodias, and John's effort to bring Israel to repentance was, at an end. Jesus now entered on a new stage of his work, to be carried on in Galilee. After meeting a repulse at Nazareth, he fixed his residence at Capernaum, on the Lake of Tiberias, and from that point made a series of circuits through



Galilee. His old followers rejoined him, and he at once began to add to their number, while by his discourses and miracles he speedily attracted crowds of more or less appreciative hearers. In close connection with the most famous of the Galilean discourses, the Sermon on the Mount, Jesus chose twelve of his disciples to be, under the name of apostles, his constant companions and by degrees his associates in labor. Proofs were multiplying of the indisposition of Israel as a whole to profit by the mission of Jesus of Nazareth. Licensaries of the Judean priesthood were busy in Galilee, and gradually formed a hostile party there. Jewish beliefs and prejudices were also operative in the minds of those who were attached to his person. His own relatives misapprehended him, and even John the Baptist sent a message from his prison which expressed his perplexity at the course which Jesus was pursuing. Nevertheless, the end of his work in Galilee was practically secured. He had a body of faithful adherents, who loved and trusted if they did not understand him, and whom he was educating for future service.

As the next Passover drew near, John the Baptist was put to death by Herod at the instigation of his wife. From this time Jesus began to withdraw as much as possible from public notice in Galilee, and to devote himself to the instruction of the twelve apostles. Entire seclusion was out of the question, and some great miracles were wrought during this period. In the month of October, or about six months after the death of John the Baptist, Jesus began his second and final attempt to gain a hearing from the representatives of the nation at Jerusalem. He appeared somewhat suddenly at the Feast of Tabernacles, and by miracles and discourses, as well as by the angry opposition which he excited, he at least succeeded in awakening new interest in his movements, and in fixing the attention of the nation upon himself during the rest of his career. It may be inferred that he then returned to Galilee, and set about arranging what had in some sense the air of a royal progress to Jerusalem. Seventy disciples were sent, two by two, to the various towns which he designed to visit, and he followed them, preaching and working miracles, as he had been accustomed to do in Galilee. The scene of these new labors must have been Perea, the country E. of the Jordan, through which lay the longer but safer route from Galilee to Judaea. It bordered on the latter province for a considerable distance, and whatever excited general interest in Perea would soon be known across the river. That intense excitement did follow Christ's appearance in a region which hitherto, so far as we know, he had scarcely visited, is clearly indicated in the Gospels. In December, at the Feast of the Dedication, Jesus was again at Jerusalem. He was met by questions about his Messiahship, which show that his claims were undergoing eager discussion, but his answers only provoked fresh hostility, and he narrowly escaped being stoned as a blasphemer. His home during these visits to the ecclesiastical capital was probably the house of Lazarus at Bethany, 2 miles E. of the city. Lazarus and his sisters, Mary and Martha, must before this time have become disciples and intimate friends of Christ. On his return to Perea, Christ, instead of going from place to place as before, fixed his abode at Bethabara (or Bethany), near the scene of his baptism. Hence he was summoned to Bethany in Judaea by the dangerous illness of Lazarus, and arriving after the latter had been four days dead, he wrought the greatest of his recorded miracles by restoring his friend to life. This act led the Hebrew council, or such of them as were under the influence of the high priest Caiaphas, to resolve formally and finally on the destruction of the Galilean prophet. Whatever he was, he could not be the Messiah, and he might become the occasion of popular tumults which would draw upon the nation the vengeance of their Roman masters. Jesus now for a time concealed himself, taking refuge in a town called Ephraim, 20 miles N. E. of Jerusalem.

Another Passover approached, and Jesus prepared to attend it in such a way as to terminate his royal progress royally. He seems to have gone northward and joined one of the companies of Galilean pilgrims then moving eastward near the Samaritan border in order to go to the feast by the ordinary Perea route. The suburbs of Jerusalem were reached, probably, on the evening before the sabbath. Christ and his followers stopped at Bethany, where more than one house was open to them. On the first day of the week, and evidently in pursuance of arrangements previously made, Jesus entered the Holy City, riding on an ass never before used, and surrounded by an intensely excited throng, composed largely, no doubt, of pilgrims from the N. and E. The multitude hailed him as "Son of David" and "King of Israel," and he distinctly sanctioned their acclamations. On the following day he went to the city again, and repeated the act by which he had announced himself and his mission three years before—the

cleansing of the temple. The third day, Tuesday, was also spent in the temple, but was devoted to teaching. As Jesus and his apostles returned each evening to Bethany, they may be supposed to have paused for prayer in the garden of Gethsemane, at the western base of the Mount of Olives. The next day seems to have been passed in retirement. Meanwhile, Christ's enemies, not daring publicly to arrest one who was for the time so popular, resolved to get him into their power in some clandestine manner, and after the feast should be over. An apostle prepared the way for the accomplishment of their purpose. Judas Iscariot bargained with them for the possession of his Master's person, and watched for the opportunity to complete his treachery. On the evening of Thursday, Jesus kept the Passover with his disciples, coming once more to Jerusalem for the purpose. While they were at the table he indicated to Judas, as also to John and Peter, his knowledge of the intended betrayal, and Judas hastened to the priests to bid them act at once. At the close of the paschal supper Jesus instituted the Christian feast of bread and wine commemorative of his own impending death, and the company set out on their return to Bethany. On the way they turned aside to the garden of Gethsemane, where Jesus passed through a fearful inward struggle in view of the sorrows before him. The struggle was scarcely over when the sorrows began. Judas entered the garden, guiding a band of armed men, with some members of the council, and probably a crowd of midnight revellers from the streets of Jerusalem. Jesus was arrested and led back to the city for trial before the Sanhedrim. The charge was blasphemy, but in the absence of trustworthy witnesses, owing, no doubt, to the haste with which the proceedings were conducted, no evidence was produced on which the party of the high priest, themselves wholly unscrupulous, could call for an unfavorable verdict from the majority of the council. The prisoner was then virtually put under oath and required to criminate himself. When solemnly appealed to by the high priest, he not only avowed his Messiahship, but asserted that he was the Son of God and the future judge of the world. The Sanhedrim then unanimously condemned him as a blasphemer, though two members of it, at any rate, Joseph of Arimathea and Nicodemus, were no doubt absent. After the formality of a fresh trial at daybreak, had in order to make the proceedings legal, the priests led Jesus to the Roman procurator, Pontius Pilate, to obtain authority for the execution. Pilate resided at Caesarea, the political capital of the province, but was now at Jerusalem for the sake of maintaining order at the feast. The procurator made several efforts to rescue Jesus without exasperating the Jews, but he was at last intimidated by the danger of a riot, and the implied threat of accusing him to the emperor as in disloyal sympathy with a pretender to the Hebrew throne. He then gave the order for the death of Jesus by crucifixion, having previously subjected him to scourging. The sentence was promptly executed, and for six hours, or from about nine in the morning until three in the afternoon, Jesus endured the punishment allotted to the worst and basest criminals, and with a convicted felon on either side of him. From time to time he spoke briefly, uttering first his feelings in behalf of others, then his consciousness of his own bodily and spiritual anguish. He died in the act of commending his soul to God. The body was given by Pilate to Joseph of Arimathea, and, aided by Nicodemus, he wrapped it in spices and laid it in a tomb prepared for himself in a garden which he owned outside the walls.

On the day but one succeeding, or Sunday, some of the Galilean women went to Joseph's garden to do their part in honoring the body of their Master. As they approached they saw that the tomb had been opened, and one of them, Mary Magdalene, hurried away to tell John and Peter. These two apostles had probably taken lodgings in Jerusalem, where John had friends. In the mean time, the other women saw a vision of angels, who told them that the Lord was risen, and bade them instruct his friends to meet him in Galilee. It is reasonable to infer that most of the apostles continued to lodge at Bethany, where they would feel far safer than in Jerusalem. While the message was on its way across the Mount of Olives, Mary came with John and Peter. They carefully examined the tomb, and returned, leaving Mary behind them. There the Lord "appeared first" to her, and entrusted her with a message respecting his ascension. As she went to deliver it, her late companions, still on their way to the place where the greater part of the Galilean disciples were to be found, saw their Lord coming towards them. He renewed the charge which the angels had given them. Five distinct appearances are recorded as occurring on this day. Jewish theories about the Messiah had made no provision for what had actually taken place, and the disciples were so far under the influence of those theories as to be hard to convince. The unbelief of the apostle Thomas delayed for a week their



return to Galilee. They did return at last, and there saw their Master more than once. His principal appearance, and that for the sake of which he had summoned them to Galilee, is supposed to have taken place in the presence of the whole body of disciples, more than 500 in number. After a few weeks the apostles went again to Jerusalem, and on the fourth day after his resurrection, the Lord Jesus, having led them forth, as if for another visit to Bethany, left them for the last time, not vanishing, as before, but passing visibly upward till a cloud concealed him from their sight. While they looked after him, two angels brought them another message: that he should "so come in like manner."

Among the recent works on the life of Christ accessible in English, are those of Neander, *The Life of Jesus Christ*; Lange, *Life of Jesus*; Strauss, *Life of Jesus*; and *A New Life of Jesus*; Reim, *Life of Jesus* (all translations, and the last three by unbelievers); Elliott, *Historical Lecture on the Life of Jesus Christ*; Hanna, *Life of Jesus*; Farrar, *The Life of Christ* (the most recent); and by American authors: those of Crosby, *Life of Jesus*; Eddy, *Jesus*; Beecher, *Life of Jesus the Christ*, vol. i.; Andrews, *Life of our Lord*. In the last named work will be found the reasons for the chronological order followed in the foregoing article.

S. J. ANDREWS.

**Jet**, a perfectly black mineral, capable of high polish, is sometimes a kind of pitch-coal or albertite, and sometimes a very black lignite. It comes from various geological strata in the Asturias, Spain, in Aude, France, from Whitby, Yorkshire, from the Baltic regions, etc. It is extensively employed for mourning ornaments for ladies' use.

**Je'ter** (JEREMIAH BELL), D. D., b. in Bedford co., Va., July 18, 1802; entered the ministry in 1822, and removed to the "northern neck" of Virginia in 1827; 1836-49 was pastor of the First Baptist church in Richmond, Va.; in 1849 of the Second Baptist church in St. Louis, Mo.; 1852-70 of the Grace Street Baptist church in Richmond, Va. Since 1865 he edited the *Religious Herald* at Richmond, Va. He published *Memoir of Rev. N. W. Clifton*, *Life of Mrs. Henrietta Shuck*, *Camphellism Examined*, etc. D. Feb. 18, 1880.

**Jet'sam** (Fr. *jeter*, to "throw"), goods which are thrown into the sea in order to save a vessel and the residue of the cargo from wreck or loss in case of imminent danger, and which sink and remain under water without coming to land. If articles thus thrown overboard float upon the surface of the sea, they are termed flotsam. (See **FLOTSAM**.) The owner of such goods does not lose his title to them, and may claim them if they are subsequently found. If no owner ever appears to assert his right to the property, it belongs by the English common law to the Crown. (See **LIVEN**, **JETTISON**.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Jet'tison** (Fr. *jeter*, to "throw"), the voluntary throwing overboard of goods belonging to the cargo of a vessel in order to save the vessel and the residue of the cargo from wreck, capture, or loss in case of imminent peril. If by reason of such sacrifice the threatened disaster is averted and the vessel saved, the owner of the goods lost by jettison has a claim against the owners of the ship, freight, and cargo for contribution, in proportion to the value of their respective interests, to reimburse him for the loss he has sustained, on the theory of general average. (See **AVÉRAGE**.) But in order that he may have this claim the sacrifice must have been made by reason of extreme emergency and necessity. If the master makes a jettison in a case of false alarm, there is no contribution. It is not necessary, however, that the anticipated peril should always be proved to have been real. It rests with the master of the vessel to determine whether there is a necessity for jettison; and though it should afterwards appear that the vessel might have been saved without incurring such loss, yet if he acted with prudence and caution in the exercise of a reasonable discretion, and with the intention of performing his duty faithfully, the same results will follow as if there had been an actual necessity for the sacrifice, and a claim for contribution by the owner of the goods will be sustained. The crew have no authority to make a jettison of the cargo without the order of the master, even in a case of actual distress. By the law of England and the U. S. it is not required that the master should consult with the officers of the vessel or the seamen in determining whether a necessity for jettison actually exists, but in cases of doubtful emergency proof that such consultation occurred would be of importance as indicating that the master acted with careful deliberation. The laws of most European nations require that, if practicable, the officers should be consulted, unless the vessel is unmistakably in a situation of great peril. In making the jettison those goods should first be sacrificed which are the least necessary, the most

bulky, and the least valuable, if sufficient opportunity is afforded for making the selection. But where there is an immediate necessity for lightening the vessel, any part of the cargo may be thrown overboard as may be most convenient. If goods shipped on deck be taken for this purpose, their owner must bear the loss without contribution, unless there is a general usage to carry such articles on deck, for they render the navigation more difficult, and are particularly exposed to peril. But if the goods were placed on deck without the consent or knowledge of the owner, the carrier will be responsible in such a case for their value. If any injury be done to the vessel or to the portion of the cargo which is saved by reason of the jettison, as if the deck should be cut open to get out the goods which are sacrificed, the loss thus occasioned will also be a subject of general average. If the article sacrificed is the direct cause of the danger, as in the case of cotton taking fire by spontaneous combustion, there will be no claim for contribution to recover its value. The sacrifice must be voluntary in order that it may be a case of jettison, for if goods be swept away by the violence of the sea, the loss falls upon the owner or his insurer. So it must appear that as the result of the sacrifice other property at risk was saved. It is only necessary in order to found a claim for contribution upon general average that there be a rescue from the immediate peril in which the jettison occurred; if the ship is subsequently lost in another disaster, the property saved from this second disaster must contribute to the original loss. (See **PARSONS ON MARITIME LAW**; **ABBOTT ON SHIPPING**; **KENT'S COMMENTARIES**.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Jet'ty** [Fr. *jette*, from Lat. *jacere*, to "throw," and implying "projecting" or "jutting"], a dike, pier, or embankment projecting into the sea, whether constructed of timber, earth, fascines, stone, etc., or a combination thereof. The most common application is to the mouths of rivers or at the entrance to tidal harbors, whereby to narrow the channel, concentrate the current, and thus increase the depth over the entrance bars.\* Most of the HARBORS OF AMERICAN LAKES (see that head) are the mouths of rivers or "creeks" thus treated. In Great Britain the mouths of the Liffey, Blyth (Ireland), Esk, Wear, Don, Skaney, Ayr, are so made, and the tidal harbors of Houth, Kingston, Leith, Donaghadee, and Ramsgate so improved. Also the tidal harbors of Gravelines, Dunkirk, Calais, Boulogne, Dieppe, Fécamp, etc. (France), of Ostende (Belgium), and many others owe their existence to jetties. To the Oder, the Vistula, and many river-mouths of the Baltic, jetties have been applied with more or less success.† The most noted instance, however, is the Sulina mouth of the Danube, which, a permanent depth of 20 feet having been attained where was but an average of 9 feet, instead of being the worst harbor, at once took rank among the best harbors in the Black Sea. Another instance of signal success is the improvement of ship-navigation to Rotterdam by making a new mouth to the Maas through the Hook of Holland, and prolonging the new outlet into the sea by jetties. (See **HARBOR**; also *Prof. Pope's Corps of Engineers U. S. A.*, No. 22.) This great work is a double success, inasmuch not only that the jettied entrance has thus far fulfilled expectations, but that the method of construction of fascines and stone, for the first time applied to open sea-exposures, has realized all anticipations and established a certain and economical way of constructing these sea-works on sand-coasts. (See **HARBOR**.)

A cross section of one of these jetties is given in Fig. 1. The body of the structure is made up of successive layers

\* In this application the term "parallel piers" is commonly used in the land for jetties.

† Mr. James B. Eads has furnished, as compiled from authentic sources, the following table of eighteen rivers in Europe where jetties have been effective. At some of the rivers named the jetties, though not yet entirely completed, have already been of great benefit to navigation:

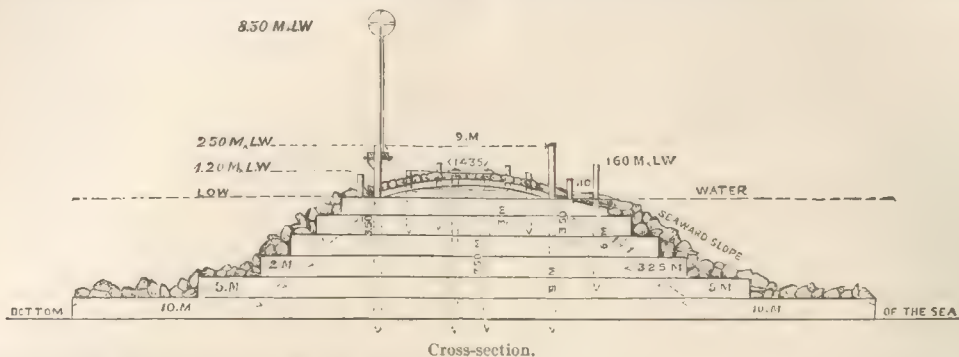
Name of river.	Country.	Length of pier.
Danube.....	Romania, Turkey	7 to 11 " 21
Maas.....	Holland (new mouth)	69 " 18
Trave.....	Prussia.....	7 " 18
Oder.....	".....	7 " 21
Warne or Warnow.....	".....	6 " 1
Persante.....	".....	4 " 15
Wipper.....	".....	4 " 13
Prege.....	".....	12 " 29
Stolpe.....	".....	4 " 14
Niemn.....	".....	10 " 24
Liban.....	Russia.....	6 " 16
Dwina.....	".....	6 " 18
Windou.....	".....	4 " 9
Pernau.....	".....	5 " 12
Nissa.....	Sweden.....	5 " 12
Konne.....	".....	6 " 9
Altau.....	".....	6 " 9
Grenne.....	Denmark.....	5 " 13



of mattresses (Dutch, *Zink-stukken*), each overspread by a layer of small quarry-stone. The ground-plan of a mattress is shown in Fig. 2, by which it will be seen to be made

with a top and bottom grillage of fascines, the interstices between the fascines and filling (second layer) between the grillages being bundles or layers of osier. A cross-section

FIG. 1.

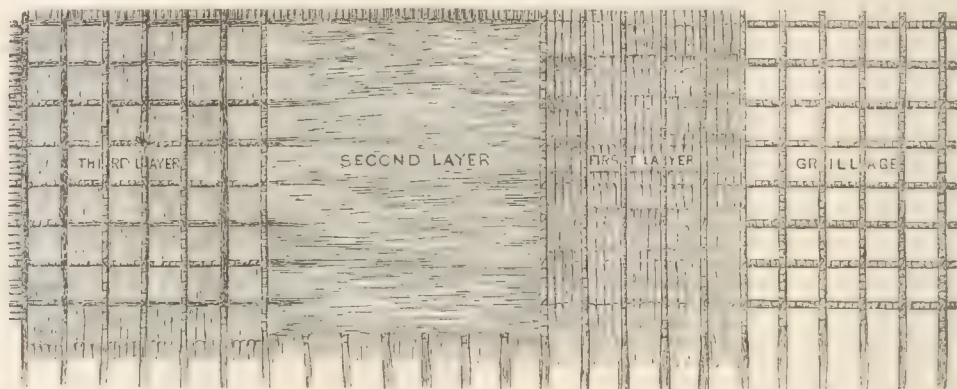


Cross-section.

of the completed mattress is shown in Fig. 3. On the top, partitions of hurdle-work, *a, a*, divide the surface into square *pois*, so that the stone thrown on for sinking may be

retained. Full details of this kind of construction are given in works cited: the following brief notes and above diagrams were kindly furnished the writer by the distin-

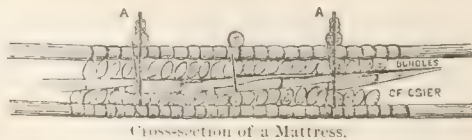
FIG. 2.



Details of a Mattress.

guished engineer (P. Caland, inspector of the Waterstaat) under whose direction the work at the Maas entrance has been executed:

FIG. 3.



Cross-section of a Mattress.

"The thickness of a mattress varies from 0.40m to 0.50m (16-20 inches); length and breadth varying according to circumstances. Their breadth is limited to 25 metres, since otherwise their transportation, sinking, and ballasting would offer too great difficulties. Their length is unlimited. However, as mattresses destined to be sunk at sea must be ballasted with great speed, too great length would be inadvisable. The largest piece sunk at the jetties of the new outlet for the improvement of the navigation from Rotterdam to the sea had a length of 50 metres and a breadth of 28 metres, or a superficial area of 1400 square metres. The courses of mattresses must overlap joints—i. e. they ought to be sunk so that the joints of the under course are covered by the upper course. The mattress is made on the sea-beach near the jetty, between high and low water, and when constructed floated to the sinking-place, where it is fastened by anchors and ropes, and placed as exactly as possible above the chosen spot. Then the ballast-stone, weighing on an average 40 to 50 kilogrammes (90 to 112 pounds), from boats or small vessels surrounding the mattress, is to be laid on, first chiefly on the middle and then also proportionally divided over the whole surface, till the mattress immerses. The sinking-lines (with which the mattress is attached to the vessels) are then payed out, at last detached, and in the mean time still more ballast is cast on the mattress: the total quantity amounting to about 700 kilogrammes (1600 pounds) per cubic metre (1½ cubic yards) of total volume. When the fascine-work of the jetty is raised above low water, the oak piles are driven

through, as indicated in Fig. 1. The rows of oak piles reaching two metres above the water line, and driven into the bottom, consolidate the jetty. Under the track of the rails, laid for conveyance of stone and other material, rows of piles are driven through all the layers into the bottom of the sea. The stakes of the other rows are shorter, and only serve to secure the stone revêment. Between the rows of piles around the jetty forming the fore-berm, and outside this berm, heavier stone is placed, weighing on an average 500 kilogrammes (1125 pounds).

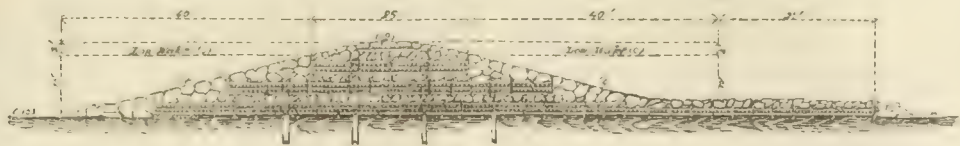
"From low-water line to the top line the jetty is formed of osier, laid down in layers of 0.25m thickness, secured by hurdles placed at a distance of 0.60m. The space between these hurdles is filled up to the top with rubbish or waste stone; the entire top surface of the jetty must be covered with stone weighing on an average 50 kilogrammes. In order to get well-connected joints, stones of a more regular appearance are employed for this pavement. As already stated, experience has proved the stability of this construction, neither heavy storms nor strong currents being able to damage the jetties. Should the bottom along the head and the edges be abraded, those parts of the mattresses protruding from the jetties will by their flexibility conform to the inequalities thus produced, and protect the work from undermining. On a movable bottom the foregoing method of construction offers guaranties of solidity which recommend its employment wherever the materials for fascines can be readily had."

The question of an adequate navigable outlet to the Mississippi River has turned attention to the feasibility of an open river-mouth by the use of jetties. The recent board of engineers which visited Europe for the purpose of investigating the use and success of the method, recommend "parallel dikes or jetties, constructed of brush, fascines, and stone, in the same general way as used by Mr. Caland at the mouth of the Maas," to be applied to the South Pass of the Mississippi; and in conformity thereto Congress, Mar. 4, 1875, authorized "James B. Eads of St. Louis, Mo., with such others as may be associated with him, to construct such permanent and sufficient jetties, and such auxiliary works as are necessary to create and permanently

maintain, as hereinafter set forth, a wide and deep channel between the South Pass of the Mississippi River and the Gulf of Mexico," etc. etc. Under the stipulations of this

grant, construction must be "substantially commenced" within eight months, a navigable depth of 20 feet secured within thirty months, from the approval of the act. Mar.

FIG. 4.



Intermediate section of jetties.

4, 1875. Moreover, an additional depth of two feet per annum is stipulated for until a total depth of 30 feet is attained. FIG. 2 represents a medium section a modification of Mr. Calan's, FIG. 1 of the jetties proposed by the board already referred to. At the outer ends, where the water is 30 feet deep, the section attains very great magnitude.

Other methods of jetty construction are comprised in what has been said under the other heads. (SEE HARBOR, HARBORS OF THE AMERICAN LAKES, and BREAKWATER.)

J. G. BARNARD.

**Jevons** (WILLIAM STANLEY), b. at Liverpool, England, in 1835, is a grandson of William Rose, the historian; was educated at University College, London; held an appointment in the Australian royal mint at Sydney 1854-59; returned to England with the U. S.; became fellow of his college in 1864, and was appointed in 1866 professor of logical and moral philosophy, and Cobden lecturer on political economy in Owens College, Manchester. He has published a pamphlet on the *Value of Gold* (1863), showing the depreciation of the precious metals; *The Coal Question* (1865), showing the probable impending exhaustion of the English coal-fields, and the expediency of liquidating the national debt in time; *Elementary Lessons in Logic* (1870); *Theory of Political Economy* (1871), and an elaborate treatise on *The Principles of Science* (1874), in which numerous original ideas concerning processes of reasoning are propounded.

**Jew'el, or Jewell** (JOHN), D. D., b. at Buden, Devonshire, England, May 24, 1522; studied at Oxford, and during the reign of Edward VI. became a Protestant minister. In the reign of Mary he was expelled from Oxford by the Romanists; went to Strasburg at the invitation of Peter Martyr, and engaged in teaching. Returning to England after the accession of Elizabeth, he aided in all the measures for the re-establishment of Protestantism, was made bishop of Salisbury in 1560, and was the most eloquent defender both in the pulpit and with the pen of the accomplished Reformation. Besides many controversial pamphlets against the Catholic champion, Dr. Thomas Harding, he wrote in Latin his famous *Apologia Ecclesie Anglicane*, 1562, ever since esteemed a classic of the Anglican Church, a copy of which was placed by order of Elizabeth in every English church. D. at Monkton-Farleigh Sept. 22, 1571.

**Jew'ell**, county of Kansas, bounded on the N. by Nebraska. Area, 390 square miles. It is a high rolling prairie region, with a good soil, especially near the streams. It affords good pasturage. Cap. Jewell City. Pop. 207.

**Jewell** (MARSHALL), b. Oct. 20, 1825, at Winchester, N. H.; was first a tanner, and afterwards was extensively engaged in telegraph construction in the South-western States. In 1850 he began a successful business at Hartford, Conn., where he manufactured leather belting. He supported the Union vigorously during the late civil war; was chosen governor of Connecticut in 1869, 1871, and 1872; U. S. minister to Russia 1873-74; postmaster general in 1874.

**Jewell Centre**, post-v. of Centro tp., Jewell co., Kan.

**Jewell City** (JEWELL, P. O.), a v. of Buffalo tp., cap. of Jewell co., Kan., built on a beautiful plain surrounded with timber; has a weekly newspaper, large school house, 6 stores, 1 churches, large nurseries, various shops, etc. Coal is found in the vicinity. M. WINSON, Ed. "DIAMOND."

**Jewelry and Jewels**, terms used in a confined sense for precious stones set in gold or silver and worn as personal ornaments, but more generally applied to ornaments made only of the precious metals.

Paris is in this branch of industry the great factory for the world, and sells to it annually jewelry to the value of nearly 60,000,000 francs, of which about one-half is for gold work, the other for precious stones. Great pains are taken in Paris to protect purchasers from being deceived in any way. Only three grades of gold are allowed, and these are set forth by official stamps (*poinçons*). In every

large French city there is a so-called bureau of guaranty, where all new jewelry is chemically tested with great care. The English also endeavor to secure a standard of value for their jewelry, but recent revelations have shown that the "Hall mark" is not to be depended upon, the evasions having been both flagrant and extensive. For the U. S. the only rule is  *caveat emptor*—"Let the purchaser beware," or look out for himself. There are in Paris 900 manufacturing jewellers (masters), 826 shops, and 77 diamond and gem merchants. In London there are 512 jewellers, 4 wedding-ring makers, 29 gold-chain makers, 11 gold cutters, 2 mourning-ring makers, 39 diamond cutters and setters, 109 diamond merchants, 3 dealers in rough diamonds only, 8 jewel merchants, 25 pearl merchants, 7 dealers in jewellers' requisites, and 33 jewelry-case makers. The boast, however, which a French writer makes of the great cheapness with which jewelry is now made, and "the extraordinary degree to which an immense number of tools ingeniously perfected has wonderfully diminished all the difficulty of workmanship," is a proof that in France it has been reduced from an art to a mere manufacture.

Silver jewelry has become of late years a very extensive branch of industry. That of London is the most elegant in the world, being in exquisite taste, simple, and extremely cheap. There are only 33 manufacturers specially devoted to this branch (silversmiths not included), but the quantity which they produce is immense. Most of their work is in strictly antique fashion. Elegant silver jewelry is also made in Scotland, Ireland, Normandy; and that of Russia (inlaid with enamel and chased) is of remarkable beauty. There are in Paris 141 manufacturers of silver ornaments, of whom only 97 make what is strictly jewelry. Two grades of silver only are permitted. Steel jewelry is extensively made both in France and Germany. For this soft or malleable iron is at first employed, the surface of which is case-hardened, and the object is worked or filed while red, and steeled after the form is given. Many pieces are made by passing soft iron while red hot between steel rollers in which the pattern is cut in intaglio. Polishing is effected by means of wheels of wood or tin with emery and English plate-powder for the portions in relief, and with brushes for the indentations. There are in Paris over 100 manufacturers of steel ornaments, employing 1500 workmen. Ivory jewelry, which was almost unknown till within a few years, is now made in immense quantities in France, Germany, and England. It may be remarked that the raw material has increased in value; the demand for ornaments made from it has also augmented. There are at present in London 30 ivory-carvers, all of whom, in addition to other objects, make brooches and earrings. Tortoise-shell jewelry is generally set off with spots and small plates of gold. Thirty years ago the manufacture was confined to Rome and Naples, and in 1868 there were only six men who made it in Paris; at present there are in that city 12 establishments devoted to this jewelry alone. A singular specialty in personal ornaments is the so-called mourning jewelry, some of which consists of gold and black enamel, the greater part, however, being made of jet, human hair, and vulcanite—the latter an American invention. There are in Paris 60 manufacturers of mourning jewelry, and about 30 more who manufacture hair ornaments only; in London there are 25 of the latter and 13 jet-workers. Jet is, however, made extensively in all the cities of Great Britain, that of Whitby being preferred. This kind of jewelry was very well made in England during the pre-historic Stone Age, and the jet of England was prized of old by the Romans. An old British jet necklace is engraved in Wilson's *Pre-historic Scotland*. Amber has of late, in common with jet, become a fashionable material for personal ornaments. It is principally manufactured in Germany. Old amber beads which have become rich deep brown in color bring a very high price. CHARLES G. LELAND.

**Jewelry: Its Manufacture in America.** In the colonial period the wearing of jewelry was at first discouraged in the New England colonies; it was regarded as one of the "devices of Satan," and aside from what was



brought over by the wealthier immigrants there was very little demand for it. Gold beads were handed down from mother to daughter as heirlooms, and as the colonists became prosperous an order was occasionally given to the not over-skilful goldsmiths of the time to make up some of the carefully hoarded guineas or doubloons into beads or massive gold rings or chains. In New York, Maryland, and Virginia there was a greater demand for gold ornaments: gold rings, beads, earrings, watch-seals, and chains were more worn—not that the colonists possessed more wealth than those of New England or of Pennsylvania and New Jersey, but because there were not so many of the Puritan or ascetic ideas controlling their minds. Most of the jewelry used in these colonies was imported, the fine arts being no more cultivated there than in New England. The “watchmakers,” or more properly the dealers in and repairers of watches (for no watches were made in the colonies), were also importers of jewelry to a limited extent, and made in many cases the simpler articles mentioned above; but there is good reason for believing earrings, pins, bracelets, watch-seals, and the finer qualities of necklaces and chains were not manufactured in this country, and that the setting of the precious stones for ornamental purposes was not attempted before the Revolutionary war, nor, indeed, till some years after it. The country was left so much impoverished by the war that there was very little demand for luxuries for some years, and the currency was in such a deplorable condition that its purchasing power was almost entirely gone. The first manufacturer of jewelry of whom we can find any account was Mr. Epaphras Hinsdale of Newark, N. J., a man of great mechanical ingenuity and remarkable skill as a workman. He established a manufactory of jewelry in that town, on a small scale, somewhere between 1790 and 1795, and gradually increased it. Mr. Hinsdale died in 1810, but a Mr. Taylor, who had been one of his employés, and perhaps a partner, succeeded him and enlarged the business greatly. Mr. Taylor was a man of genius in the mechanical arts, and invented numerous machines to perfect the manufacture. Both Mr. Hinsdale and Mr. Taylor made earrings, pins, bracelets, chains, and necklaces, all of fine gold, using at that time gold of not less than 16 carats fineness. Their work was all solid, in distinction from the filled work of which we shall speak presently. It was a few years later than Mr. Hinsdale's beginning at Newark, but not after 1800, that two or three manufacturers of jewelry commenced business in Providence, R. I. Very soon, and perhaps from the first, they began to make what has ever since been known to the trade as “filled work”—i. e. the design or pattern of the jewel, whether earring, pin, or bracelet, was stamped out from very thin ribbons of gold, usually of 18 carats fine, and this shell was filled with a solder of pewter or lead and tin, and a back soldered on of gold of inferior quality. The thin shell, under well-cut dies, took very beautiful forms, and the fineness of the gold caused it to receive a high polish; and this filled jewelry, which could be offered at lower prices than the solid, found a wide and speedy market. The business has expanded until it has now reached an immense extent. In 1812, Mr. George F. Downing commenced the manufacture of watch-seals at Newark, to which he subsequently added other articles of jewelry, and removed to New York City in 1821. A French manufacturer named La Guerre had established in New York City in 1812 a factory for the production of filigree jewelry, and had brought over several French workmen of remarkable skill. He carried on the business for many years. Mr. Downing, who is still living at the age of eighty-five years, thinks that at the time he came to New York in 1821 there were no other manufacturers of jewelry in that city except La Guerre and himself. The Yankees, he says, flooded the whole country with their “filled work.” Very soon after 1820 other manufacturers entered the field, and from 1830 to 1837 the demand increased beyond the power of producers to supply it. Large amounts of jewelry were imported at that time. The terrible financial disaster of 1837 checked for some years the progress of this as it did the production of all other articles of luxury, but with the return of prosperity the demand was renewed, and constantly increased for many years, the discovery of gold in California and Australia adding largely to it. The disasters of 1857 and the severe pressure of the first years of the war diminished the business for a time, but the great abundance of paper money which followed, the large fortunes acquired by contractors and in the shoddy and petroleum speculations, and the reckless extravagance of those who had suddenly acquired fortunes, gave to the jewelry trade a vastly greater impulse than it had ever before received. The use of diamonds as jewelry, previously confined to a very few, became common, and, though unquestionably many spurious gems were sold as diamonds, the demand for genuine stones became so great that a class

of diamond-brokers found constant employment, and the cutting and setting of these precious gems, which had previously been carried on mostly in Holland, became a recognized branch of the business here. But this almost insane rage for jewelry had another result; servants and the lower classes of society were infected by it, and as their means were insufficient to purchase the genuine articles, there sprang up a great trade in gilt and imitation gold jewelry—paltry stuff, made often in fine patterns, of brass, copper, or “oroide of gold,” and covered with the thinnest possible film of gold by the electro-plating process. This trash was and is sold to the poorer classes, at an enormous profit, to the amount of millions of dollars. In regard to the originality of the designs of jewelry manufactured here there is not much to be said; there have been combinations of the fragments of antique designs, good, bad, and indifferent, occasionally a gleam of something new intermingling with the old; but for the most part the rococo, the filigree, and the Etruscan patterns have been more or less slavishly followed; and it must be confessed that in jewelry, as in furniture and architecture, there are not even the germs of an original American style. The Mexican and the ancient Aztec and Toltec ornaments of gold have more claims to originality, though not to beauty, the gold ornaments taken from the graves of the Chiriqui Indians on the Isthmus of Panama, as well as those found in the pueblos of the Moquis and other remnants of those races, being far from elegant or even graceful in form.

The following statistics will show the progress of this manufacture in this country within the last three decades. In 1850 the manufacture was but moderately developed. The entire production of the year was reported as only about \$2,750,000, and this included watch-cases, hair jewelry, and lapidaries' work. In 1860 there were 463 establishments for the manufacture of jewelry alone, employing a capital of \$5,150,723, using raw material of the value of \$5,102,500, employing 5947 persons (5363 males and 584 females), paying wages to the amount of \$2,605,056, and producing goods to the annual value of \$10,415,811. The manufacture of hair jewelry was conducted in 8 establishments, having a capital of \$27,000, and using raw material to the amount of \$15,300; it employed 42 persons (17 males and 25 females), the wages paid were \$10,629, and the annual product \$45,600. Lapidaries' work occupied 7 establishments, and produced \$36,850 annually. The total production of jewelry under these three heads was \$10,498,261. In 1870 in the manufacture of jewelry alone there were 681 establishments, employing 10,091 hands (8141 men, 1545 women, 405 children), using capital to the estimated amount of \$11,787,956, paying for wages \$4,433,235, using raw material valued at \$9,187,364, and producing goods annually to the value of \$22,104,032. In addition, lapidary-work was conducted in 12 establishments, employing 88 persons, to the annual amount of \$107,300. Hair jewelry is included under the general heading of “hair-work,” and its amount cannot be ascertained. The aggregate, then, is \$22,211,332. The annual product of some of the great centres of the trade in 1870 may be added. Providence produced in 74 establishments \$3,086,846; New York City in 198 establishments, \$9,595,700; Philadelphia in 53 establishments, \$1,583,741; Springfield, Boston, and Cincinnati respectively, \$370,000, \$338,000, and \$338,000; San Francisco, 18 establishments, producing \$475,562; Bristol co., Mass. (including Attleborough, etc.), 33 establishments, producing \$1,510,925. L. P. BROCKETT.

**Jewett**, post-v. and tp. of Greene co., N. Y., in the Catskill Mountains. Pop. 1105.

**Jewett** (CHARLES COFFIN), b. at Lebanon, Me. Aug. 12, 1816; graduated at Brown University in 1835; was for a time student and librarian of the Andover Theological Seminary; in 1843 catalogued the library of Brown University, where he remained as librarian and professor of modern languages until 1848. He became librarian and assistant secretary of the Smithsonian Institution, and was 1858-68 superintendent of the Boston Public Library. D. at Braintree, Mass., Jan. 9, 1868. He wrote a valuable report on the public libraries of the U. S. (1850), and in the same year brought forward an improved plan of cataloguing books.

**Jewett** (REV. CHARLES RAYMOND), b. July 29, 1824; educated at Emory College, Ga., and joined the Georgia conference (M. E.) in Jan. 1844. He was of a sanguine temperament, a cheerful, zealous, and eminently useful minister. He was distinguished as a model presiding elder, and earnest, bold, eloquent, as a preacher. He was a member of the South Georgia conference at the time of his death, July 10, 1872. T. O. SCHMERS.

**Jewett** (LUTHER), b. at Canterbury, Conn., Dec. 24, 1772; graduated at Dartmouth in 1795; was a physician at Putney and St. Johnsbury, Vt.; member of Congress



1815-17: pastor of a Congregational church at Newbury, Vt., 1821-28; published newspapers at St. Johnsbury, Vt., 1828-32; and d. in that town Mar. 8, 1860.

**Jewett** (Milo PARKER, LL.D., b. at St. Johnsbury, Vt., in 1808; graduated at Dartmouth in 1828, and at Andover Theological Seminary in 1833; was a professor in Marietta College, O., 1835-38; left the Presbyterian and joined the Baptist denomination, and became president of Vassar College, Poughkeepsie, N. Y. He is author of a work on baptism.

**Jewett City**, post-v. of Griswold tp., New London co., Conn., on the Quinebaug River and Norwich and Worcester R. R., 10 miles N. E. of Norwich. It has cotton manufactures and several churches.

**Jew fish**, a name given to several fishes of the family Serranidae, attaining a weight of several hundred pounds; that of Florida is the *Promicropus gurnea*, of which a specimen in the Smithsonian Institution weighed 700 pounds; that of California is *Stenobatis gigas*.

**Jewish Literature.** While Europe claims pre-eminence in the arts and sciences, Asia has been the mother of religions. Among all the religious systems of Asia, that which originated among the Hebrews excels in purity and loftiness. In them the profound subjectiveness of the Semitic character found its noblest expression. Lacking that eagerness of spirit which led the Greeks to observe nature and to cultivate the plastic arts, they looked upon the world of phenomena with a human interest, and regarded it solely in its relations to their own consciousness. The external was to them no more than symbol. This idea dominated their history and literature. It made them a people. Being in sole possession of monotheism, they became at once united among themselves and exclusive toward their polytheistic surroundings. And since a religious idea was at the very root of their existence as a nation, it is not strange that the interests of religion maintained their supremacy during the whole course of their history. In the Middle Ages, indeed, the Jews, in conjunction with the Arabs, became the mediators of the sciences. But even then those of their productions for which originality can be claimed were more or less intimately connected with the discussion of religious subjects.

The most ancient monuments of Hebrew literature are contained in the Bible. Much, however, that would now be considered valuable was not preserved in the sacred canon, and has been lost in consequence. The nature of the biblical writings at once illustrates the above remarks. Their historical portions are designed to show the workings of Divine Providence in the destinies of men in general, and particularly of the chosen people. Rhetoric becomes in them a vehicle of inspiration. Poetry is devoted to the glorification of God, with the exception of the Song of Songs, perhaps, and is chiefly intended to be sung by sacred choirs. Philosophy, disregarding the problems of the material world, is busy on the questions of good and evil, and labors to reconcile the presence of the latter with the goodness of the Creator, as in Job and Ecclesiastes. The influence of Persian ideas is visible in several of the later writings of the Old Testament. To it has been ascribed the introduction of the names of angels and the doctrine of a resurrection in the body. The contact of the Hebrew and Greek spirit is of profounder interest. It took place both in Palestine and in Alexandria. In Alexandria philosophy and inspiration joined forces on the basis of a modified system of Platonism. A rich crop of apocryphal works in prose and poetry sprang up, the words of the Bible were interpreted so as to express metaphysical tenets, and those anthropomorphisms which it contains, and which had at first sight awakened considerable suspicion, became, in the new light that Philo (the originator of the theory of the Logos) and others shed upon them, transparent to a deeper wisdom. There, also, the first translation of the Bible into Greek, known as the Septuagint, was effected. In Palestine the attitude Judaism assumed against Hellenism was hostile to the last degree. The Hebrew has ever found it a comparatively easy matter to absorb the philosophical teachings of the age in which he lives, from the absence of fixed dogmas in his own religion, but he resists to the utmost any attempt to interfere with the observance of those practical commandments of his faith which he regards as its essential feature. Such an attempt was made by the degenerate Greeks who ruled in Syria in the time of Antiochus Epiphanes. The consequence was that Judaism retired upon itself, that Greek culture and heterodoxy came to be synonymous terms, that the authority of Scripture was more than ever secured in the affections of the people. From that time forth it became the centre of their existence. All their energies seem to proceed from it, all their thoughts return

to it. None the less, innovation became a necessity. All the biblical laws were no longer applicable to the altered conditions of a new age. Unavoidable changes were gradually introduced. But such was the reverence now paid to the Holy Writ that no ordinance, however salutary, could enforce obedience unless it had previously received at least the nominal sanction of the great "Book." The teachers of the people thus became doctors of the law. By an ingenious method, which left them the widest latitude of interpretation, they were enabled to read from the letter of the Hebrew Bible whatever meaning they desired to read into it, and to fortify their own injunctions by referring them to a divine origin. The inferences they drew, the analogies they insisted upon, were in a philological sense absolutely reckless. Every letter and word that seemed superfluous, every unusual form of construction, was tortured into some unheard-of signification; nay, they proceeded in defiance of all grammatical construction. The principles of jurisprudence, the ritual and ceremonial laws, even the rules of decorum, were deduced from biblical sentences. Finally, the fiction that an oral law was revealed to Moses on Sinai, which from him had been transmitted to succeeding generations, aided them in establishing the celestial origin of their teachings where they might otherwise have been at fault. A few of the leading rabbins were Hillel, shortly before the birth of Christ, Jochanan b. Saknai, at the time of the destruction of the temple, Akiba, in the days of Hadrian, Juda the Holy, the compiler of the Mishna, R. Meir, Aba Areka, called Rab, Raba, Rabbah, and others. Of the three Greek translations undertaken in the second and third centuries of our era, those of Aquila, Theodotion, and Symmachus, the first in particular shows signs of having been largely influenced by the rabbinical mode of exegesis. The elaboration of the Talmud continued down to the sixth century. (For an account of that great work see the article TALMUD.) The existing stock of tradition was classified at the end of the second century in the six divisions of the Mishna. The bulky commentaries grounded on them are known as the Gemaras of Palestine and Babylon.

The liturgical compositions of the Jews deserve at least a passing notice. Prayer, as distinguished from mere supplication, was the only adequate form of worship which a monotheistic religion could accept. The heathen gods, being dependent on the gifts of their votaries, demanded sacrifice; the God of the prophets was exalted above all human failings and needs. There was nothing which man could do for him. To serve him was to become like him. "Holy shall ye be, for I, the Eternal, your God, am holy." The desire to imitate God, therefore, became the keynote of Hebrew worship. In order to imitate, it is in the first place necessary to regard the object to be imitated with interest and attention. And thus an endless dwelling on the attributes of the Deity became a leading characteristic of Hebrew prayer—a ceaseless heaping of epithets, as if the soul struggled to exhaust an infinite theme. It has been remarked that "the Jews pray metaphysically." The cause of this peculiarity is thus made plain. That admiration of the Divine Being should find vent in praise is natural. The All-Good is the dispenser of all bounties, and has ordained even the seeming ills of life for a wise end. Hence the countless blessings which are interspersed in the Hebrew service, and which accompany even the most trivial occurrences of daily life. Lastly, a comparison between human imperfection and the grandeur of Him whom he is called upon to imitate leads the mind of man to expect only from the mercy of God that power which he lacks to become god-like, and he implores for divine assistance: "I fly from Thee to Thee."

When the Arabs received, through Syrian channels, the treasures of ancient Greek thought, a new spirit of inquiry was awakened among them, and was soon communicated to the Jews. As early as the seventh century works on mathematics, astronomy, and astrology began to appear among them. Exegetical studies received a powerful impetus from the new sect of Ananites or Karaites, founded about 750 A. D. (see KARAITES), who, rejecting the authority of tradition as represented by the rabbins, professed to return to the letter of the Hebrew Bible as the sole standard of faith. They did not, it is true, remain faithful to their professions, adopting many principles and practices of post-biblical origin; and it has been conjectured that they ought to be considered the successors of the ancient Sadducees. Among him self, Benjamin Nahawich, an Eusebi, Nonesh may be mentioned among the earliest authors of their sect. The introduction of vowel signs into the text of Scripture was a result of the increased attention paid to philological pursuits. Two systems were invented. The one originated in Babylonia, the other in Palestine. The latter is the one in common use. The mystical tendencies of this period found expression, notably, in the so-called



*Book of Creation*, a work of small compass, but of great influence, which is held to be a production of the eighth or ninth century. It employs the method of the Neo-Pythagoreans, seeking to solve the problem of creation with the help of numbers and letters. In the same epoch arose the poetanic school of writers, with Elasar b. Kalir at their head. Their verses were designed for use in the synagogue. But though the *Psalms* multiplied excessively during the succeeding centuries, there are but few of these prayers in rhyme that possess any real poetic value. A remarkable instance is on record of the liberal spirit fostered by the encouragement critical investigation received at this time. The explanation of miracles proposed by a Persian scholar named Chiwi, certainly reminds one strongly of Eichhorn and the Rationalists. In the first half of the tenth century arose the Gaon (a title signifying "His Excellency") Saadiah, born in Faïum, Egypt. He engaged in bitter conflict with the Karaites, among whom Solomon b. Jerucham was his chief adversary. Saadiah's main work is a philosophical treatise entitled *Emunath ve Deoth*—"Faith and Knowledge." In it he seeks to reconcile the commandments of the Bible and the injunctions of tradition with the dictates of reason. He places great emphasis on the doctrine of free-will in opposition to a tendency toward fatalism which had been encouraged by the spread of Islam. He was also the author of a translation of the Old Testament into Arabic, and a commentary on the *Book of Creation*, above mentioned, is said to be from his pen. Another commentary on the same book is ascribed to his contemporary, the celebrated astronomer and writer on medicine, Isaac Israeli of Cairoan. Judah b. Coniah, residing, like Israeli, in the N. of Africa, is distinguished as having been the first to introduce a comparative study of the Chaldean, Hebrew, and Arabic languages.

In the latter half of the tenth century the supremacy which the high schools of Babylonia were too feeble to maintain longer was assumed by Spain. Moses, a captive Talmudist, having been sold as a slave to Cordova, was ransomed by the Jews of that city, and placed at the head of their Talmudical school. Under the patronage of Chasdai Shaprut, the trusted adviser of Abderrahman III., letters flourished. Menahem b. Saruk was the first of the rabbinist Jews to attempt the preparation of a Hebrew lexicon, and his work shows signs of considerable learning and freedom from prejudice. His opponent, Dunash b. Librat, was among the first to apply the metrical forms current among the Arabs to Hebrew poetry. Chajuz, a pupil of Menahem, discovered the system of triliteral radicals which forms the basis of Hebrew grammar, while his successor, Abulwalid, elaborated a complete Hebrew grammar and a lexicon, which is now (1875) being published in the original Arabic. The eleventh century is illustrated by such men as Bachia b. Joseph, whose noble work on the *Duties of the Heart* exalts the claims of the spiritual, moral nature of man at the expense of mere outward formalism; also by the poetic vezir of Granada, Samuel ha Nagid ("the prince"); and, above all, by the profound philosopher and poet, Solomon Gabirol. His system is based on the theory of emanation, and is the product rather of an ardent imagination, thrilling with enthusiasm, than of exact study. His muse is melancholy, and dwells chiefly on the pain and sorrow of existence. Yet his verse is not lacking in power and grandeur of expression. It has been well said of his compositions that the spirit of Faust seems to pervade them. (For an account of his philosophical work, *Fons Vita*, see Munk's *Mélanges de Philosophie*, etc.) While Hai, the last of the Gaons whose name is of note (d. 1038), assumed an attitude hostile to all liberal culture, the Talmudists of Moorish Spain were content to pursue their path, without caring to molest those who inclined to studies differing from their own. This is noticeable in the case of Isaac Alfasi, the far-famed head of the Academy of Lucena, whose labors to extract from the interminable mass of discussions contained in the Gemara a clear statement of their final results have secured him high consideration as an authority in his branch down to modern times. In Christian Spain a poet arose in the beginning of the twelfth century (Jehuda ha Levi, b. in Castile 1080 A. D.), whose verse indeed is tender, sweet, full of pathos, but whose thoughts and sympathies are far narrower than those of Gabirol. His philosophical work, the *Cuvari*, is written in the form of a dialogue between the king of the Chazares previous to his conversion (the king and his people adopted Judaism in the eighth century) and the representatives of the three great religions, Christianity, Islam, and Judaism. The first two being compelled to own that their religious records are based on the Hebrew Bible, the king confines his conversation to the Jew. In the exposition of his philosophical ideas Jehuda ha Levi makes frequent use of the term *sephulch*, which may be rendered "heritage of the Divine Spirit." Though no human being is excluded from

the grace of God, there are certain men and places that have been gifted from the beginning with the faculty of becoming peculiar vehicles of his spirit. Adam transmitted this gift to the patriarchs, thence it was obtained by Israel, and among them was accorded in its highest potency to the prophets. The places so selected are the cities and villages of the Holy Land. In accordance with these convictions the poems of Ha Levi are inspired by an intense yearning for Jerusalem and the ruins of its temple, and the "songs of Zion" are the most eloquent productions of his Muse. Geiger, in his lectures on Jewish history (ii. p. 118), has pointed out the connection between the sentimentalism of Ha Levi and the direction given to men's minds by the prevailing doctrines of the Church in his native country. A contemporary of the above was Abraham Aben Esra, born in Toledo in 1093. In the course of his restless life his travels led him to Egypt, Italy, the S. and N. of France, and to England. He d. in Rome in 1167. He wrote several works on Hebrew grammar, of which that entitled *The Sefer* is of considerable historical value. His great renown is due to his commentaries on the books of the Bible. His style is brilliant, his observations profound, and often pointed with bitter, cutting sarcasm. In his commentary on the Pentateuch he refers to those passages which appear to preclude the idea of Mosaic authorship; in that on Isaiah he anticipates modern criticism by indicating the distinction between an earlier and later prophet of that name. He believed with the astrologists in the influence of the stars on human destinies, and is supposed to have entertained pantheistical notions concerning the Deity. But he loves to assume the mask of simple credulity, and is fond of displaying an ostentatious deference for the views of the ancients, so that it is a matter of no little difficulty to extract his true opinions.

The high-water mark of Jewish literature in the Middle Ages was reached in the writings of Maimonides, born in Cordova in 1135. He fled with his father from the persecutions of the Almohades, and at last found protection and security in Egypt under the mild sway of Saladin. Among his chief works we mention his commentary on the Mishna and the *Mishneh Thorah* ("Repetition of the Law"), in which it is his purpose to present a complete and systematic code of rabbinic law, and by this summary to supplant the Talmud itself; for he was aware that that work requires a life-study to master, and leaves little or no room for the pursuits of science. The *More Nebuchim* (*Deliverance of the Captives*) is its title in the original Arabic—"The Guide of Those that are Gone Astray") embodies the philosophical system of its author. In it Maimonides proposes to harmonize the principles of religion as laid down in the Bible with those metaphysical conceptions which the age inaccurately ascribed to Aristotle. The anthropomorphic expressions of Scripture are pregnant with a deeper meaning; the ceremonial observances which it enjoins were largely instituted as a safeguard against heathen practices. The Deity himself can be described by none but negative attributes. Revelation is a union of the individual soul with the Active Intellect. The reward of virtue lies in the high spiritual development which it leads us to obtain. The tendency to systematize which is thus apparent in the works of Maimonides induced him, in one of his earlier writings, to set up thirteen articles of faith, a step which was equally unprecedented and dangerous. The free, pure-minded philosopher might have become the author of mental slavery for his people had not the spirit of Judaism been such from the beginning as to resist all attempts to hamper it with dogma.

Among the Jewish authorities of note at this period in Germany may be mentioned Gershom, surnamed "the Light of the Exile" (end of the tenth and beginning of the eleventh century). He eradicated the last vestiges of polygamy among the Jews, and declared the consent of the wife a necessary condition of divorce. In the second half of the eleventh century lived in Troyes R. Solomon b. Isaac, commonly known as Rashi, a man whose name is familiar to every student of Hebrew literature. His commentaries on the Bible may still be read with interest and advantage. But to the brief explanatory notes with which he has elucidated all the voluminous works of the Talmud we owe in a great measure the possibility of still comprehending the intricate discussions of that difficult work. Samuel b. Meir (Rashbam) followed in the footsteps of Rashi, his grandfather and teacher, and is distinguished for the simplicity and straightforwardness which mark his interpretation of Scriptures. His brother, Jacob Tham, was among the earliest of the so-called Tossafists, a school of casuists who exhausted the power of dialectics in fine-spun subtleties of little real value, that tended only to make the study of the Talmud still more complex and laborious. Simon Darshan deserves mention as the author

of an oft-quoted compilation, known as the *Jalkut*. In Italy, Shabthai Donolo gained distinction as a physician. He was the author of a new commentary on the *Book of Creation*. At the end of the eleventh century R. Nathan b. Jehiel of Rome prepared a lexicon of the Talmud, Targum, and Midrash, which is still considered a valuable auxiliary to the studies it was designed to facilitate. In the S. of France, the land of heresy and free thought, we find in the twelfth century, besides a number of distinguished Talmudists, such scholars as Abraham b. Chija, the mathematician, the Kimchis, and Thibbons. Joseph Kimchi introduced the current classification of Hebrew vowels. Of his sons, David Kimchi bears a high reputation as a grammarian, lexicographer, and commentator on the Bible. Juda Thibbon translated into Hebrew the philosophical works of Saadiah, of Bechai, and of Juda ha Levi. His son Samuel is the translator of the *More Nebuchim*. The devoted industry of these men opened the rich mine of Arabico-Jewish literature to the countries of Christian Europe. Conversely, the Latin works of scholastic authors were now being rendered into Hebrew, and new channels for the exchange of thought were thus opened. In the thirteenth century flourished the poet Chirisi, whose spirited imitations of the Arabian Hariri are justly esteemed. Joseph Ibn Akin, the favorite pupil of Maimonides, did not exert that wide influence which one would suppose his relations to the great master might have given him. At this time the writings of Maimonides became the apple of discord between the friends of liberal culture and the conservatives. The opinions of this philosopher concerning the resurrection, and the doubts he seemed to cast on the "creation out of nothing," proved peculiarly objectionable. Abraham b. David of Poqueres and Meir ha Levi of Toledo had already raised their voices against the new opinion during the lifetime of its author. After his death the struggle broke out violently. Solomon of Montpellier, the leader of the anti-philosophical party, went so far as to call in the aid of the Dominicans to crush his opponents. The Spaniard Juda Aflahar took sides with the Provençal rabbi, though urged by David Kimchi to declare in favor of Maimonides. Passions ran high in either camp. A settlement of the questions under discussion could not, however, be reached. The tendency to rationalism as exhibited in the exegesis of the period, continued to grow, until at the beginning of the fourteenth century a new outbreak occurred. The learned, pious, and polished Adereth, the stern and unbending German exile, Jacob b. Asher, were at that time the chief rabbinical authorities of Spain. The authority of the former was invoked by the fanatics of Montpellier to anathematize the party of progress, and, after offering a vain resistance for some time, he was forced to yield to their importunities. But the right of free investigation was too sacred a tradition within the pale of Judaism to give way before the decrees of orthodoxy. The *Milchamoth Asherah* ("Battles of the Lord"), by Gersonides, the commentaries of Kaspi and Maestro Vidal on the *More Nebuchim*, show plainly that the spirit of philosophy would not succumb without a struggle. Nay, in the fearless assertion of conviction these works transcend even the productions of Maimonides. The eternity of matter with God is boldly asserted, the testimony of miracles denied, etc. For all that, the decline of metaphysical studies could not be arrested. It was brought on not by the machinations of a Jewish priesthood—for nothing of the kind existed—but by the force of adversity and persecution. Philosophy goes out, mysticism steps into its place. Nachmanides, the profound thinker, one of the most esteemed commentators of the Bible, contributed largely to ensure it a favorable reception. It was crystallized into a system by Moses de Leon in the latter half of the thirteenth century. His chief work, the *Sohar* ("Radiance"), is written in Chaldaic, or rather Syriac, and has remained the standard work of the Mystics down to the present day. He ascribes its authorship to Simon b. Jochai, the hero of many legends in the early Talmudic age. Hence the name of Cabbala, or tradition, which is falsely applied to this and similar productions. Though the forgery is sufficiently palpable, it escaped detection. Form and contents of this strange composition equally attest its late origin. The doctrine it inculcates rests on the theory of emanation. God is the *Ein Sof*, the Endless. From him, in successive gradation, the higher and lower worlds have come, until the world of matter and of evil appeared as the last modification of his Spirit. The sefiroth (originally "numbers," then spheres, then the presiding spirits of the spheres) form the channels between the celestial and the terrestrial. By skillful manipulation of the words of Scripture, especially the letters of the ineffable name of God, man is able to exert a magical influence upon the workings of the Divine. The pernicious tendency of these ideas did not become widely manifest until a few centuries after the *Sohar's* appearance.

In the mean time, it is refreshing to observe how vigorously Jewish writers took part in the popular literature of the different countries to which they belonged wherever their oppressors allowed them a brief respite. We refer to Ben Sahn, whose erotic poetry was the delight of the Arabs; to Santob de Carrion, the Castilian; to Süsskind of Trimberg, the German Minnesinger; and to Manocello, or Immanuel, who was admitted to the intimate circle of Dante's friends. In the vision of heaven and hell contained in the *Divan* of Manocello, a marked contrast appears between him and his great contemporary. The Jew hails the great and good men of the heathen world, regardless of their belief or unbelief, among the dwellers of paradise. In the beginning of the fifteenth century Chasdai Crescas wrote a philosophical treatise entitled *Ore Jehonah* ("Light of God"), in which he seeks to show that all human actions are controlled by law, each effect being conditioned by an antecedent cause. He does not, however, deny the freedom of the will. His pupil, Joseph Albo, is the author of *Icarim* ("Fundamental Principles"). In this work the salvation of the soul is represented as the sum of human existence, and the doctrine of Maimonides that we are to reach a progressive advance toward perfection as the end of our being, declared manifest. Ben Shimon's views, laid down in his *Kehad Elohim* ("Glory of God"), are equally worthy of attention. Among the polemical writers of the Middle Ages, Profiat Duran, called Efodi, takes rank with the highest. The attempt of converted Jews, like Paulus de Santa Maria, Gerónimo, and others, to destroy the faith of their brethren, provoked sharp and frequent discussions. The satirical letter of Efodi, addressed to a former friend and coreligionist, is a model of its kind. His most pointed and telling arguments are wrapped in the forms of concession. Simon Duran met the doctors of the Church on their own ground, and endeavored to prove from passages of the New Testament that Christ himself was unwilling to be considered more than man. Toward the end of the fifteenth century, Abrabanel, the exiled minister of King Ferdinand of Spain, wrote his commentaries on the Pentateuch, the books of Joshua, Judges, and Samuel, which contain much valuable information of interest to the historian.

The productions of Jewish literature were at this time more quickly and widely disseminated by means of the new art of printing. The Jew Jerome Soncino is prominent among the early Italian printers for the excellence of his Hebrew and classical publications. It is in Italy, indeed, that the interest of Jewish literature in the sixteenth century mainly lies. The Cabbala, it is true, found devoted adherents in that country, but rather among cardinals and princes than among Hebrew scholars. The two counts of Mirandola are instances in point. It is well known that even Reuchlin, the defender of the Talmud, suffered himself to be tricked by cabalistic mummery. Of Elias Levita, on the other hand, we know that he devoted his energies to solid study and investigation. He called attention to the fact that the vowel-signs of the Hebrew Bible were added at a comparatively modern period, and that we are free to disregard them in the criticism of the text. Again, Asaria dei Rossi showed that the current chronology of the Jews, dating from the Creation, is utterly untrustworthy and contradicts well-established historical facts. He was also the first to avail himself of the Septuagint as a critical instrument. In other European countries no literary work of any great importance was going on. In Prague, David Gans, himself an astronomer, who corresponded with Kepler and enjoyed the society of Tycho Brahe, wrote the annals of Jewish and universal history. Other books on history appeared about the same time. In the middle of the century the influence of the Cabbala among the Jews was revived by Isaac Luria, the divine Rabbi Isaac (Ari), who closed his brief life in Jerusalem. To Palestine we are also indebted for that renowned code (compiled by Jos. Karn) known as the *Shulchan Aruch*, which, embracing in its provisions the entire life, public and private, of the Israelites, has maintained an infallible authority down almost to the present day.

In the seventeenth century free Holland afforded an asylum to the Jews. But the literature of the German and Portuguese settlers that soon arrived in great numbers, so far as it is distinctively Jewish, is not of any high order of merit. The writings of Manasse b. Joel, b. *Address to the Protector*, his *Esperance de Israel*, his *Validation of the Jews*, are noticeable chiefly for their political bearings. The congregation of Amsterdam was infected with the spirit of the Inquisition, from which it had suffered so cruelly in their former home. They had become narrow and bigoted, and the best men that were of that mold, Uriel da Costa, Benedict Spinoza, were bitterly and persistently persecuted. In other countries the interest of culture fared no better. In Poland the attention of scholars was absorbed in fruitless discussions of barren themes,



and high intellectual gifts were wasted on abstruse questions of Talmudical casuistry. Germany was inundated with Polish rabbis, and seemed to have lost all productive power of its own. As a *casa aris* in its day may be mentioned the commentary of Lipman Heller on the Mishna, which, with that of his predecessor, Obadiah di Bertinoro, is commonly printed alongside of the text in the standard editions. Italy alone continues to contrast favorably with the general gloom that had settled on the Jewish world. There we find the forerunners of the reform movement of our own time. Leon Modena attacked the prevailing system of rabbinical Judaism, called for a purification of public worship, and demanded the abolition of the ceremonial observances which the Talmud had enjoined. Joseph Delmedigo, a man of profound and varied learning, the pupil of Galileo, was no less exalted above the bigotry of his age. The end of the seventeenth century was marked by the great Messianic movement, instituted under the auspices of the Cabala, with the impostor S. Zewi, as its acknowledged leader. The fever spread from the East to the West, and left deep traces in the writings of the time. In the eighteenth century the young poet Ch. D. Luzzato caught the prevailing contagion, and ruined a promising career by his devotion to mysticism. Those dreams of a great glory near at hand not only tended to sow discord in the congregations, as may readily be seen by referring to the controversial writings of Eibeschutz and Jacob Emden (see the article Jews), but they also loosened the bonds of social order, and, especially in Poland, where they were much encouraged, brought about the complete demoralization of the common people. The evil was at its worst when the time of change was already near. Already, at the beginning of the century, Jechiel Heilprin had written his *Seder ha Dinor* ("Order of Generations"), which showed an awakening desire for the cultivation of historical pursuits. The Protestant Basnage wrote his history of the Jews, which served to give the Christian world some, though indeed a very inaccurate, knowledge of the great theme which it sought to illustrate. Prof. Wolf of Hamburg undertook to do for Hebrew bibliography what the Buxtorfs had done for Hebrew lexicography. At last, with Moses Mendelssohn, the new era fairly began. A translation of the Old Testament in the corrupt idiom then current among the Jews had been attempted before by Jos. Wittenhausen. Mendelssohn, however, was the first to render the Pentateuch into pure German, and thereby, like Luther in his day, created a powerful desire for change among his brethren. Under the influence of his disciples, the "Meas'fim" (so-called from the *Measef* or "Gatherer," a periodical published under their auspices, and of N. Wessely in particular), Hebrew poetry revived, and a due regard for grace and polish of form was inculcated.

But the great benefit which the modern reform movement has conferred on Jewish literature lies in the application of scientific methods to its study. Germany has in our day broken its long silence, and the labors of its scholars have brought order into the chaotic mingling of confused elements which the literature of the Jews presented to the scholar fifty years ago. The true succession of generations has now been, to a great extent, restored, many works that were considered lost have been redeemed, and the past is being reconstructed before our very eyes. Among the illustrious men who have done this work we mention Zunz, the pioneer, Jost, Geiger, Rappoport, Munk, S. D. Luzzato, Steinschneider, Derenburg, Graetz, Frankel. As it was intended in the above summary to indicate merely the direction of the great current of Jewish literature, many names of authors otherwise deserving attention have not been noticed. The reader is referred for full information to the works quoted in the article on JEWISH HISTORY, and to the excellent treatise of Dr. Steinschneider first published in Ersch and Gruber's *Allgemeine Encykl.*, and since translated into English under the title of *Jewish Literature*.

FELIX ADLER.

**Jewish Sects.** *Sadducees and Pharisees.*—Until within a very recent period the character of these sects or parties, which divided the Jewish state in the last two centuries preceding its downfall, was strangely misconceived. The Pharisees were represented as having been hypocrites—the Sadducees, libertines. We are chiefly indebted to the brilliant researches of Geiger for a more truthful, if not yet complete, understanding of their principles and tendencies. The Syrian king having attempted to introduce the worship of images in Judæa by force of arms, the Jews became more closely attached to the religion of their fathers, and the Scripture in which it was laid down, by reason of the long struggle through which they were compelled to pass for its preservation. Even before the Maccabean war a party had been formed among them who, to ensure a stricter observance of the Mosaic law, withdrew from the society of the surrounding peoples and their own

less scrupulous brethren. These were known as "Nid-dalim" (separatists), or, in the Aramaic dialect, Perishin, whence Geiger derives the name Pharisees. In the war of independence the reigning family of priests had lost the confidence of the nation by their subservieney to the invaders, and a new dynasty, that of the Hasmoneans, assumed the tiara, and soon after the crown. The power of the priesthood, however, had been sadly shaken. It was regarded with fear and suspicion. The Hasmoneans, it is true, had headed the war against Antiochus and his successors. But no sooner were they seated on the throne than they allied themselves with the enemies of the separatist party, and incurred its displeasure. This party had in the mean time identified its interests with those of the people, and in opposition to the class-rule of a favored hierarchy began to develop strongly democratic tendencies. The whole people are priests, they said, and they attempted to extend the character of sanctity to every member of the community. In this undertaking they were much hampered by that book which they regarded as the very foundation of their faith. The Pentateuch distinctly recognizes the prerogatives of the priesthood. Powerless to abolish them, therefore, they copied the peculiar rites and ceremonies of the priests, and enjoined their observance on all. They could not level the law of Moses; they built up new ordinances of their own of equal height. Like the besiegers in olden times, they raised wall against wall. Thus, if the priests were commanded to perform certain ablutions before an offering, every Israelite was now to do the same before sitting down to his meals; the laws of purity, hitherto incumbent on the servants of the temple only, were declared universally obligatory. The blessing over the wine sanctified it so as to replace the libation; even a substitute for the offering of frankincense was not wanting. The repasts which the Pharisees held in common are in like manner explained as imitations of the customs of the priestly *fratria*. Every house was designed to be a temple, every hearth an altar. The religious equality of all was the watchword of the Pharisaic party. This would aid in explaining the origin of the elaborate code of ceremonies embodied in the Talmud. In the course of time, when the meaning which had inspired them at their inception was lost, they became a heavy burden. We may observe, in passing, that a desire to do away with temple and sacrifice is distinctly expressed in the later prophetic writings of the Bible. Also, a friendly spirit toward the Gentile world, and an effort to establish more intimate relations with them, which was, however, speedily checked.

In the priestly party, in opposition to which Phariseism arose, Geiger recognizes the Sadducees. Their name he derives from Sadok, a distinguished priest of the first temple. Nor can it be denied that we find the Zadokites in high honor later on, as testified by Ezechiel and Nehemiah. The Sadducees an aristocracy; the Pharisees the champions of popular rights; the former the party of conservatism, the latter that of religious reform—this is, in brief, a statement of the opinion which at the present day largely prevails concerning them. That the leaders of the Pharisees were men of high aims and noble purposes no one can reasonably question, though the means by which they sought to attain their ends were not always wisely chosen. Concerning the Sadducees and their true character, there will still be much discussion. It may be urged that the well-known conservative spirit of the sect is cause sufficient to explain the peculiarities of their doctrines. Without denying the right of "tradition" to amplify the provisions of the Mosaic code, they resisted all far-reaching innovation, preferring to adhere as closely as circumstances would permit to the beaten track. The Pentateuch—and this is of great importance—exalts the descendants of Aaron and Levi above the rest of Israel. A desire to remain loyal to its evident prescriptions may have been the sole motive which impelled them to lean toward the priesthood and watch over its rights. We need not, therefore, charge them with hierarchal tendencies. As to the points of difference between Sadducees and Pharisees, the information we possess is scanty and insufficient. We know that the Sadducees rejected the doctrine of the resurrection in the body. This will hardly surprise us when we recollect that the books of Moses contain no allusion to any such doctrine. It was, moreover, a foreign importation, having probably been carried to Judæa from Persia. The Sadducees declare that holy things communicate their character of sanctity by contact; the Pharisees assert that their touch makes unclean—a declaration which was designed to prevent profane handling. If this is the case, say the Sadducees, then the Bible would cause uncleanness, while the Homeric poems would not. False witnesses are to be punished, according to the Sadducees, only when they have caused the punishment of the accused; according to the Pharisees, as soon as the judge has pro-

nounced sentence. The former seems more equitable. The Sadducees are of opinion that the high priest should kindle the frankincense in his censer before entering the Holy of Holies; the Pharisees command him to desist till he has passed the curtain. The exegesis of Lev. xvi. 2, on which the discussion hinges, is, if anything, favorable to the former. (For an extended account of the differences between the two sects, see Geiger's *Urschrift und Jüdische Zeitschrift für Wissenschaft und Leben*, 1863.) The Pharisees explain the word "sabbath" in Lev. xxiii. 11 as meaning, in this connection, feast-day in general. The Boethusians, whom Geiger considers a subdivision of the party of the Sadducees, and identifies with the Herodians of the New Testament, retain it in its original signification. In this way, counting from "the day after the sabbath," they bring it about that the fiftieth day, the Feast of Weeks, shall always fall on a Sunday. The writer of this article has elsewhere attempted to show that it is erroneous to attribute such an opinion to the Boethusians or Sadducees. It is well known that the name Boethusians or Sadducees is frequently used in the Talmud where Christians are really meant. The Sadducees had no motive to prefer the Sunday, but many against such preference. On the other hand, it was of great importance to the Christians that the Feast of Weeks, the Pentecost, the close of the resurrection-period, should fall on the day of the resurrection. We have before us here a conflict not between the Pharisees and Sadducees, but between the Pharisaic Synagogue and the primitive Church. The important bearings of this controversy on the development of early Christianity cannot here be shown. (For a brief statement of the main argument in support of the above theory, see the *Proceedings of the American Oriental Society* for 1874.)

That the first book of Maccabees was written by a Sadducee, the second by a Pharisee, is one of the many interesting points which Geiger has labored to prove in his *Urschrift*. In how far Jesus himself adopted the principles of the Pharisees, made use of their methods, and even of their very words, may best be seen by studying their writings. The necessity of doing this in order to penetrate the obscurity which covers the first century of Christian history, has been forcibly urged by Hausrath in the *Protestantische Kirchenzeitung* 1863, No. 44.)

**Essenes.**—Little is known of this mysterious sect save the few stray data which Josephus has preserved. They lived in communistic societies, led a quiet and secluded life, enjoined celibacy, observed moderation in speech and action, wore garments of spotless white. They shut themselves off from the society of the world, finding it impossible to maintain that scrupulous purity which they aspired to in the midst of social influences that exposed them to constant contamination. They have been considered the extreme right wing of Phariseism. Popular superstition clothed them with magical powers. It is difficult to arrive at the truth concerning them at the present day. The Talmud does not mention them. (For an account of the KARAITES see the article under that head.)

The *Chasidim*, a modern sect, arose in the last century. It has numerous adherents among the Jews of Poland, Russia, and Hungary at the present day. Their religious practices are said to resemble those of the Shakers. The authority of their rabbis is supreme, the honors paid them amounting almost to worship. They delight in ecstacy and vision; and mysticism, as is everywhere the case, not unfrequently leads to immorality. This sect is an offspring of the Cabala—a sad sign of the utter demoralization which long oppression has produced in the countries where it prevails. FELIX ADLER.

**Jews**, a people of Semitic origin, known also as **Hebrews** or **Israelites**. The former name is probably derived from their early seats beyond the Euphrates, whence they migrated to Palestine (the word *Eber*, whence *Ibrim* or *Hebrews*, meaning "beyond"); the latter is taken from the surname of the third patriarch, Jacob. With the waning fortunes of the kingdom of the ten tribes and the consummation of its late Judah became the centre around which the remnants of the people crystallized. It was the foundation on which the polity of the second temple was raised after the exiles' return from Babylon; and from that time to our own day the scattered members of the nation have been known in common by the name of Judah (Jehudim, Judaists, Jews). A complete history of the Jews has not yet been written, and the best attempts that have been made to supply this deficiency only prove by their failure the prematureness of the undertaking. Nor is it likely that a better result will soon be achieved. The various fortunes which the Jews have met with on their journey of 3000 years, the persecutions they have undergone, the all-absorbing devotion with which they have clung to the religious ideal of their past, and which could not but paralyze their interest in the present—their want of appreciation, too, of

the importance of historical research, joined to the wanton destruction of precious relics of their literature by the fanaticism of their adversaries—have conspired to make their annals like the torsos of some gigantic group, which the genius of a later age in vain exhausts itself to reconstruct. It is with good reason that this people has been termed a mystery to the nations. It is almost an enigma to itself. In view of these facts we shall do well to content ourselves with directing the attention of the reader to the main events of Jewish history only, which can be established by the records.

At the very outset of our undertaking we are distressed by the almost complete want of contemporaneous accounts. Setting aside for the moment the aid which Egyptologists proffer, and concerning whose value prudence warns us to suspend our judgment, we are dependent exclusively on the scriptural narrative for the source of our information. For, although continued research in Egyptian tombs and Assyrian palaces may reasonably be expected to bring to light some day much that will add to our knowledge, we need have no scruple in at once rejecting the fables of Hecateus of Abdera and his like. Concerning the manner in which the biblical account itself is to be received, the opinions not only of philosophers and historians, but even of many eminent divines, go far asunder. To us it seems that of all the views that have been advanced on this subject there are only two which can claim the merit of consistency. The one embraces the inspirational theory, and looks upon the sacred writings of the Hebrews as the direct work of God through his instruments the prophets. The other simply regards them as the joint product of many generations of ancient Israel, and, while asserting for them certain distinctive excellences of their own, throws them entirely into the chain of human development, and abandons them, no less than the hymns of the Vedas, the books of Homer, or the narrations of Herodotus, to the analysis of the critic. We think it wisest in what follows to adhere as closely as may be to the very words of Scripture, nor shall we only select from them what, measured by a modern standard, may seem more or less adequate to the demands of reason. The narrowness of our space will excuse the brevity of the sketch.

The Hebrews, inhabitants of Palestine, did not assert the natural claim of being aboriginal. They were the bearers of the monothestic idea. In the light of that idea their history began with the Creation, their destiny was to embrace the world. They were not to seek others; their duty was to remain true to themselves. In good time all nations would gather to their "holy mountain." Their roots reached backward into antediluvian soil; they had no need of coveting the doubtful honor of having sprung from the soil of Canaan. Abraham came from Ur, in Chaldaea, with his wife and nephew. On reaching Palestine he traversed the country in every direction, and, what is worthy of note, erected altars on those spots which in later times became the principal seats of cults not always pure or regarded with favor by the prophets. (See Hosea on Bethel.) A famine drove him to Egypt, where his beautiful wife, Sarah, was taken into the royal harem. This was a consequence of Abraham's previous agreement with her that she should pass as his sister, he fearing that the lust of Pharaoh might otherwise endanger his life, and trusting that Divine Providence would allow no evil to result. Indeed, he does not seem to have explained the true state of things even after the royal order had been executed. But his confidence was justified. Pharaoh was warned by the plague of his misdeeds, and dismissed the pious prophet with many gifts. Almost the very same traits occur in the narrative of Abraham's visit to Abimelech, king of Gerar, in Philistia, and again in the account of Isaac's sojourn at the same court: he likewise introduced Rebecca as his sister to the Philistine. Abraham on his return to Palestine separated from his nephew, allowing him to take the richer fields near Sodom for his share. In a war undertaken by the Sodomites against Chedorlaomer and his allies, Lot was captured, and boldly rescued by Abraham. In a vision, accompanied by fearful signs, God assured the patriarch that his descendants should possess the land in which he dwelt, and these visions and promises were frequently repeated, the whole country from the Nile to the Euphrates being assigned as their future possession. But as yet Abraham is unblest with offspring. His union with Hagar results in the birth of Ishmael. Before the child has seen the light the Egyptian woman is driven into the desert by Sarah. There an angel finds her by a well, foretells the future greatness of her son, and commands her to return to her mistress. The circumstances of Hagar's flight are related without reference to the first account, and with some divergence in the narrative, in Gen. xxi. To avenge the misdeeds of the Sodomites, God descended to earth. Three men appear to Abraham to acquaint him with the



approaching judgment, and at the same time with the fulfillment of his own darling wish. Sarah will bear him a child who shall be the inheritor of his fortune and his mission. The name Isaac is variously explained in Gen. xvii. 17, xviii. 12, and xxi. 6. After God has left Abraham, and the touching intercession of the prophet in behalf of the doomed city has proved vain, for there are not ten righteous men in its midst, the direful work proceeds. From the ruins of Sodom and Gomorrah, Lot and his two daughters are saved. To one interested in such inquiries it is instructive to compare the manner in which an event somewhat similar to the destruction of Sodom is treated by pagan writers. (See Ovid's *Metamorph.* x., "Baucis and Philemon.") We would also draw the attention of philologists to the curious coincidence between Gen. xix. 4-9 and Judg. xix. 22-25. In the one hundredth year of the patriarch Isaac is born. Being commanded to sacrifice his son, the father complies without a murmur, but before he can consummate the terrible deed a voice from Heaven checks his hand, and announces to him the reward of God for the steadfast trust which he has exhibited. On the occasion of Sarah's death he purchases a burying-place for his family, and thus secures the right of possession to the land. The exquisite story of Isaac's wooing through his father's faithful servant, the meeting of the gray-haired steward and the bright young girl at the well, his entertainment and departure, is one of the choicest bits of description which the history of the ancients has preserved to us. His favorite son being wedded to his kinswoman, and the danger of intermarriage with idolaters being warded off, Abraham "is gathered to his people," having reached the good old age of 175 years.

The life of the second patriarch is less eventful. After his departure from Gerar, to which we have already referred, Isaac concludes a treaty with Abimelech, on which occasion Beer-Sheba receives its name. (Compare Gen. xxvi. 31 with xxi. 31, 32, where the name seems to be referred now to the word *sheba*, to "swear," now to *sheba*, the numeral 7.) The birth of Jacob and Esau introduces a permanent element of discord into the family of their parents. Their strife begins even in their mother's womb, and, increased by differences of temper and occupation, continues a source of mutual vexation till late in life. Jacob, although a peaceful shepherd, seems to have given the first occasion of their quarrel. It is he who, taking undue advantage of the exhausted hunter, betrays him into bartering away his birthright. It is he who, at the instigation of Rebecca, imposes on his blind old father, and deprives Esau of the blessing which was intended for him. The fond reliance with which the decrepit patriarch leans on his strong elder son, the tender filial love which the rude, generous-hearted Esau returns, the pains he takes to procure his father's favorite delicacies, the eagerness with which he endeavors to make good his faults—above all, the deep pathos of the meeting between parent and son when they find that they have both been overreached by the "man of wiles"—enlists all our sympathy in behalf of Israel's disinherited brother. Jacob flees to Mesopotamia, finding his home no longer a safe place to dwell in, and remains for twenty years in the employ of his uncle Laban. He marries both his cousins, though the first fourteen years of his service were devoted to Rachel alone, and then continues for six years longer to undertake the care of Laban's herds. The manner in which he gains his great wealth during this period reminds us of his earlier dealings in his father's house (Gen. xxx.). In the mean time, his family having largely increased, and his relations with his father-in-law ceasing to be friendly, he determines secretly to depart. Being pursued by Laban, he concludes a covenant of peace with him, and both parties combine in erecting a stone mound as a memorial of their league. On his return to Palestine, Jacob wrestles in the night with a divine being at Peniel (compare Judg. viii. 8 and 1 Kings xii. 25), and there receives the surname by which his descendants prefer to be known. Fearing the wrath of Esau, he now prepares to conciliate his favor, and with every token of submission and humility approaches him. Esau, true to his nature, discards the proffered gifts, embraces and kisses the brother who has so bitterly wronged him, and forgetting the past dismisses him on his way with kind words and offers of protection. We cannot sufficiently admire the truthfulness with which Scripture has drawn the character of Esau, and the unsparing justice with which it exposes the vices of him who is cherished as the father of the chosen people. As Abraham makes the future capital of the prince of Judah his favorite abode, and acquires landed property at Hebron, so Israel chooses the future residence of the kings of Israel, raises an altar, and buys land at Shechem. On reaching Bethel, where he had previously seen the vision of the heavenly ladder on his flight to Haran, the promises then made are repeated, and the name Israel is a second time bestowed on him.

Removing thence, his beloved wife Rachel presents him with a son, Benjamin, and dies by the wayside. Jacob has now twelve sons, like Ishmael, and one daughter, Dinah. On account of an indignity offered to her, the two brothers Simeon and Levi take fearful vengeance on the people of Shechem, killing all the males, leading the women and children away captive, and plundering the town.

Joseph, the eldest son of Rachel, was the favorite of his father, who presented him with a tunic of many colors. This and the boy's ambitious dreams arouse the envy of his brothers, and they determine to slay him. Saved from death through the intercession of Reuben, he is sold as a slave to Egypt by the advice of Judah. There, entering the house of Potiphar (the same name occurs Gen. xli. 45, where he is called a priest of Heliopolis, and Joseph marries his daughter), and exciting the passion of his mistress, he saves his virtue at the expense of his liberty. After two years he is taken from prison, and his skill in interpreting the dreams of Pharaoh raises him to the dignity of viceroy of Egypt. His prophecy proves true. The seven years of plenty are devoured by seven of famine, and the wise precautionary measures of the Hebrew ruler alone save the land from overwhelming disaster. Among others who come up at this time from the surrounding districts to avail themselves of the rich granaries of Pharaoh are the sons of Jacob. They are confronted with Joseph, who at once recognizes his brothers, and exposes them to a long series of trials to test their honesty and mutual affection. He dismisses them, with the money they have paid him secretly restored to their sacks, detains Simeon, and commands that their youngest brother be brought before him; then on their return so contrives that Benjamin appears guilty of theft, and claims him for his bondsman. It is at this juncture that Judah, with words of eloquent tenderness, appeals to the seeming tyrant's heart, and offers himself to slavery in his brother's stead. Joseph reveals his true character, sends messages to his father which induce him, though already far advanced in years, to remove his family (about seventy souls) to the district of Goshen, which the bounty of the king has provided for him and his.

In reviewing the lives of Jacob and his sons we cannot but note how the fortunes and rival claims of their posterity are, as it were, visibly foreshadowed in the acts, and even the affections, of these fathers of the tribes. While the birth-right incontestably belongs to the son of Leah, the love of Israel goes out to Rachel, and her eldest born, Joseph, is called the "prince of his brothers," a character which he plainly assumes in his dreams (Gen. xxxvii.). We know that later on the tribes that sprang from Joseph did, indeed, assume the sovereignty of the kingdom of the north in opposition to Judah; and if it was the latter, the fourth of Leah's sons, who reigned in the person of David and his house, we find the prior claims of Reuben, Simeon, and Levi already disposed of in the days of their father. The rights of these three were forfeited by their passions. The first was guilty of incest with one of Jacob's concubines; the other two were bitterly denounced for their cruelty to the Shechemites (Gen. xlix.). The prophetic lips of the dying patriarch here curse the wrath of Levi, which proved so valuable in the time of Moses, and the dispersion of that tribe, which is elsewhere characterized as a divine prerogative, is here foretold as the punishment of their guilt. We may also call to mind that as in later times the tribe of Benjamin alone became permanently attached to Judah, so even in the history of their ancestors we find Judah at once the affectionate brother and the bold protector of Israel's youngest son in Joseph's presence.

After Jacob had passed away, and with the death of Joseph the guardian of their interests was removed, the sons of Israel, who had largely increased in the mean time, became the slaves of the Egyptians. Four hundred and thirty years they served their pitiless taskmasters (according to Ex. xii. 40; Gen. xv. 13 gives the somewhat lower estimate of 400 years, while from Ex. vi. 16 it would appear that only three generations, Levi, Kohath, and Amram, the father of Moses, had passed between the first settlement of the Israelites in Goshen and their final deliverance). At length the period of their bondage drew to a close. After Egypt had been visited with nine plagues without the rigor of the king and people being softened—for God had hardened the heart of Pharaoh, that his great miracles might be displayed in the sight of the Egyptians (Ex. vii. 3)—the work of emancipation was consummated. The children of Israel prepared the Passover sacrifice, and in the night, while all the first-born of the land perished, they marched forth laden with silver and gold, and under Moses' guidance turned in the direction of the Red Sea. Pharaoh followed, but was overwhelmed with all his host in the floods that had opened to let Israel pass. Instead of taking the shortest road to Palestine, by way of Philistia, Moses now led the people about in the desert for

about forty years. Concerning the first two years of this period our accounts are tolerably complete. The people were weak in faith, and on every occasion when their obedience was tried, failed utterly to meet the emergency. They cried for water. Moses miraculously procured it for them; they demanded bread—the heavens rained it down upon them. The scriptural etymology of the word *manna* is peculiar. The description of its appearance and taste remind us of the virtues of the white and pearly *haoma* of the Persians. Moses had ample reason to say that the load was too heavy for him to bear. The crowning event of the Exodus was the revelation of the Law on Sinai. There Jehovah had appeared in a flaming bush to the fugitive shepherd while tending the flocks of the Midianite priest, and now again, amid the sublime phenomena of the thunderstorm, the "majesty of God" descended in fire (Ex. xix. 18) to the pinnacle of the smoke-enveloped cliff. Concerning the attending circumstances of the revelation, the scriptural account seems open to various constructions. From Ex. xxiv. 2 it would appear that Moses alone was to approach the Divine Presence; in xix. 24, Aaron is commanded to accompany his brother; while in xxiv. 13 the person of Joshua is substituted for that of the high priest. And again, while in Ex. xxxiii. 20 we learn "thou canst not behold my countenance and live," we are informed in xxiv. 9, 10, 11, "and Moses, Aaron, Nadab, and Abihu ascended, and they saw the God of Israel, and beneath his feet; . . . and they saw God, and they ate and drank." In like manner, Ex. xxiv. 3, 7, would lead us to suppose that Moses himself wrote down the words of revelation in "a book of the covenant," while in xxxi. 18 two tables of stone are spoken of, "inscribed by the finger of God." Let us add that in Ex. xx. the fourth commandment of the Decalogue is referred for its origin to the repose which the Maker of heaven and earth instituted on the sabbath of the Creation, while Deut. v. 15 regards it as a memorial of Israel's redemption from the servitude of Egypt. The new covenant into which they had entered with Jehovah was quickly broken by the people. In Moses's absence they worshipped a golden calf, and Aaron himself was rebuked by the indignant prophet for the readiness with which he had yielded to the popular clamor. Directions were now given for the construction of a tabernacle in which the priests and Moses were henceforth to receive the communings of God. The details of the erection of the sacred tent are twice enumerated at considerable length toward the end of the second book of Moses. There are certain differences in the arrangement of material and the choice of language in the two accounts. (For a learned discussion of the whole subject the curious reader is referred to the excellent treatise of Dr. Popper, *Popper's Stiftshütte*, Leipsic, 1862.) The sacrifices and feasts, the various rites and ceremonies connected with the new sanctuary and its priesthood, are rehearsed in the book of Leviticus. We may claim the reader's indulgence if we forbear to discuss them. With the elevation of Aaron's family to the ministry of the tabernacle the contentious spirit of the people found new cause for discontent. A conspiracy was formed, with Korah, a cousin of Moses, at its head, for the purpose of resisting the divine command that had preferred the Aaronites to the priesthood. But their ambitious designs were thwarted. The earth opened and swallowed up the whole band of conspirators, Korah and his friends, their wives and children, and all that belonged to them (Num. xvi. 27, 32). With regard to the distinguished honors which the descendants of Korah bore in the service of the temple at Jerusalem, see Num. xxvi. 11: "the sons of Korah did not perish."

Having approached the confines of Palestine, Moses sends out twelve spies to the Promised Land to report upon the condition of the country and the strength of its defences. The news they bring so alarms the fears of the people that they desire to be led back to Egypt, and are in consequence declared unworthy of the prize they had scorned, and are doomed to perish in the wilderness. The events of the succeeding thirty-eight years of their wanderings are wrapped in obscurity. We may marvel how so vast a concourse of human beings—600,000 fighting men alone, besides the women and children—could support life for so long a period in the barren desert; we may invent plausible theories concerning the manner in which they spent the dreary days of that joyless interval; but Scripture gives us no clue to aid our aspiring fancy. When at last a new generation had grown up, the Israelites once more direct their march towards the Jordan. With Moses as their leader, and under the protection of their God, they defeat the armies of Sihon and Og, subjugate some of the most fertile pasture-lands E. of the river, and spread far and wide the terror of their name. The king of Moab (the etymology of the name is curious: his own means "lightning," that of his father, "bird"), alarmed by the advance of so formidable a foe, calls in a sorcerer from the East to

blight the fortunes of Israel. (Those who are fond of drawing parallels may compare the incident of Balaam and the ass with the account of the ass who startled Dionysos when he fought with the Titans, of the ass who foretold his imperial honors to Augustus, also of the ass in the story of Priapus, to whom St. Jerome has likened the Balaam of our text.) In the plains of Moab the assembled people receive the parting monitions of Moses. The penalties of disobedience are painted in colors so vivid as to seem the very reflex of present vision, and the rewards of a glorious future are promised if they will be true to the law of which they are the bearers. That law is familiarly known, and the "Book of books" in which it is contained is easily accessible to all. Its provisions are mainly laid down in Exodus, Leviticus, and Deuteronomy, and all of these three must be carefully consulted in order to arrive at correct conclusions concerning the intentions of the lawgiver. This is not always so easy a task as might be wished, as serious difficulties are apt to complicate a harmonious interpretation. Lev. xviii. 16—Deut. xxv. 5 may be mentioned as an instance in point. (The difference in legislation which is here cited has been ingeniously referred by Dr. Geiger to the discrepant needs and interests of the kingdoms of Judah and Israel. The writings of this distinguished scholar are stored with erudition and masterly research on this and kindred subjects. His *Urschrift*, in particular, should be in the hands of every historian who treats of the rise and development of the monotheistic idea.) In passing, we cannot refrain from expressing a just surprise that the law of Moses should have been charged with neglecting the sanctification of the spirit, and placing the religious life of man on a merely legal basis—a law which proclaimed the childhood of man and the fatherhood of God; a law which took for its principle the sanctification of all the people; which devised such tender measures to ensure respect for the feelings of the poor; which commanded the creditor to return the pledge of the debtor before nightfall; which prevented the seducer, in an age when the marriage tie was but loosely knit, from divorcing the victim of his passion! As Moses was not to enjoy the fruition of his work, the beginning of the conquest of the Promised Land set a period to his life. From afar off he was permitted to view the future home of the tribes. Then he died. The circumstances of his life, indeed, are calculated to awaken an interest even in the minds of the sceptical. Cradled amid the waters, a shepherd serving a foreign master, a man of miracles, whose staff changes into a serpent, divides the sea, cleaves the rock, and calls forth the living water—the favored of Heaven, from whose countenance beams of light are shot forth that dazzle the beholder, the bright-eyed prophetic hero who sinks to rest among the mountain-peaks, his history awakens many reminiscences in the minds of those conversant with the early lore of ancient nations.

The work which Moses had left unfinished was taken up by his successor, Joshua. He led the people across the Jordan, and erected a monument of twelve stones in commemoration of their safe passage. (For the locality which was thus distinguished we may choose between Josh. iv. 9, "in the midst of the Jordan," and iv. 20, "at Gilgal.") The narrative of the first victories of the new leader is interspersed with the most marvellous events—the falling of the walls of Jericho, the phenomena at Ajalon, the affair of Achan. In some points we notice a marked resemblance between the incidents of Joshua's life and that of his predecessor and teacher. (Compare, e. g., Ex. iii. 5 and Josh. v. 15.) Before his death, Joshua distributed the conquered and unconquered territory among the tribes, and exhorted the people to choose between Jehovah and the idols. They willingly declared their readiness to follow the pious example of their chief. In the succeeding period, however, we are surprised to find no trace of the fulfilment of so fair a promise. Disorder and distrust prevail. Mutual jealousies excite fierce conflicts among related clans; almost the whole tribe of Benjamin is extirpated; Abimelech kills seventy princes on one stone; lust and treachery run riot. The general darkness is at times illumined by the patriotism of heroic women and herculean men, but the light it spreads is fitful and uncertain. What most distresses us in the account we have of this evil time is the conduct of those whom we are taught to revere as the chosen messengers of Jehovah. Gideon after his victory proceeds to make a golden idol, which he worships (Judg. viii. 27); Jephthah sacrifices his own daughter (Judg. x. 5); Samson marries a heathen woman (xiv. 1); while a Levite, contrary to both the letter and spirit of the Law, consents to become the priest of an individual and to superintend the worship of images (Judg. xvii. and xviii.). To the question, What had become of the remembrance of Moses and his law in the mean time? we look in vain for a satisfactory answer.

The last of the judges marks an important epoch in Is-



rael's history. Samuel was born of pious parents, and early dedicated to the service of God. (The etymology of the name, given in 1 Sam. i., seems to belong rather to Saul.) Eli and his sons were at that time in charge of the sanctuary at Shiloh. The weakness of the one, the wickedness of the others, brought destruction upon themselves, defeat upon the people. The Israelitish army was routed by the Philistines, and the ark of the covenant became the spoil of the victors. It proved a dangerous possession, and after having brought plague and pestilence in its train wherever it was transported it was finally returned, along with certain strange offerings, to appease "the God of Israel." Samuel now became the acknowledged leader of the people, and during all his lifetime is said to have overawed the Philistines and secured the peace of the land (1 Sam. vii.). The books of Samuel, however, continue to recount renewed conflicts between Israel and Philistia. The sons of Samuel were unworthy to succeed their father, and the people clamored for a king. The political tendencies of monotheism were republican. Samuel resisted their persistent demands to the utmost, but at last gave way, and anointed Saul of Benjamin. (According to 1 Sam. viii., ix., x., it would appear that the elevation of Saul was due to the general desire of the people for a stronger government. Chapters xi. and xii., however, speak of it as occasioned by the attack of the Ammonites, on which occasion Saul, as yet a simple farmer's lad, is suddenly seized by the Divine Spirit, and succeeds in effecting the rescue of Jabesh-Gilead.) The connection between Saul and the prophets gives rise to a popular saying, which is variously explained in 1 Sam. x. 11 and 1 Sam. xix. 21. Saul's hope of founding a dynasty of kings was not to be fulfilled. He was rejected of God (1 Sam. xiii. 13) because he had anticipated the coming of Samuel in an hour of great need, and himself brought the sacrifice before battle; or (1 Sam. xv. 26) because he had failed wholly to extirpate the hated race of Amalek. A new king was now to be chosen. Samuel selected a shepherd-boy, David, the son of Jishai. The manner of the future ruler's introduction to Saul is related in 1 Sam. xvi. 23 and xvii. 57. It is the fame of his skill on the harp which brings him to court, in the former narrative, to soothe the gloomy spirit of the king; in the latter, the attention of Saul is first directed to the young hero after he has slain the Philistine giant (in 2 Sam. xxi. 19, Elchanan is mentioned as the vanquisher of Goliath). The suspicions of Saul were soon aroused against David, but the prowess of the latter repeatedly defeated the schemes that were laid for his destruction. Saul was even compelled to give him his daughter in marriage and to witness the close alliance subsisting between his son and his hated rival. David was at last compelled to flee the court, and thenceforth led the roving life of a fugitive. The jealousy of the king followed him wherever he went, and the repeated proofs which he gave of his respect for the person of "the Lord's anointed" served only to secure an occasional interval of repose. A lasting reconciliation was not brought about. The records of that dismal age are frequently stained with deeds of bloodshed. Eighty-five of the priests of Nob are butchered by command of Saul, and the city itself utterly destroyed. David, to save his life, plays the fool at the court of Achish (1 Sam. xxi.), enters into relations of close intimacy with Ammonites and Moabites—he was himself the descendant of Ruth, a Moabitish woman—and serves in the army of the Philistines (1 Sam. xxix. 2). In the mean time the incursions of the Philistine forces continue to endanger the political existence of Israel. Saul is reduced to utter despair. The weird scene in the house of the Witch of Endor, described in ch. xxviii., where the spirit of him who is "shrouded in a mantle" (comp. xxviii. 14 with ii. 19) rises out of the earth to announce impending doom to the weary king, is a fitting prelude to the tragic close. In a great battle the hosts of Israel are routed by the Philistines, Saul falls on his sword, and his sons perish with him. David was now recognized as king, at first by his own tribe, then, after Ish-bosheth's death, by the whole people. He delivered seven sons of Saul into the hands of the Gibeonites that they might kill them, while he supported the son of his friend Jonathan, a poor cripple who was content to live on the king's bounty. The peace of his house, however, was continually disturbed by the misconduct of his own children. The incestuous passion of the one, the boundless ambition of the other, distressed the father's heart. He was forced to flee, an exile, from Jerusalem, the city which he had himself conquered and made the capital of the country. And his victory over the insurgent chief was but a new source of grief, involving as it did the destruction of his beautiful if unworthy son. His victorious arms had, indeed, extended the boundaries of the land and secured its safety. But domestic discord and the rankling consciousness of his own deep guilt clouded the happiness of David's declining years.

After a reign of forty years he died. Solomon, the son of Bathsheba, whose husband had been treacherously slain by David, succeeded to the throne. He executed the design which his father had formed, but had not been permitted to accomplish. With the aid of his ally, the Phœnician king, he reared the splendid temple on Mount Moriah, and dedicated it with imposing ceremonies to the service of the God of Israel and of the stranger. Renowned from childhood for extraordinary wisdom, he illustrated his reign with the magnificence of regal display rather than the glory of victorious arms. Trade flourished, his ships returned laden with the treasures of the distant East, and Jerusalem was adorned with palaces. But the people were burdened with taxes, the royal harem was enlarged beyond all precedent, and the heart of the uxorious king was won for foreign gods by the foreign princesses whom he had espoused. Hardly had Solomon breathed his last when the people rose in open revolt. His son, Rehoboam, unwisely provoked the resentment which justice and policy called upon him to allay. Ten tribes under the leadership of Jeroboam seceded from his dominion; Joseph and Judah were thenceforth separated. Jerusalem remained the capital of Judah; Shechem, Tirzah, Samaria became in turn the residence of the kings of Israel. To prevent a return of the people to their old allegiance Jeroboam established new seats of worship, introduced innovations in the celebration of the festivals, and created a new priesthood. His rule was the inauspicious beginning of a long series of disastrous reigns. His son Nadab was slain while besieging Gibthon of the Philistines. Baasha, a successful conspirator, ascended the throne, and ruled twenty-four years. Then followed his son Elah, who was murdered by Zimri. This seven-day king kindled the royal palace above his head when he learned that the army around Gibthon (comp. 1 Kings xv. 27 with xvi. 15) had raised their captain, Omri, to the throne, and were already entering the gates of Tirzah. An unholy distinction belongs to the reign of Ahab, Omri's son. Having wedded the Phœnician princess Jezebel, he introduced the lascivious worship of Baal (the cult of the phallus) into Israel. The bonds of law were loosened, the service of the Deity was degraded to sensual orgies, and the example of the court corrupted the manners of the people. The better and purer spirits reacted against the inroads of a foreign worship which outraged alike their feelings of piety and of patriotism. A more profound conception of the Divine Being was gradually evolved, and the inward and outward struggles of infant prophecy may still be traced in the lives of Elijah and Elisha as they are transcribed in the chronicles of the Kings. The victory of Ahab over the Syrian Benhadad was sullied by the untimely clemency which he extended to his vanquished foe. Soon after, in a war undertaken with Jehoshaphat, king of Judah, for the purpose of wresting Ramoth-Gilead from the power of Aram, Ahab lost his life, and, as Elijah had prophesied, his blood was licked by dogs in the vineyard of Naboth, the same whom he had treacherously murdered. The house of Ahab was utterly rooted out by command of Jehu, whom Elisha had anointed king over Israel. The 70 sons of the Baal worshipper were slain, and his wife, Jezebel, audacious to the last, was cast from the window of her palace by her attendants. The successors of Jehu continued in the evil courses of their predecessors. Jehoash captured Jerusalem and destroyed part of its wall. Jeroboam II. extended the boundaries of his kingdom, but the lustre of his successors was but the last glow of an expiring flame. A new and warlike dynasty possessed the throne of Assyria. Menahem bought a transient peace by the payment of a heavy tribute to the Assyrian king Phul. In the reign of Pekah, however, the whole land of Naphthali was overrun by Tiglath-pileser, and its inhabitants carried away into captivity. It was in vain that the king of Israel united his forces with those of his old enemy, the king of Syria, for mutual protection against the common danger that approached from beyond the Euphrates. The final blow could no longer be averted. Too late his successor, Hosea, implored the aid of the Egyptian Pharaoh. The army of Salmanasar attacked Samaria. A fruitless siege of three years ended in the capture of the capital and the complete downfall of the kingdom of Israel (b. c. 721). The ten tribes were settled in distant districts of the Assyrian empire, and soon lost among its inhabitants. The once mighty people of the N. of Palestine left a lasting monument of its greatness in the inspired writings of its noble prophets, but of the subsequent fortunes of the scattered tribes nothing became known, save to the idle dreamers of a later age.

For more than a century after her sister kingdom had been swept away Judah continued to brave the storms that threatened her own existence. In the reign of Rehoboam, Shishak, king of Egypt, plundered the temple and palace of Jerusalem. (The biblical account is corroborated by



the testimony of the Egyptian monuments.) His successors (comp. 1 Kings xv. 2 and 10) proved little better than the neighboring rulers of Israel. Even the more God fearing among them would not or could not abolish the idolatrous custom of sacrificing on high places. Jehoshaphat and Ahaziah formed an alliance with the house of Ahab, for which the latter paid dearly with his life. Athaliah, a daughter of Omri, then usurped the sovereign power, and commanded a promiscuous slaughter of the royal family to secure her throne. Joash, a suckling infant, alone escaped. In the seventh year of her reign Athaliah fell before a conspiracy of the priests and captains, with Jehonada at its head, and Joash was proclaimed king. He was succeeded by his son Amaziah, who defeated Edom, but was himself severely chastised by the king of Israel. Azariah, the son of Amaziah, was afflicted with leprosy, and was forced to leave the care of the state in the hands of his son Jotham. Jotham, in turn, was followed by Ahaz. This king was attacked by the combined armies of Israel and Syria. To save his power he was compelled to call in the doubtful aid of the Assyrian Tiglath-pileser, and purchased his security at the expense of his independence. His son, Hezekiah, is celebrated in history as a prince of distinguished piety, whose virtues arrested for a time the downward course of Judah's fortunes. His court was adorned by the presence of the most magnificent of the prophets, and the king had the rare fortune of listening to the counsels of Isaiah, and the rare merit of deferring to his monitions. The armies of Assyria, which had extinguished the national existence of Israel, passed harmlessly by Jerusalem. The vast host of Sennacherib was struck with a sudden blight; an angel of Jehovah passed through the camp, and in the morning 185,000 corpses covered the field. After the death of Hezekiah, Manasseh and Amon brought back the evil practices of former days. Then came Josiah, celebrated as the restorer of the law. In his day Hilkiah, the high priest, found a scroll in the temple which he sent to the king (this scroll is by many critics supposed to have been the book of Deuteronomy). Josiah, terrified by the announcement of approaching doom contained in it, projected a complete reform in the religious life of the people. He ordered the temple to be purged of its idols, the Passover to be celebrated, and concluded anew the broken covenant with God. When Pharaoh-necho advanced against Assyria, Josiah, true to his allegiance, marched out against him, but was slain at Megiddo. In the reign of his son Joiakim, whom Pharaoh had appointed king in place of Joash, a change took place in the complexion of the political world. Great Nineveh fell. Upon her ruins rose the empire of the Chaldeans, and as Egypt's strength was paralyzed, the armies of Babylon asserted her undisputed sway over the surrounding nations and cities. Before this new power the kingdom of Judah at last succumbed. Joiakin, a youth of eighteen years, who succeeded his father, was hardly fitted to guide the helm of state at so critical a period. Nebuchadnezzar came upon Jerusalem. The king was carried captive to Babylon, and Zedekiah appointed in his stead. Zedekiah rebelled. For two years Jerusalem withstood the siege of the Babylonians. At last, driven by famine, the besieged endeavored to cut through the lines of the besiegers. Zedekiah was overtaken, brought before Nebuchadnezzar, his children slain before his eyes, and, blinded, he was carried in chains to the capital of the conqueror. Jerusalem was in ashes, its temple a smouldering ruin, and "the paths of Zion were in mourning." The prophecies of Jeremiah had foretold the calamity which he was powerless to avert: his lamentations sing the dirge of Judah's fallen greatness. A remnant of the people was left in Palestine under Gedaliah as governor. Assassination put an end to his brief reign, and the others, fearing the vengeance of the Chaldeans, fled to Egypt, with Jeremiah as their unwilling companion. The great majority of the people, however, had been led into exile, to recall "by Babel's streams" the sad memories of their native land. (It is worthy of remark that the mother's name of the ruling prince is invariably mentioned in the annals of the Judean kings, while it is omitted in those of Israel. The high power of the king's mother is also attested by the sovereignty which Athaliah exercised during seven years, and by 2 Kings xxiv. 12, where the mother of Joiakin is mentioned as the most considerable personage of his court.)

Babylonia proved for the Jews the crucible from which they came forth for the first time wholly aglow with the spirit of monotheism. In the year 538, Cyrus, having overturned the empire of the Chaldeans, permitted them to return to their country. About 50,000, with Jeshua, the high priest, and Zerubbabel, of the seed of David, at their head, availed themselves of this permission. Spurred on by the eloquent monitions of such prophets as Haggai and Zechariah, they proceeded to re-erect the fallen temple,

though frequently interrupted in their work by the enmity or jealousy of the surrounding nations. Prominent among these were the Samaritans, with Sanballat their chief. These people had been transplanted by the Assyrian monarch to occupy the vacant seats of the ten tribes, and had adopted the religion of Israel. But being still tainted with idolatry, they were not admitted to the share they claimed in the new sanctuary of Jehovah. Their calumnies at the Persian court for a time caused the complete suspension of the work. In the year 515 the building of the second temple was finished. The religious basis of the infant state was fixed by the scribe Ezra, "the second Moses," who, coming from the court of Artaxerxes armed with great powers, used them to secure the general observance of the Law and to purge the people of the heathen elements which had crept into their midst. His measures do not appear to have been quite as effective as they were stern. Nehemiah, the cupbearer of Artaxerxes, followed in his footsteps, forbade the desecration of the sabbath, rebuked the wealthy for their greed and their oppression of the poor, and strengthened the defences of Jerusalem by the erection of a wall. The succeeding period until after the death of Alexander the Great is wrapped in obscurity. Judaea, remaining tributary to the Persian ruler, had no history, and may therefore be supposed to have been happy. After the death of the Macedonian conqueror, Ptolemy Lagi captured Jerusalem, and for almost a century Palestine was held in subjection by the Ptolemies, whose yoke was not, at first, a heavy one. Many of the Jews had settled in Alexandria, where their industry, enterprise, and wide connections soon raised them to the position of merchant princes. A rich, manifold, and widely influential literature arose in the midst of this Egyptian colony, and under the fostering care of scholarly kings a new philosophy was cultivated, destined thereafter in Christian garb to spread over the world. The Septuagint (the Greek translation of the Old Testament) was composed, and a temple, built after the pattern of the one on Moriah, at Heliopolis, became at once a source of pride and distrust to the patriots of Jerusalem. With the decline of Egypt's power and the growing strength of the Seleucidae, a new danger threatened the existence of the Jewish state and religion. In the beginning of the second century B. C. Judaea had transferred its allegiance to Syria. In return, Antiochus Epiphanes barely three decades after commanded them to abjure their religion, defiled their sanctuary, and erected the statue of the Olympian Jove, to which they were ordered to pay divine honors. This outrage provoked a disastrous "thirty years' war." Antiochus was aided by the party of the Hellenists, friends of the Greeks, at whose head stood the infamous priests Jason and Menelaus. The cause of the people was espoused by the family of the Hasmoneans, or Maccabees, so called from its most valiant member, Judah the Hammer (Maccab). The Maccabean brothers were the main stay of the revolution. Equally great in defeat and success, they achieved victories over Syrian armies that were superior to their own in numbers, equipments, prestige, in everything but devotion to their cause, while they never allowed their courage to sink under the most crushing adversity. Their heroic deeds are related in the works of Josephus and the books of the Maccabees. (For an ingenious argument to prove the Sadducean origin of the first book, the Pharisean of the second, see Geiger's *Uebersicht*, p. 200.) The Talmud, strange to say, almost ignores them. Judas Maccabee succeeded in cleansing the temple. He died a soldier's death in a decisive battle fought with the Syrian general Bacchides. Jonathan, his brother, profiting by the disorders that had broken out in the enemy's country, secured his recognition as high priest and ethnarch by the possessors of or pretenders to the throne of Syria, but was finally ensnared by the wily Tryphon, and treacherously slain. The command now devolved upon Simon, to whose prudent counsels the father of the Maccabees had on his deathbed referred the brothers for their guidance. He ended the long war successfully in the year 143 B. C., established the independence of Judaea, and was invested by a grateful people with the chief magistracy. It is probable that in his day the Sanhedrin, the highest tribunal of the state, composed of eminent doctors of the law, first entered upon its duties, though a more ancient origin is ascribed to it by some. Simon was assassinated by his son-in-law Ptolemy, who betrayed at once the sacred trust of hospitality and the confidence of paternal affection. His son, John Hyrcanus, succeeded him. This prince subjugated the Idumeans, and forced them to accept the religion of Moses—a fatal step for his people and his dynasty. During a reign of thirty years (135-105), which was signalized by many warlike achievements, he incurred the hatred of the popular party of the Pharisees by his ill-concealed preference for their Sadducean opponents. His son, Aristobolus, who followed him, added the kingly purple to the high



priest's robe. The brother of Aristobulus, Alexander Jannæus, is remarkable for the rapid succession of his military exploits and the general bad fortune which attended them. On one occasion he was only saved from utter destruction by the intervention of Cleopatra and the Jewish generals that commanded her army. In his lifetime he bitterly persecuted the Pharisees, but on his deathbed he advised his wife, Salome Alexandra, to make her peace with a party whose hostility might ensure her destruction. The bloody feud which began to rage after the death of Jannæus between his sons, Hyrcanus and Aristobulus, was the fatal beginning of a long struggle that ended in the final dismemberment of the Jewish state. The friendship of the Romans had proved valuable in the war of independence. The Roman *casus* was now called in, like the fox in the fable, to judge between the hostile brothers. Scæurus at first decided in favor of Aristobulus, but (63 B.C.) Pompey reversed his decision. The temple was stormed, Hyrcanus reinstated, and Aristobulus with his sons carried captive to Rome. The independence of Palestine was thus forever lost. A native prince was, indeed, still permitted to assume the vain shadow of authority, but the policy or caprice of the Romans thenceforth appointed or dismissed the rulers of the Holy Land. The counsels of the feeble Hyrcanus were directed by Antipater, a statesman of unusual sagacity, an Idumean by birth. While we cannot but abhor their treachery, we are compelled to admire the subtle craft by which this Antipater and his son Herod contrived to secure the favor of all the great captains who at that time successively swayed the destinies of the Roman world. When the star of Pompey was about to decline, Antipater earned the gratitude of Cæsar by the powerful support which he lent him in the conquest of Egypt. Herod, ruling in Galilee, strengthened the hands of Cassius by the prompt despatch of supplies collected in his district. He enlisted the sympathies of Mark Antony so completely in his behalf that his cause was introduced into the Roman senate by both Antony and his colleague Augustus. Through their efforts the usurper was proclaimed king. Meantime, Antigonus, the son of that Aristobulus whom Pompey had sent to Rome, obtained the aid of the Parthians in an attempt to regain his throne. Jerusalem was taken, Hyrcanus sent captive to Babylon, and Herod forced to flee to Idumea. With the help of his Roman friends, however, he succeeded in turning the fortunes of the war. After a most sanguinary conflict the capital was taken (B.C. 37), and Antigonus, at his instigation, shamefully executed. King Herod "did his days in stone." He rebuilt the temple on a scale of great magnificence, erected spacious amphitheatres, and introduced the games of the arena. But this outward splendor could not conceal the real misery of his disastrous reign. The tyrant's fierce passions were quickly roused, and he possessed the fatal power of fulfilling his desires. Among those whom he slew may be named—Hyrcanus, to whom his family owed its elevation; the grandchild of the former, his own beautiful wife Mariamne; her brother, the young high priest Aristobulus; two husbands of his sister Salome; three of his own sons, and others too numerous to mention. After his death the kingdom was divided among his sons, Archelaus, Antipas, and Philippos. By the favor of the emperor Claudius his grandson, Herod Agrippa, once more for a brief time united the divided principalities under one sceptre. But in the days of Agrippa II., in whose reign the destruction of the state was accomplished, the power of the last Jewish dynasty had lost all substance. The extortions of such Roman governors as Antonius Felix and Gessius Florus urged the people to the very verge of despair. A republican party long since subsisted among them, as appears from Josephus (*Antiq.*, xiv. 3), and the Zealots under the leadership of Judah of Gaulonitis were impatient of the Roman yoke. Encouraged by the destruction of the army of Cestius Gallus (A.D. 66), the patriots at last dared to raise their head. The gauntlet was thrown down to Rome, the revolution began, and Josephus, the future historian of the war, was sent to organize the defence of Galilee. The disciplined legions, advancing under Vespasian, the ablest general of the age, were met by rude bands of guerillas, and the arts of war baffled by the obstacles of nature and the frantic courage of despair. The strong fortress of Jotapata successfully resisted every effort of the besiegers, until, covered by the mist of early morning and led on by a traitor, the Romans succeeded in surprising the guards, and the place fell into their hands. Josephus, who commanded in person, was taken prisoner; 40,000 men are said to have fallen in the siege. On Vespasian's departure the completion of the war was entrusted to his son, Titus. In the spring of A.D. 70, Titus opened his works against Jerusalem. The city was torn by dissensions. Famine soon made its appearance, the houses were filled with the dead and the dying, mothers are said

to have devoured their own children in the frenzy of hunger. After two weeks the outworks were taken. Upon this the attack was directed against the strong castle Antonia, which was connected by cloisters with the temple. Notwithstanding the repeated sallies of the besieged under their heroic chief, John of Giscala, the castle was captured. Then began, under the eye of the Cæsar, the last desperate struggle of the defenders for the palladium of the state, the sanctuary itself. Again and again the imperial soldiers were beaten off and dashed from the walls. At last a Roman soldier, rising on the shoulder of his fellow, threw a firebrand through an open casement into the outer halls of the temple. The woodwork caught, the temple stood in flames. The infuriated troops rushed into the holy places, murdering and pillaging, and the arm of Titus himself was powerless to stay the carnage or save the great edifice. Many of those whom the sword spared were carried to distant countries as slaves or saved for the sports of the arena. Jerusalem was an utter ruin; the Jewish state had fallen to rise no more.

With the loss of its political existence the integrity of Judaism as a religion remained unimpaired. The foundations for a new order of things had already been laid. Prayer took the place of sacrifice, the synagogues replaced the temple, and the Beth-Din, noiselessly founded by Rabbi Jochanan ben Sakcai in Jannia, became a centre of authority to reunite the scattered people. The Beth-Din was presided over by a *nasi* (prince), a descendant of Hillel, the great master of the law, and two other officers (*ab-beth-din* and *chacham*). It was composed in the first place of seventy academic members; secondly, of such as had been ordained to act as teachers; and of their disciples, in the third place. The sittings were open to the public. The questions discussed in this and the similar academies at Scpphoris, Tiberias, and elsewhere affected the entire religious, political, and social life of the Jews. Through the agency of such schools the work of extending and modifying the provisions of the law and of ancient tradition (*Cabbala*) to suit the altered circumstances of the time was successfully carried on. The political position of the Jewish citizens of the Roman empire (they had been admitted to the rights of citizenship by the emperor Claudius) varied with the character of the reigning sovereign. Vespasian seized the tax which the Jews had hitherto remitted to the temple for his own treasury, and thereby set an example to his real or pretended successors down almost to our own day. Domitian displayed his animosity chiefly by the severe treatment of proselytes. The mild rule of Nerva was succeeded by a period of wild disorder in the reign of Trajan. The Jews of Egypt, Cyrene, and the isle of Cyprus rose in open revolt. The barbarous conflicts that ensued have left few traces in history save in the increased legacy of mutual hate between the parties engaged in them, which they transmitted to succeeding generations. At this time the great *Proseuche* of Alexandria was destroyed. The last powerful insurrection of Judæa followed in the days of Hadrian, and was quelled by Julius Severus. Their Messianic prince, Bar-Cochba, led the insurgents in more than fifty battles against the Romans; half a million of Jews are reported to have fallen in them. With the taking of Betar the war came to an end. Bar-Cochba himself is said to have been found among the dead enveloped in the folds of a serpent. Jerusalem now became a Roman town, under the name of *Ælia Capitolina*, in honor of *Ælius Hadrianus* and the Capitoline Jove; the Jews were forbidden to enter its precincts. They were, moreover, disturbed in the practice of their religious rites, and the vital point of their faith was attacked when the teaching of the Law was interdicted. The stubborn resistance of the people must have impeded the execution of these commands, and the more obnoxious of them were soon after abrogated by Antoninus Pius. The close of the second century is rendered memorable by the compilation of the Mishna (see TALMUD) under the auspices of the patriarch R. Jehuda, who is called *Hakkadosh* ("the saintly"). This work was intended to present in an authentic and codified form the decisions of the Beth-Din, which had accumulated during several centuries. Its bulky commentaries, the *Gemaras* of Babylon and Palestine, explain or amplify its provisions. The successful completion of so difficult a task bears witness to the high authority which the patriarch or *nasi* must have wielded in the academy, while the willingness of the people to accept the code which the doctors of the Law recommended evinces the respect in which these *chaberim* or *chachamim*, this "brotherhood of the Learned," were held. At the same time, the deposition of Gamaliel shows us the firm determination of the Beth-Din to resist all undue exercise of power on the part of its chief officer. The members of the college themselves never aspired to other prerogatives than those which superior wisdom and purity might justly claim. A privileged caste could not arise where merit

was the sole measure of worth. The Pharisaic doctrine that the priesthood belongs to all the people was rigorously maintained, and both in the synagogue and without it the democratic principle of the equality of all was religiously adhered to. This state of things was largely due to the happy example set by the rabbins themselves. Of some of the most distant epochs of their number we know that they followed some humble calling to earn their bread, thinking it shameful to coin their teachings into gold. A similar sentiment is echoed in the twelfth century by Moses Maimonides. In paying a passing tribute to the singular disinterestedness of the ancient rabbins, we would briefly advert to the legends with which the stories of their lives are intertwined. These legends are not, as has been supposed, mere fanciful embellishment or exaggeration of historical fact. In the account of Oni Ha Me'agel, the man of the wheel who was obliged to procure rain, of Simon b. Jochan, whose fiery glance spread desolation in the fields when he left the cave where he had dwelt concealed, of R. Jochanan (the fabled compiler of the Gemara of Palestine), whose arm emitted a wondrous rosy light, we recognize distinct mythological traits. These legends are contained in the Hagada, the historical and poetical part of the Talmud as distinguished from the Halacha, the discussions and disquisitions on points of religious theory and practice. A careful scrutiny of the legends of the Talmud and its supplementary works would, we doubt not, richly repay the labors of the student of comparative mythology.

In the reign of Diocletian the Jews seem to have been exempt from persecution. Their general condition in the Roman empire at this time was at least tolerable. Their peculiar customs, the dietary laws which prevented them from joining in the festivities of their neighbors, provoked the ridicule or the scorn of the pagans. But their legal status was not thereby affected. All this changed when Christianity in the person of Constantine ascended the throne. The harsh spirit which he infused into the legislation of the empire with regard to the theological opponents of the reigning faith was still further developed by his successor, Constantius, whose measures called forth an unsuccessful revolt in Judaea. The philosophic Julian (361) granted them the full blessings of his favor, but they failed to second his efforts for the restoration of the temple. Theodosius I. was just in his dealings with an oppressed people, in defiance of the vehement reproaches of Ambrosius, the bishop of Milan. In the reign of Theodosius II., Cyril of Alexandria, who has earned an unenviable fame for permitting the murder of the noble Hypatia, expelled the Jews from that city. The emperor himself deprived them of valuable rights, such as the rebuilding of synagogues, the exercise of judicial functions, and the like. The Jewish patriarchate, though its incumbent had but lately been numbered among the "Illustres," about this time (the beginning of the fifth century) expired. In the following century the code of Justinian excluded them from all honorable offices, imposing upon them the duties while depriving them of the privileges of the citizen. Meantime, the centre of authority in what concerned the internal affairs of the Jews had been gradually transferred from Palestine to Babylonia, and the latter ultimately assumed many of the peculiar prerogatives of the former. About the time of the compilation of the Mishna, Abba Areka (Rab) and Mar Samuel removed from the land of Israel, and founded schools of learning on the banks of the Euphrates and the Tigris. The most important of the schools that flourished in those regions were those of Nehardea, Susa, Pumbeditha, and Machza. In them the Gemara of Babylonia (compiled about 500) was elaborated. The political representative of the Babylonian Jews was known under the name of "prince of the Captivity" Rosh Ge'uthan. He was accustomed to live in great state. The office continued to be filled until the tenth century. When in the third century the religion of Zoroaster celebrated a great triumph in the accession of the house of Sassan to the throne of Persia, the position of the Jews remained, on the whole, unaltered. Persecutions were indeed more frequent than they had been, but the yoke of the Magi was light when compared with that of the priests in Christian countries. Shabur II. (343) transplanted a considerable number of the Armenian Jews to Ispahan. Jostazerd II. forbade the observance of the sabbath and the prohibition of the Shema, the proclamation of the unity of God, &c. &c. His son Firuz banished many of the Jewish inhabitants of Ispahan, and further extended the stringent measures of his father (414-81). About this time a colony of Jews is said to have landed on the coast of Malabar, a part of whom afterwards settled in Cochinchina. The rise of the sect of the Zendis involved the Persian Jews in the general disasters that then befel the realm. Hormasdas, test, discarding the example of the great Chosru, pursued the cruel policy of Feroz, and it was but natural that the Jews should take sides with his enemy,

the usurper Bahram, in the conflict that ensued between the rival aspirants to the throne. Under Chosru II. they joined the Persian troops which invaded Palestine, and avenged the injuries of their brethren by expelling the Romans from the land. While the power of the Sassanids visibly declined in the country which we have heretofore designated by the ancient name of Babylon, a new faith rose on the Arabian peninsula whose conquering arms were soon carried over a great part of the civilized world. From a very early time Jews had settled in Arabia, and had assumed the language and manners of its inhabitants, differing from them only in their religion. The Jewish prince Samoeil b. Adija is still celebrated as the greatest of all the poets that flourished before the coming of Mohammed; while the Jewish king, Jussuf b. Nowas, became a byword to the credulous superstition of a later age. Powerful Jewish tribes, settled in the neighborhood of Yathrib (Medina), prepared the minds of the Arabs to receive the doctrines of the Prophet, and to Jewish learning he owed the better part of his teachings. (Compare Goldziher's *prolegomena, Ueber die Mohammedanische Religion aus der Judentum*.) When Mohammed found the Jews as stubborn to resist his own pretensions as they were ready to aid him in expelling the sham of idolatry, the friendly spirit of his earlier policy toward them changed into bitter animosity. Yet he ever exempted the "scriptural people" from the edicts of persecution with which he pursued the worshippers of images, and the rule of toleration which the founder introduced became a law for his successors. The Persian empire succumbed before Omar, the second of the caliphs. To him are ascribed these well-known enactments which define the status of Jews and Christians in countries subject to Mohammedan rule. They may be compared to the canonical laws of the Christian Church, only that they have less of that spirit of intolerance which is characteristic of the latter. They were, moreover, less frequently and less stringently enforced. By them it is provided that Jews and Christians are not to build new houses of worship, nor repair their old ones; they are to prevent no one from conversion to Islam; they are not to sell wine nor wear their hair long; they are not to be considered eligible for office. A Moslem who maltreats an infidel is to pay a fine, &c. &c. The political head of the Jews was treated with sufficient respect by the first caliphs, and Bostani, the "prince of the Captivity," seems to have been the recipient of the highest royal favors. But a new power, that of the Gaons, gradually eclipsed the importance of these so-called princes. The Gaons were the presiding officers of the learned academies. They succeeded in drawing to their own persons the undivided attachment of the Jewish community, and continued during several centuries to extend their influence to the most distant congregations. The revival of letters that followed in the train of Arabian conquest was felt and hailed with eager joy among the Jews. The critical attention of scholars was turned to the text of the Bible. A simpler method of interpretation obtained. A new sect, the KARAITES, was formed under the leadership of Anan, called for their closer adherence to the letter of Scripture (Mikra) Karaites. Philosophy found an eloquent exponent in the Gaon Saadia (tenth century); and to Sherira Gaon (d. 1000 A. D.) we owe a document of the very highest historical value. When the caliphate of Bagdad succumbed before the advancing Mongols, the Jews shared the general fate of their countrymen. But the religious tolerance or indifference of the conquerors protected them from special acts of hostility. In the year 1138 a Jewish physician, having gained the particular favor of the khann Argim, was appointed minister of finance for the whole Persian empire. The fanaticism or jealousy of the nobility procured his assassination, and his death was the signal of persecution for his brethren. The condition of the Jews in Asia has remained with little variation down to the present day one of utter misery. In the N. of Africa, under the rule of the Fatimites, their position was on the whole hardly more favorable. Turning to Europe, we find, on entering the period of the Middle Ages, that the more or less friendly relations which until then subsisted between the Jews and their neighbors were gradually dissolved by the increased bitterness of religious hate. In France the attempted conversion by Gregory of Tours of King Chilperic's jeweller, the Jew Priscus, and his assassination by a rancor of his own race, were followed by acts of the high consideration which Israelites enjoyed, and by the growing chance for the worse that they might appear in their fortunes toward the end of the sixth century. In the beginning of the seventh, the Jews seemed almost commencing them to choose between baptism and death. In Spain, under the rule of Alphonse, Jews and Christians not amicably in social relations, and the bond of friendship between them was dissolved by frequent intermarriage. But when Roderic, a converted Catholic, in this peaceful state of things came to an end. He was a con-



vert, it is believed, from motives of policy, and, relying on the aid of the clergy, desired to invest the royal office with greater power than the constitution of the Visigoths was calculated to allow. The same motive may have impelled him to curry favor with the clergy by persecuting the Jews. (On this subject see the admirable article on Jewish history by Selig Cassel, in Ersch and Gruber's *Allgem. Encyklopädie*.) About 612, Sisebut banished the Jews from his kingdom. In the next reign, however, they were allowed to return. In 633 the Council of Toledo condemned the system of enforcing their conversion which had been lately inaugurated by the king. But its decrees were very stringent against those who returned to Judaism after they had been nominally received into the Church. An extraordinary severity toward men of this class continued to be a peculiar feature of Spanish legislation in later times. In 638 the Jews were again driven from the realm by King Chintila, and again admitted under his successor. In the reign of Receswinth and of Erwig new laws were enacted to ensure their humiliation. They were entirely deprived of the right of holding office, their testimony was no longer accepted in court, while those who had made the outward profession of Christianity were placed under the strict surveillance of the priesthood to secure their allegiance. The progressive advance of intolerance which marks the seventh century reached its climax when in 694 the Jews of Spain were deprived of the liberty of person and declared slaves. Such being the condition to which Spanish bigotry had reduced them, it is not surprising that Taric on his approach was hailed as a deliverer, and that the Jews became the friends and allies of the Arabs in their conquest of Spain. Under the benign light of the Crescent they entered upon the brightest period of their history since the destruction of Jerusalem. While Christian Europe was sunk in barbarism they joined the Moors in keeping alive the flame of science, and became the mediators between ancient and modern culture. Philosophy, poetry, mathematics, astronomy, medicine, received their attention, and their skill in the arts of diplomacy introduced them to the favor of kings. In the tenth century, Hasdai Ibn Shaprut became the trusted agent of Abderrahman III. at Cordova. He received the ambassadors of foreign monarchs. His knowledge of the Latin language, a rare accomplishment at the court of his master, proved peculiarly serviceable. It is reported that he even corresponded with the chief of the Chazares, an independent Jewish prince, whose country could only be reached by a fifteen days' journey from Constantinople. Jacob Ibn Gau was the recipient of high honors at the hands of the caliph about 985. (See Graetz, *Geschichte der Juden*, v. 398.) In the eleventh century Samuel (called Ha Nagid, "the prince") was raised to the dignity of vezir. His calligraphical skill paved the way to his greatness. But, far from being a mere writer, he was fully conversant with the literature of the age, and himself an author. The friend of the poet and philosopher Gebirol, he showed himself the liberal protector of art and science. His son Joseph succeeded him in his honors, but was murdered in a furious assault of the mob on his palace, which had been instigated by his enemies. Contemporary with Samuel ha Nagid at Granada, Ibn Hassan was raised to high office at the court of Saragossa, and again in Seville Ibn Albalia was appointed astrologer to the king. But the same kindly policy which guided the Arabs in their conduct toward the Jews was now adopted by the rulers of Christian Spain. In Castile they were placed on quite the same level with the nobility and the clergy. They were devoted to their country, and prepared to risk life and fortune in its defence. Alfonso VI. employed them as ambassadors to Moorish princes, and they served with equal distinction in his army and at his court. In 1085 he succeeded in taking Toledo, but soon after was himself totally routed by the Moslems under the leadership of the Almoravide Jussuf. The success of the latter seemed at first likely to bring ruin on the Jews of Moorish Spain. A fabulous story gained credit to the effect that their ancestors had bound themselves to embrace Islam if at the end of the year 500 of the Hedjrah their own expected Messiah had not yet come. Referring to this legend, Jussuf called upon them to fulfil what had been promised. But it was not until the middle of the twelfth century that this demand was seriously pressed. The Almohades, conquering Northern Africa, crossed over into Spain. The power of the Almoravides was broken, and Cordova fell into the hands of the victors. The Jews of Andalusia were forced to follow the example of their African brethren, and either fled the country or acknowledged with the lips the prophetic mission of Mohammed and the inspiration of the Koran. Toledo, the new Christian capital of Castile, now became a refuge to large numbers of the fugitives. Here they increased rapidly in wealth and power, and monuments of both are still extant. Jews occupied high positions at the

court of Alfonso VIII. Alfonso X. (1252), it is said, entrusted the work of preparing the celebrated astronomical tables which bear his name to a certain Don Zag, a reader in the synagogue. Nor is he the only Israelite mentioned among the scientists who illustrated Alfonso's reign. The harsh restrictions which this king imposed upon the intercourse between Jews and Christians were not fully observed, even by himself. In Aragon the influence of the Dominican Raymond de Penjaforde was directed to the conversion of "the lost sheep." But the famous disputation of Barcelona between Pablo Christiana and Nachmanides (1263), held in the presence of James I. and his chief dignitaries, did not serve to advance the project. At the opening of the fourteenth century a great danger threatened the Jews of Castile in the person of Gonzalo Martinez, the all-powerful minister of Alfonso XI. He succeeded in bringing about the fall of two of their number who had hitherto enjoyed the favor of the monarch. But his further plans were frustrated in time, and he fell a victim to his own treachery. The civil war between the adherents of Pedro and Henry entailed bitter sufferings on many of the largest congregations of the land. The Jews took the part of Pedro, and were in the main sure of his protection as far as he had the power to extend it. But even the victorious Henry could not entirely dispense with their services. They were in great request as physicians, and the management of the finances of the kingdom continued to be entrusted to their care down to the time of their final banishment. In the mean time, the seeds of hatred, which the Church had long been busily disseminating, took root. Toward the end of the fourteenth and at the beginning of the fifteenth century outbreaks of fanaticism, which had hitherto occurred only at far intervals, became alarmingly frequent. The Jews were henceforth to be confined to narrow Juderias, were to put off their costly robes and wear none but garments of the coarsest kind, on which a patch of red cloth served as a badge of degradation to mark them as fit objects for insult. This latter device owed its origin to the inventive genius of Mohammedan despots, and was borrowed from them at second hand by the popes. A massacre of peaceful Jews had by this time ceased to be regarded as an event of extraordinary interest or importance. The great disputation of Tortosa, held (1413-14) under the auspices of the so-called Pope Benedict XIII., failed entirely to secure its avowed object—the conversion of the Jews *en masse*, and served only to embitter the feelings of mutual dislike that were already sufficiently strong. The sinister influence of the Dominicans and Franciscans, of such men as Vincente Ferrer and Alfonso de Spina, was aided by renegade Jews like Paulus de Santa Maria and Geronimo de Santa Fé. The marriage-bells of Ferdinand and Isabella rang out a funeral dirge for the liberty of the Jews of Spain. In 1480 the tribunal of the Inquisition was established at Seville. Notwithstanding the strenuous opposition of the people in many districts, its power increased with fearful rapidity. Those nominal Christians who still secretly adhered to Judaism were the special objects of its pious zeal, and those who perished in the flames on the Quemadero of Seville and in other towns were soon numbered by thousands. In 1483, Torquemada was appointed grand inquisitor. When Granada fell into the hands of "the Catholic king" the doom of the Spanish Jews was sealed. From the palace of the Alhambra the irrevocable decree of their exile went forth. On Aug. 2, 1492, they left the inhospitable land which yet they had so dearly loved, and while Columbus sailed westward to discover a new home of freedom, they, robbed of their fortunes and cast adrift upon the world, knew not whither to turn for shelter. For a time, indeed, many of them found refuge in Portugal. There the position of their brethren had long been exceptionally favorable. Their chief rabbi (Rabbi Mor) received his appointment directly from the king, and their affairs prospered under the kindly influence of long-continued royal favor. But in the days of João II. all this changed. The brief breathing-spell which the exiles enjoyed in his dominions was quickly at an end. He broke the promises he had made them, and many of them were sold as slaves. His successor, Manoel, at first seemed inclined to adopt a more liberal policy, but the influence of Spain altered his purpose. Amid heartrending scenes of despair Jewish children were torn from the arms of their parents and dragged into the churches; the aid of the rack was called in to enforce the conversion of the adults; and with the close of the fifteenth century the last remnant of the Jews, being at length permitted to escape their oppressors, had disappeared from the soil of Portugal.

The comparative quiet which the Jews of France and Germany enjoyed in the earlier part of the Middle Ages was rudely broken in upon by the Crusades. The spirit of absolute intolerance which the Catholic priesthood inculcated had at last taken firm hold of men's minds, and



while in this period we frequently see the princes and the higher classes—nay, even the popes themselves—anxious to preserve the Jews from the last application of their own previous example and teachings, it is the frenzied populace which with greater consistency now hounds them with relentless fury in every city and village. In the first Crusade the banks of the Moselle and the Rhine were the chief theatres of persecution. The congregation of Treves consented to embrace Christianity in the hope of warding off the calamities that threatened them, and of returning to their faith when the danger had passed off. But instances of such complacency were extremely rare. A tumult occurred in Spire in which a considerable number of the Jews lost their lives. In Worms many of them perished by their own hand. In Mayence the archbishop harbored them in his palace, then opened the gates and gave them over to slaughter at the hands of their enemies. The citizens of Cologne facilitated their flight from that city, where the rabble had already determined on their destruction, but they escaped only to perish miserably elsewhere. The arm of the emperor, Henry IV., was powerless to protect them. In the second Crusade, Peter Venerabilis in France was instrumental in causing the plundering, and in some cases the massacre, of the Jews. In Germany, taught by recent experience, they acquired the protection of strongly-fortified castles by the payment of heavy sums. Those who were not fortunate enough to gain such places of security in time were exposed as before to the fury of the mob. A certain monk, Rudolph, kindled the popular fanaticism by his inflammatory speeches. "You go to Palestine," he said, "to slay the unbelievers; why not begin with the infidel Jews in your own midst?" After incalculable mischief had been done, Bernard de Clairvaux at last succeeded in silencing the dangerous preacher. The third Crusade proved disastrous to the Jews of England. The coronation of Richard Cœur de Lion was the occasion of a terrible outbreak against them in London and other large towns. The fate of the Jews of York was of a peculiarly tragic character. (The reader will find an easily accessible account of this mournful occurrence in Disraeli's *Curiosities of Literature*, ii. p. 240.) In Italy and in the S. of France the Jewish congregations prospered in the enjoyment of an undisturbed tranquillity. In the N. of France Philip Augustus, the fellow crusader of Richard, drove them from his dominions. In 1198 he reconsidered his decree and suffered them to return. To Frederick Barbarossa, the leader of the German forces in the third Crusade, is ascribed the institution of the *Kammerknechtschaft* of the Jews of the empire. As *servi cameræ* they were supposed to enjoy the inviolate character attaching to imperial property, but the protection which this afforded them proved sadly inefficient when it was most needed. The sovereign claimed, on the other hand, the supreme right of disposing of their persons and possessions. A threefold tax of the most oppressive kind, which they were forced to pay into his treasury, shows how the right was used. The German emperors delighted in the double attribute of the Holy and the Roman. As the successors of the Roman emperor they referred their right of taxation to the example of Vespasian, who appropriated the tax for the temple at Jerusalem to his own uses. As the temporal representatives of the Christian faith their good pleasure was held to be absolute in deciding the fate of their Jewish subjects. The Jews having forfeited the right of existence in Christian states by the crucifixion of Jesus—such was the theory propounded by the Church—could find no place within the pale of the feudal system. As foreigners they stood in direct relationship with the head of that system only, and, being themselves utterly powerless, his will was their law. This theory continued to prevail down to the beginning of the present century. In the thirteenth century the war of extermination waged against the Albigenses brought disaster to the Jewish congregations of the Provence. In 1215 the fourth Lateran Council, held under Pope Innocent III., besides repeating former provisions of a hostile character, enacted that no Jew should appear in public without a conspicuous badge attached to his garments. From that time the wearing of the Jew's badge was generally enforced in Christian countries. Even Frederick II., the protector of science, an emperor whose orthodoxy was more than doubtful, did not hesitate to compel obedience to this decree, although among the scholars who graced his court the names of Jews are mentioned with distinction. In the reign of Louis IX. (St. Louis) of France, after a great disputation held under royal auspices, it was decided that the Talmud be condemned for certain blasphemous expressions against the author of Christianity which it was supposed to contain, and copies of the work were publicly burnt by cartloads. St. Louis once more drove the Jews of his realm into exile, but their banishment proved, as heretofore, temporary. In the days of the em-

peror Rudolph of Hapsburg the Jews of Germany found their condition become so intolerable that numbers of them determined to leave the Fatherland, at their head the celebrated rabbi, Meir of Rothenburg. Meir was, however, arrested, and ended his days in prison. King John of England employed the Jews as a convenient instrument for replenishing his exhausted treasury. Stephen Langton, archbishop of Canterbury, insisted on their wearing the badge. Under Henry III. a chief rabbi, appointed by the king, was allowed to exercise considerable power over his people, and a Jewish parliament was convened at Worcester. But they were summoned for no higher purpose than to raise funds for their royal master's benefit. The monks of the Dominican order were here, as everywhere, active in fanning the flame of popular prejudice. The charge of counterfeiting the coinage contributed to increase the suspicions of the king and the hatred of the citizens, and at last, in 1290, Edward I. banished the Jews from English soil. In Germany the end of the thirteenth century is marked by a bloody persecution of the Jews. One Rindfleisch and his followers preferred the ridiculous charge that the Jews had pierced a consecrated wafer until the blood of Christ flowed forth; 100,000 of them are reported to have perished in consequence. In 1306, Philip the Fair decreed the exile of the Jews of France. In 1320, having previously returned to their homes, they suffered from the fury of the Pastoureaux. In Italy alone they still enjoyed repose. King Robert of Naples extended his favor to them for their devotion to science, and the great Dante received the poet Immanuel into the circle of his friends. About this time the belief had become general that the Jews not only delighted in profaning the sacraments of the Church, but were commanded by their religion to drink the blood of Christian children, in order properly to celebrate the festival of the Passover. The ignorant clergy were not aware that the same charge of bloodshed in connection with the observance of their religious rites had been brought against the early Christians—nay, that they were only repeating, almost verbatim, the legends which had been invented to bring their own faith into disrepute. Yet we find this preposterous accusation again and again repeated during more than five centuries, and it never failed to bring the most terrible misfortunes in its train. In 1336, 5000 peasants, under the leadership of Arnold, began the sacred work of destroying "the children of Satan" (the Jews) in Alsace and along the Rhine. In 1337 the town of Deekendorf in Bavaria witnessed the massacre of its Jewish inhabitants, and a church built in honor of the event may still be seen at the present day. In the middle of the fourteenth century the Black Death traversed the continent of Europe; 25,000,000 of its inhabitants, it is estimated by Hecker, were carried off by the plague. In addition to the sufferings which they shared with the rest of mankind, a new and more fearful visitation awaited the Jews. They were made responsible for the ravages of the scourge. From Toledo, it was said, a horrid concoction had been distributed among them, with which they were ordered to poison the wells in every county of their abode. At Chillon, on Lake Geneva, the outrageous persecutions consequent on this charge commenced, and soon spread to Berne, Bâle, Freiburg, Worms, and Strasburg. The bravery of the citizens in the town last mentioned, who resisted the frantic mob, only served to secure their own destruction. It was of no avail that the pope himself refuted the cruel and baseless accusation. The fire and the executioner's axe could no longer be checked. It would fill pages to give an account of all they endured. In 1360 the Jews who had been expelled from France received official permission to return. But as they were compelled to resort to usury in order to satisfy the avarice of their rulers, the populace rose against them in 1380. Their houses were plundered, and many of them killed. On Easter Sunday, 1389, in the reign of the emperor Wenzel, the Jews of Prague and the neighboring places were butchered by thousands. Two children had been playing in the Ghetto, throwing sand at each other. A few grains happening to strike a priest who was passing by a tumult ensued with the usual result. In 1394 a general decree of banishment was once more issued by Charles VI. against the French Jews. But the time had now passed by when they could hope for a speedy recall, and they were no more permitted to return.

Whenever Catholicism was forced to contend against the rise of a great heresy in its own midst, the Jews were made to suffer from the religious fervor which the struggle evoked. This was shown in the time of the crusade against the Albigenses. We find it again illustrated in the beginning of the fifteenth century, when the Church mustered her forces to meet the arms and arguments of the followers of Huss. In 1420 the Jews of Vienna were imprisoned, in the next year numbers of them were consigned to the flames. The wild eloquence of the Dominicans did not fail to embrace



the infidel Jews in its denunciations of heretics. The Franciscan monk Capistrano, too, was no less active in using his immense influence for their destruction. In 1454 the bishop of Würzburg expelled them from his diocese. In Breslau they were burnt at the stake. In Poland, Casimir IV. was induced to revoke the humane enactments which he had but lately passed in their favor. Capistrano merited the name which his admirers bestowed on him, "the scourge of the Hebrews." In Italy the bright fortunes of the Israelites had not yet been darkened. There were too many counter-currents in that land to permit the monks to obtain the same absolute power which they did not scruple to assert in other countries. How wretchedly did the position of the German Jews contrast with that of their Italian brethren! In 1476 the rabbi of the oldest congregation in Germany, that of Regensburg, was accused of sacrificing a Christian child, and it required all the influence of the emperor and of the king of Bohemia to ward off from his brethren in that town the terrible fate with which they were long threatened. In the beginning of the sixteenth century we find the Jews of Italy an influential body in many of the large towns, and some of their number occupying positions of trust, especially at the papal court. In Germany they were expelled from Nuremberg and several provinces of Austria. In Greece their numbers had considerably increased, and they appear to have remained, on the whole, unmolested. It was in Turkey, however, that they at this time enjoyed to the full that liberty and security which the bigotry of the Christian nations denied them. In that country many of the exiles of Spain and Portugal had at last found an asylum; they quickly increased in wealth and power, and flourishing congregations grew up in the large cities of Constantinople and Salonichi. In the reign of Selim II., Joseph Nassi was appointed duke of Naxos, and exercised the rights of sovereignty over Andros, Paros, and some ten other islands. His influence in the councils of the sultan was so great that the ambassadors of foreign powers were forced to conciliate his favor. Nor was he the only one of his coreligionists in the diplomatic service of Turkey whose word was powerful in shaping the political affairs of Europe.

The main interest of Jewish history at the commencement of the sixteenth century concentrates upon the great Reuchlin-Pfefferkorn controversy in Germany. John Pfefferkorn, a converted Jew, a willing tool in the hands of the Dominicans of Cologne, declared the Talmud to be the main obstacle to the general conversion of the Jews, on account of the blasphemous utterances contained in it against the Christian religion and its founder. He won the ear of Kunigunde, the sister of the emperor Maximilian, and through her that of the emperor himself for the time being. John Reuchlin, the famous and universally esteemed scholar, was called upon by Maximilian to examine and pronounce upon the charges. An ardent admirer of the Hebrew and of Jewish literature, he declared the accusations groundless, and severely rebuked the accuser. This roused the fury of Pfefferkorn and his supporters against him. A number of inflammatory pamphlets, "mirrors," denouncing Reuchlin and the Jews were issued under Dominican auspices. Reuchlin answered with his *Augenspiegel*. A *Brandspiegel* followed on the part of the fanatical monks of Cologne. They desired every copy of the Talmud and similar "heretical" books to be confiscated and secured with chains in the great libraries, lest the Jews should steal them back. Even the Hebrew Bible was threatened with destruction to make way for the sole supremacy of the Vulgate. Dangers thickened around the bold humanist who had taken up the cause of learning against bigotry. The emperor's protection was not to be relied on, and, indeed, he repeatedly changed sides in the conflict that ensued. At last, Hochstraten, the inquisitor of Cologne, ordered Reuchlin to appear before him in Mayence for trial, or rather for condemnation. The plans of the Dominicans, deeply laid though they were, were foiled at the very last moment by the sudden intervention of Archbishop Uriel. The question of Reuchlin's heresy in defending the Talmud was next referred by the pope to a commission that met at Spire. Their verdict was in favor of Reuchlin, and Hochstraten was condemned to pay costs. Its effect was somewhat weakened by the adverse decision of the University of Paris, which had tried the case of its own accord, without any authority from the pope. A new tribunal, created in Rome, took the part of Reuchlin with such decision that the monks of Cologne were forced with bad grace to give way. In the mean time the *Epistole Obscurorum Virorum*, which appeared in two series, had made them the laughing-stock of all Germany. The interest which the controversy excited in Jewish literature proved in the highest degree beneficial to its correct preservation and culture. In 1520, Daniel Bomberg began the publication of the Talmud in an edition which for accuracy has not been equalled. Im-

mense sums were expended on this and other Hebrew works. In several prominent universities professorships for the Hebrew language were founded. The Reformation, though largely indebted to the writings of Jews for its weapons of attack, did not at first lighten the load of their sufferings, and the intolerance of Protestants did not prove less oppressive than that of Catholics. With the loss of the mind's creative power entailed by so many bitter persecutions a tendency toward centralization became apparent among the Jews. In 1567, Joseph Kara, a rabbi of Safet in Palestine, published a digest of the rabbinical laws, which soon came to be looked upon as supreme authority in matters of religion. The same tendency appears in the synods of Poland which began to be held toward the end of this century, and it is further illustrated by the history of the great congregations of Amsterdam and Hamburg in the next. In Spain and Portugal many of the more faint-hearted of the Jews had assumed the mask of Christianity to escape the necessity of leaving their country, while in secret they still preserved an unflinching allegiance to their ancient creed. The position of these miserable ones was truly deplorable. Frequently discovered in the exercise of forbidden rites, they fed the flames of the Inquisition, and, despairing of mortal aid, sought refuge in the illusory promises of mysticism in the vain hope of release. Solomon Molcho, a youth whose fancy was fired by the Cabbala, which for several centuries had slowly been increasing the number of its adherents, created a great commotion among them by earnestly predicting the near approach of the Messianic age. He was burnt at the stake in Mantua (1532) by order of Charles V. The successful revolution of the Netherlands, which Spanish bigotry had provoked, at last opened to them a haven of security. Free Holland invited them to its shores. The city of Amsterdam availed itself of the wealth and industry of the "Judaizing" Christians of Portugal, and to their efforts the rapid extension of the city's commerce was in no small measure due. The Jewish congregation of Amsterdam soon became one of the most influential of all Europe. They cultivated letters and erected an institute (Talmud Torà) for the instruction of the young in Hebrew literature. From their midst Spinoza went forth. Elsewhere their brethren were not so fortunate. In 1614 the guilds of Frankfort, with Vincent Fettmilch at their head, expelled the Jews from their town. In the next year the example of Frankfort was followed by Worms. Both cities were compelled by the emperor to receive the fugitives back into their walls. In the middle of the seventeenth century the Jews of Poland were visited with a calamity from which they have never recovered. The Cossacks, led on by the fierce Chmielnicki, succeeded if not in exterminating, as they intended, yet at least in reducing them to a condition of utter and abject degradation. Chmielnicki and his soldiery are reported to have slain between the years 1648 and 1658 about 250,000 Polish Jews. Those that were spared emigrated in great numbers, and inundated the countries of Central and Southern Europe. They were everywhere kindly received. But from being guests they soon rose to be masters. With great powers of intellect they united, as a body, certain faults of character, whose influence on their new surroundings proved vicious in the extreme. In England the Jews were readmitted after having been banished the country since 1290, mainly through the exertions of Manasseh b. Israel, a rabbi of Amsterdam. In 1655, Cromwell invited him to visit England, and he there found active sympathy among many of the Puritan leaders. Their love for the Old Testament inclined them to look favorably upon the remnant of ancient Israel. Moreover, were not these the people from whom Jesus had sprung?

In 1665 a strange drama was enacted in Smyrna. A native of that town, Sabbathai Zewi, was solemnly proclaimed the Messiah of the Jews. The Cabbala had inspired him—the Cabbala paved the way for his astonishing success. The tidings spread from the Orient to the Occident, and everywhere the new evangel found ardent believers. S. Zewi taught that in him the "God of Israel," the Third Person of the Godhead, had become flesh and blood. He inculcated the doctrine of the transmigration of souls, and, like all mysticism, his teachings were strongly colored with sensualism. He ended his Messianic career by assuming the turban in Constantinople for fear of being put to death. But this did not remove the evils of which he had been the occasion. The contagion of his views spread throughout Europe, and while the outward position of the Jews was now very slowly improving, their mental condition was far inferior to what it had been in the Middle Ages. The great elector of Brandenburg received a number of those Jewish families whom the emperor Leopold had driven from Vienna. In 1700 the Jews succeeded in causing an imperial injunction to be laid on the publication of Eisenmenger's infamous attack on their religion and

themselves. In Hamburg a colony of the mother-congregation of Amsterdam began to rival the glories of its parent, notwithstanding the determined resistance which had at first opposed its progress. In 1751 a contest arose between Jonathan Eibeschütz, the rabbi of Hamburg, and Jacob Emden, in which the former was charged with Cabbalistic practices, especially the writing of magic talismans in the name of the Messiah, Sabbathai Zewi. Soon after the sect of the Frankists arose in Poland. Frank, their leader, pretended to be the successor of S. Zewi, and, like his model, ended by abjuring his religion. The sect of the Chasidim, which still exists at the present day, may be regarded as the last outgrowth of this deplorable movement.

The modern epoch is marked by the name of Mendelssohn. His German version of the Pentateuch became, like Luther's translation of the Bible, the groundwork of reform. Lessing's *Nathan the Wise* rebuked the time-worn prejudice of the Christian world. Dohm labored to secure the civil emancipation of the Jews. The French Revolution broke down the walls of their ghettos. On Sept. 28, 1791, the National Assembly decreed the complete enfranchisement of the Israelite citizens of France. In the hour of need, when the great struggle with Napoleon was impending, Frederick William III. felt himself constrained to liberate the Jews of Prussia. Other states and cities slowly followed. It cost many a bitter struggle until civil and religious freedom was finally secured. The "Hep, hep" cry raised in Germany in 1819, the bloody persecution in Damascus some thirty years ago, in which French diplomacy was seriously implicated, the Mortara affair in 1858, and recent events in Roumania, have shown that the embers of bigotry have not yet completely died out. But a general conflagration need no longer be feared. Under the benign influence of liberty the Jews have everywhere shown themselves ready and able to advance the interests of civilization. Not only has their own literature been opened to scientific study by such men as Zunz, Geiger, Munk, Rapoport, Luzzatto, and others, but they have rendered signal service in almost every department of science and art. I mention among the philosophers M. Mendelssohn, Maimon, Herz; in political economy, Ricardo and Lasalle; in literature, Büchse, Heine, Auerbach, Grace Aguilar; in music, Mendelssohn-Bartholdy, Meyerbeer, Halevy; among the prominent statesmen of the day, Disraeli, Lasker, Crémieux. In this country the Jewish population has largely increased during the last three decades. In New York City alone it is now estimated at between 50,000 and 60,000 souls. For 2000 years the world has endeavored to crush out the Jewish race. That spirit of exclusiveness with which it is charged was but the natural result of such relentless hostility. It vanishes wherever confidence is inspired by security. The majority of intelligent Israelites in the present have long since abandoned the wish of building up an independent national existence of their own. Their patriotism has been illustrated on all the great battlefields of this century. The achievement of higher conditions of human life they are disposed to regard as the fulfillment of Messianic prophecy, and the furthering this end in intimate union with their fellow-men as the highest objective of their religion. FELIX ADLER.

**Jews'bury** (GERALDINE ENDORS), b. in Manchester, Eng., in 1821, sister of Maria Jane, wrote a number of novels concerning society life, among which are *Zoe*, the *History of Two Lives* (1854), *The Half Sisters* (1858), *The Sorrowful Gentility* (1856), and also minor works for children.

**Jewsbury** (MARIA JANE), b. in Warwickshire, England, about 1800; resided in Manchester most of her life; was a frequent contributor to the English magazines and to the *London Athenaeum*. Wordsworth pronounced her unsurpassed by any writer of her time for the "quickness of the motions of her mind," while the *Athenaeum* passed a similar eulogy upon her play of imagination, thirst for knowledge, and elevated purposes. In 1833, Mrs. Jewsbury married Rev. William Fletcher, a missionary to India, and d. at Bombay in the same year. Her collected works embrace *Phantasmagoria*, *Letters to the Young*, *Lays of Leisure Hours*, and *Three Histories*, the last of which was very popular and has been frequently reprinted.

**Jeypoor'**, one of the Rajpoot states under English protection in Western Hindostan. Area, 15,254 square miles. Pop. 1,891,124. Its soil is in most places poor, often barren sand, and its climate is intolerably hot. Its capital of the same name is situated in 26° 36' N. lat. and 75° 35' E. lon., and is considered the finest city the Hindoos ever built. It forms a parallelogram divided by straight streets intersecting each other at right angles. It is surrounded by a wall surmounted by towers, and contains a large and magnificent palace.

**Jez'ebel** [Heb. *Izebel*], daughter of Ethbaal, king of

Tyre and Sidon, and wife of Ahab, king of Israel, exercised a great influence upon her husband, leading him into idolatrous worship of Baal, a Phœnician deity, long a formidable rival, especially in the northern kingdom, to the Jehovah-worship established at Jerusalem. Many acts of persecution against the prophets and priests of Jehovah are attributed to Jezebel, and were so successful that at one time there were but 7000 persons in Israel who had not bowed the knee to Baal. The narrative of this momentous controversy is found at length in 1 Kings. Jezebel was murdered by Jehu about 883 B. C., at the same time as her son, King Jehoram. Her daughter, Athaliah, married Jehoram, king of Judah.

**Jezi'rah** [Heb. *Sepher Yetsirah*], or **Book of Creation**, one of the two chief cabbalistic works of the Jews. Its date is variously assigned to the first and the eighth or ninth century. It was printed in 1562, 1642, and 1830.

**Jez'reel**, town in Northern Palestine, which was the capital of the kingdom of Israel under several reigns.

**Jhy'lum**, or **Behut**, river of Hindostan, the westernmost of the Punjab. It rises in the valley of Cashmere, and after emerging from the Himalayas it joins the Chenab and forms the Tmab. (See *HYDRAUS*.)

**Jid'dah**, town of Arabia, on the Red Sea, in 21° 28' N. lat. and 39° 13' E. lon., 60 miles W. of Mecca. It is surrounded by a barren desert, so destitute of water that rain-water must be gathered and carefully preserved in cisterns. But it carries on a most important trade, provisions from Egypt, coffee from Arabia, and manufactured goods from India being brought in large quantities to its warehouses and exchanged. Thousands of pilgrims visit yearly the town on their way to Mecca. A curious little building within the walls contains a monument called the tomb of Eve. Pop. variously estimated at from 10,000 to 20,000.

**Jika'daze**, or **Shikatze**, town of Thibet, the capital of the district of Zang, is in an elevated and very dry plain, encircled by lofty but barren mountains, and contains an immense palace or monastery, in which reside one of the chief lamas and his suite, consisting of above 4000 persons. It consists of a number of palaces, temples, and tombs of a most striking architecture and profusely ornamented with gold and precious stones. Pop. 100,000.

**Jime'na**, town of Spain, in the province of Cadiz, on the Jogergante, has 6577 inhabitants, mostly engaged in agriculture and horticulture.

**Jim Henry**, tp. of Miller co., Mo. Pop. 542.

**Jinn** [Arabic, plural of *jinni*, the "invisible," cognate with the Lat. *GENIUS* (which see)], among Arabian and other Mohammedan peoples a race of imaginary beings made out of fire and capable of assuming any form at will. They inhabited the earth long before man was created, but for rebellious conduct were finally expelled. They inhabit a world called Jinnistan, but often visit the earth in storms, tornadoes, and earthquakes. Many of their exploits are narrated in the *Arabian Nights*. The good jinn are called *peri* (fairies). Mohammed came to instruct and redeem jinn as well as men. Men are superior in dignity to jinn, but far less powerful.

**Jiquiti'te**, the native indigo of Central America, *Indigofera disperma*, which produces large quantities of excellent indigo. (See *INDIGO*.)

**Jitomir'**, or **Zytomierz**, town of Russia, the capital of the government of Volhynia, on the Kamienka, which here joins the Tetercy and flows to the Dnieper. It is the seat of the governor, of a Greek archbishop, and a Roman Catholic bishop. It has some iron and glass works, four annual fairs, and a considerable trade. Pop. 17,131.

**Jo'ab**, a son of Zeruiah, the sister of David, distinguished himself as a warrior under the reign of Saul, and was made commander of the whole Hebrew army by David. He was a valiant, talented, and influential man, but violent and unscrupulous. When David tried to rid himself of him by giving the command to Amasa, Joab plunged his sword into Amasa's heart while embracing him. He took part in the unsuccessful demonstration in favor of Adonijah, and although he fled to the tabernacle for refuge, Solomon seized him and put him to death.

**Jo'achim**, called the Promiser, b. at Celico, in Italy, about 1145. After being employed at the court of Roger, king of Sicily, and making a pilgrimage to Jerusalem, he became a Cistercian monk, abbot of Corace in Calabria, and finally founder of the monastery of Floris near Cassenza, where he d. Mar. 20, 1202. He had a reputation as a saint and miracle-worker, and his followers made an unsuccessful attempt to canonize him in 1346. He taught a peculiar mystic doctrine, of which the chief tenet was that the Christian era would close A. D. 1260, after which a new



providential dispensation would begin. This doctrine was embodied in his treatise called the *Everlasting Gospel*, which was condemned by the Council of the Lateran in 1213, and by that of Arles in 1260. He left many writings, chiefly commentaries, and propheied the downfall of the papacy. His followers, called *Joachimites*, were numerous in the thirteenth century.

**Joachim**, tp. of Jefferson co., Mo. Pop. 1865.

**Jo'achimsthal**, town of Bohemia, near the frontier of Saxony, is situated in a valley in the Erzgebirge, 2366 feet above the level of the sea, and has 5641 inhabitants, mostly engaged in the working of the neighboring iron, silver, lead, and tin mines.

**Joan**, *Pope*, a fabulous personage who was long believed to have occupied the papal chair (853-856), as John VIII., succeeding Leo IV. and preceding Benedict III. The report was that Joan was born in Germany, the daughter of an English priest; falling in love with a monk, she entered a convent in male attire at Fulda, and then went with her paramour to Athens and Rome, where she acquired a high reputation for piety and learning, and was unanimously chosen pope when a vacancy occurred. One day in the street, at the head of a procession, it is said that the pope was unexpectedly delivered of a child, soon after which she died. There has been much speculation as to the origin of this fiction, which acquired universal credence in the Middle Ages; and in the cathedral of Siena a statue of Pope Joan was for a long time to be seen. The fable still occasionally finds a literary defender, but is utterly without historical foundation, its fictitious character having been first conclusively demonstrated by David Blondel, a Protestant, in 1649.

**Joan of Arc** [*Fr. Jeanne d'Arc*, or, more correctly, *Darc*], the Maid of Orleans, b. Jan. 6, 1412, at Domremy, in Lorraine (now a part of Germany), of parents who, though sprung of wealthy and ancient stock, were reduced to the state of serfdom. The youthful Jeanne was distinguished for a sweet simplicity, piety, and industry in childhood. Her patriotism was early inflamed by the fact that Domremy was of the Armagnac or French faction, rather than of the Burgundian party of those times. When she was thirteen years old France was overrun by the Anglo-Picard troops of the duke of Bedford, regent of Henry VI., and by the forces of Burgundy. Jeanne, impressed by the distressed state of France, conceived that she heard voices from Heaven and saw visions of Sts. Michael, Margaret, and Catharine, calling her to deliver France. Four or five years later (1428) she announced her vision to Baudricourt, governor of Vaucouleurs, and in 1429 gained an audience with the dauphin, who in April gave her command of the French troops, who by this time were fully inspired with belief in her heavenly mission. She assumed male attire, a sword, and a white banner, threw herself boldly into Orleans, of which she quickly raised the siege; bent the English at Meun, Jargeau, Beaugency, and Patay; caused the dauphin to be crowned at Rheims in less than three months after she took the field. She now demanded to be released from further service, the heavenly voices having ceased to be heard, and a dread foreboding taking their place; but the king would not consent. In the subsequent attack on Paris she was badly wounded, and soon after she and her family were ennobled. On May 23, 1430, after having taken part in many successful combats, she was captured by the Burgundians while heading a sortie from Compiègne, and was sold to the English (who feared her as a witch) for 16,000 francs. The University of Paris having pronounced her guilty of witchcraft after a protracted and most unjust trial, she was burned at the stake with every circumstance of indignity and cruelty, May 30, 1431. It may be added that Delapierre and others question, with some show of reason, the story of her death, and state that she married and was alive in 1444, some other woman having, as it is asserted, been tried.

**Joa'nes** (VINCENTE), b. in Spain in 1523, and d. in 1579. He studied in Rome, imitated Raphael, and became the founder of a Spanish-Italian school of painters, whose seat was Valencia. He was deeply religious, prepared himself, before he commenced a new picture, by taking the sacrament, and treated exclusively religious subjects. There is a charming expression of innocence and sweetness in his pictures, but not the intellectuality and lofty purity which distinguish Raphael.

**Joan'na I.**, queen of Naples from 1343 to 1382, b. in 1327, a daughter of Charles and granddaughter of Robert of Anjou, was married when seven years old to Andrew of Hungary, her second cousin. The idea of this marriage was to ally the two branches of the family of Anjou together, but the purpose failed, and the contest between the two political parties represented by the two branches of the

royal family became only fiercer. In 1345, Joanna had her husband strangled, and when his brother, Louis the Great of Hungary, invaded Naples to avenge him, she had to flee. By the mediation of the pope, to whom she gave Avignon and the sum of 80,000 florins, she returned soon after, and married successively Louis of Taranto, James of Aragon, and Otho of Brunswick. But in the papal schism between Clement VII. and Urban VI., Joanna sided with Clement, and at the instigation of Urban VI. a rebellion took place in Naples. Joanna was seized, imprisoned in Muro, and delivered over to the king of Hungary, who immediately had her put to death.—Her grand-niece, JOANNA II., queen of Naples from 1414 to 1435, b. in 1370, was married first to William of Austria, and after his death to Jacques de Bourbon. She was notorious for her dissolute life, and her government was utterly distracted by the feuds and intrigues between her different favorites.

**Jo'ash**, or **Jeho'ash** [Heb. *Yash* or *Yehoash*, "given by Jehovah"], the name of two kings. I. A king of Judah, son of Abaziah by Libnah of Beersheba, b. about B. C. 884. His father having died in his infancy, all his brothers were massacred by his grandmother Athaliah, who usurped the throne, but Joash was secretly saved by his aunt, the wife of the high priest Jehoiada, who brought him up within the temple until his eighth year, when a successful revolution was made, Athaliah was killed, and the young prince, the last scion of the house of David, was placed on the throne. During his minority, and for many years thereafter, his government was approved by the biblical writer, but at length he fell into idolatry, when his kingdom was ravaged by Hazael of Damascus, and he was besieged in Jerusalem, giving up the treasures of the temple to the enemy. He was murdered in his bed by his servants about B. C. 837, after a reign of forty years.—II. A king of Israel, son and successor of Jehoahaz, and grandson of Jehu, became king about B. C. 838, successfully resisted the Syrians, and defeated Amaziah, king of Judah. Joash is esteemed one of the best of the kings of Israel. D. after sixteen years' reign, about B. C. 823.

**Job**, **The Book of**, one of the books of the Old Testament, narrating the story of Job, a wealthy Arabian sheik or patriarch who dwelt in the land of Uz, and a man of benevolent, devout, and blameless life. At an advanced age he is visited with loss of estate, of family, and of health; his wife breaks down under the load of trials, but Job remains true to God, and endures all without a sinful word of complaint, to the discomfiture of Satan, his accuser. And at last his faithfulness receives an ample reward. The doctrine of retribution held a prominent place in Jewish theology. As a popular dogma it amounted to this—that God balances men's sins by adversity in this life with a perfect and inexorable justice. Thus, affliction and adversity came to be regarded as the indices of sin. Nothing less than this dogma is at stake in the poem—or tragedy, as we may well call it, from the intensity of the interests and feelings involved. Job's wife represents the evil spirit of rebellion against God. His friends represent the various shades of the popular dogma. They insist that his adversity is proof of sin, either specifically or in general, and blandly exhort him to humility and submission. Against them he defends his integrity, and it seems to be rather vexation at their platitudes than the actual effect of Satan's machinations which drives Job from his patience and leads him to fail, so far as he does fail, under the test. Finally, this vexation passes away. He turns to God in unaffected humility, which he is able to reach without doing violence to his consciousness of his own integrity, but out of his spontaneous and loving trust in God. Then he wins a new revelation of God, such as he had never had before. He sees that man cannot pretend to fathom or compass or follow the plan and purpose of God. Man's mind would fail if God should make known to him even a part of the many things which must be taken into account in the divine plan. He cannot, therefore, know God's purpose in sending adversity on this man or on that; and, in short, nothing can be more absurd or impious than for man to frame little dogmas by which to pretend to interpret the dispensations of Providence.

This poem is a wonderful specimen of literary art. The characters sustain the parts allotted to them perfectly. The time assigned to the incident is that of Moses and Joshua, and the "historic sense" is admirably displayed. Probably a historical fact lay at the basis, but the writer has used it so independently that it has disappeared. The language is peculiar, and presents numerous difficulties, and the thought is so subtle as to tax the utmost skill of the interpreter. It is almost unanimously assigned to a very early but unknown date.

**Jobe**, post-tp. of Oregon co., Mo. Pop. 848.

**Jobert' de Lamballe'** (ANTOINE JOSEPH), b. at Lam-

balle in 1799; studied medicine in Paris 1819; took his degree in 1828; and became surgeon at the Hospital of St. Louis in 1830; surgeon to the emperor in 1841, and member of the Academy in 1846. His principal writings are—*Traité théorique et pratique des maladies chirurgicales du canal intestinal* (1829), *Traité de chirurgie plastique* (1849), *Traitément des fistules vesico-vaginales* (1852). D. Apr. 22, 1867.

**Job's Cabin**, tp. of Wilkes co., N. C. Pop. 606.

**Job's Tears** (*Cala lachryma*), a grass, a native of India, where it often grows to the height of eight feet; it resembles somewhat maize both in appearance and habits. Its name is derived from its "seeds," or rather indurated husks, which are bony, shining, bluish-white globules. In India the seeds are used as an article of food, but outside of India they are used only as ornaments, made into bracelets and necklaces, or as beads for rosaries.

**Job's town**, former village of Cassco, Ind., now included in the city of Logansport. Pop. 319.

**Jo Daviess**, county of N. W. Illinois. Area, 650 square miles. It has Wisconsin on the N. and the Mississippi River on the S. W. It has mines of copper and lead, the latter especially important. Its surface is varied, its soil productive. Cattle, grain, wool, and tobacco are staple products. Carriages and saddlery are among the leading articles of manufacture. The county is traversed by the Illinois Central R. R. Cap. Galena. Pop. 27,820.

**Jo Daviess**, tp. of Faribault co., Minn. Pop. 477.

**Jodette** (*Jodette*), b. at Paris in 1532, and d. there in 1573. He took part very successfully in that movement in the French literature which was started by Ronsard, and by which imitation of the classical models was adopted as an artistic principle. The common *mysteries* and *moralities* he supplanted by regular tragedies, and his *Cleopâtre* and *Dido* created a general enthusiasm.

**Jo'el** [Heb., "The Lord is his God"], one of the minor Hebrew prophets, concerning whom little is with certainty known. He lived at Jerusalem, and his prophecies relate to Judah. The date of his life is very uncertain. He was undoubtedly one of the earliest of the prophets whose works remain to us. Ewald, Hitzig, and Keil think that he lived before 800 B. C. One of the visitations of locusts which occur from time to time in the Orient (see Lepsius, *Briefe aus Ägypten*), occurred in his time, and proved a great national calamity. The prophet called the people to penitence, public fasting, prayer, and righteousness, and turned their attention to God's great day of visitation and judgment.

**Jogues** (Jesuit), b. at Orléans, France, Jan. 10, 1607, became a Jesuit at Rouen in 1624, and came to Canada as a missionary in 1636. After preaching to the Hurons, he founded in 1642 a mission among the Chippewas in Michigan. On a journey to Quebec he was captured by the Mohawks and made a slave, but escaped to the Dutch at Albany, and went to France, whence he soon returned to Canada. In May, 1646, he concluded a treaty between the French and the Mohawks, remained among them as a missionary and was put to death by them as a sorcerer at Carthagawaga Oct. 18 of the same year. His *Letters* were published in the New York Historical Society's Collection, and his description of the New Netherlands was reprinted in New York in 1862, with a memoir by J. G. Shea. (See his *Life*, by Rev. Felix Martin, S. J., Paris, 1873.)

**Jo'hann** NEUMARK MARIA JOSEPH, king of Saxony, b. Dec. 12, 1801, and d. Oct. 29, 1873. He was an erudite and finely educated man, whose inclinations turned towards literary and scientific occupations, but who, nevertheless, devoted himself with conscientiousness to his royal duties. The graver qualities, however, of a ruler, he wanted, and he never became very popular. His youth was wholly devoted to art and science, especially to the study of Italian language and literature; from 1839 to 1849 he published at Leipzig, under the pseudonym of "Philaletes," a translation of Dante with critical and historical notes. His elder brother having become co-regent in 1830, Prince Johann took part very actively in public life as a member of the privy council, as president of the council of finances, in the diet, in military matters, and acquired thorough knowledge of all branches of the administration. At the death of his brother he became king of Saxony, Aug. 9, 1854. He was active and successful in measures referring to the internal development of his country, especially in the introduction of trade freedom, in the extension of railway lines, and in the conclusion of commercial treaties between Germany and other countries. But in the great political questions he was unfortunate. Probably ruled by ecclesiastical and Roman Catholic influences, he showed himself an unconditional adherent of Austria and an adversary of the Protestant and progressive Prussia. This tendency became apparent already during the complications with Denmark concerning

Sleswick-Holstein, and at a later period his stubbornness all but cost him his throne. The war of 1866 between Austria and Prussia was brought about, at least to some extent, by King Johann and his minister, Beust. The idea was that by a decisive participation in the humiliation of Prussia, Saxony should further the Roman Catholic Church and extend its own circumscribed sphere of power. But after the defeat of the Austrian-Saxon army the sovereignty of King Johann was saved only by the intervention of Napoleon III. Nevertheless, having concluded peace with Prussia and returned to his country, he was perfectly loyal, and showed himself capable of sacrificing his personal feelings to his political insight. In the difficult time of the war with France, Saxony acted as a true and reliable member of the North German Confederation. King Johann in 1822 married Amalia, a daughter of King Maximilian of Bavaria, who bore him three children. His son Albert succeeded him as king. AUGUST NIEMANN.

**Johanna**. See CONGO ISLANDS.

**Johan'nes Secun'dus**, whose true name was JAN EVERARD, b. at the Hague Nov. 11, 1511; acquired a great fame for learning and genius by his Latin poems; accompanied Charles V. on his expedition to Tunis, and d. at Utrecht Sept. 24, 1536. His *Opera Poetica* were published by his brothers in 1541; some of them—as, for instance, *Bania*—have been translated into nearly all European languages.

**Johan'nesberg**, post-v. of Washington co., Ill. Pop. 101.

**Johan'nisberg**, village of Germany, in the duchy of Nassau, contains a beautifully situated castle, which in 1814 was given to Prince Metternich by the allies. The vineyards of this estate produce the best of all Rhenish wines, the celebrated Johannisberger.

**Johannot** (CHARLES HENRI ATERFED), b. at Offenbach, Hesse-Darmstadt, Mar. 21, 1809; removed in 1806 to Paris, where he received his education, and d. there Dec. 7, 1837. He attracted great attention in 1824 by his engravings after Schaeffer and Gerard; in 1827 by his illustrations of Walter Scott, Cooper, and Byron; and since 1831 by his pictures, of which the two most celebrated, *Mademoiselle de Montpensier* (1833) and *The Battle of Beaulieu* (1837), are at Versailles.—His brother, TONY, well known from his illustrations to Mölière, Werther, Lamartine, and others, was b. at Offenbach Nov. 9, 1803, and d. at Paris Aug. 4, 1852.

**John the Baptist** was a son of the priest Zacharias and Elisabeth, a cousin of the mother of Jesus, and was born six months before him. In the fifteenth year of the reign of Tiberius he began to preach in the deserts of Judea, announcing the coming of the Messiah, admonishing to repentance, and baptizing as a symbol of purification from sin. The wonderful circumstances accompanying his birth and his baptism of Jesus, as well as his relations to Christ and his death, are recorded in the Gospels, and very little is known of him from other sources. He was imprisoned and put to death by Herod Antipas, but his disciples continued to form a separate body long after the rise of Christianity. In the Christian Church the 24th of June is celebrated as the day of the commemoration of his birth.

**John the Evangelist**. Jesus had parents, brothers, and sisters, disciples, fellow-citizens, but to St. John alone was granted the privilege of being his "friend."

1. *Life*.—John was born on the shores of the Lake of Gennesaret, in Galilee, and probably at Bethsaida (compare Mark i. 16, 19 and John i. 11). According to the first text, he followed the occupation of a fisher, together with his father Zebedee, his brother James, and his two friends and associates Simon (Peter) and Andrew. His mother, whose name was Salome (according to Matt. xxvii. 56, which compare with Mark xv. 40), must have been a pious woman, ardent and filled with the Messianic expectations, though under their most earthly form (Matt. xx. 20 seq.). She no doubt poured her own faith, including this alloy, into the hearts of her sons. As soon as John the Baptist, the new prophet who announced the approach of the kingdom of God, called people to prepare themselves by repentance and baptism, John and James hastened to him and remained with him as his disciples; and it was here that Jesus first met with them on his return from the temptation in the desert. The admirable picture drawn in the first chapter of the Gospel by John embodies in that full of freshness the remembrance of this meeting, which became decisive for the life of John. Having found his first disciples among the followers of his precursor, Jesus took them back with him to Galilee; and as he himself had not yet separated from his family (John i. 1, 12), he sent them also back to theirs; but on the approach of the next Pass-



over feast he called them definitively to follow him permanently as his disciples, and repaired with them to Jerusalem, where he inaugurated his public ministry by expelling the vendors from the temple (Matt. iv. 18 *seq.*; John ii. 14 *seq.*). From this moment John accompanied him through all the incidents of his earthly life, which he has described so dramatically in his Gospel. Together with Peter and James he formed a closer circle around Jesus, and he was present at the most secluded scenes of his life (the resurrection of the daughter of Jairus, the transfiguration, Gethsemane); but of the three he was the friend of the heart of the Lord. It is indeed impossible to doubt that the "disciple whom Jesus loved," which is the expression used in the fourth Gospel, means John himself. It is the phrase which he substitutes for his own name, embracing the gentlest remembrances which ever thrilled through the heart of man. Modern criticism has raised the supposition that either Nathanael or Andrew could have been meant, or even a purely ideal being which never existed in reality. But those two disciples are designated by name in several passages of the Gospel (i. 40; vi. 8; xii. 22; i. 45 *seq.*; xxi. 2), and how could the disciple whom Jesus loved be any other than one of the three intimates with whom he liked best to associate? As for an ideal being, how could the evangelist place him among the twelve, and ascribe to him a decisive part in the scene which brought about the departure of Judas from the Last Supper (John xiii.)? How could an ideal being be the friend to whom Jesus from the cross bequeathed his mother, and who took her into his home from that moment (John xix. 29)? Such traits can be applied only to a being of flesh and bones. Up to the time of the death of Jesus, John lulled himself in the most glorious earthly expectations (Mark x. 35 *seq.*), but the resurrection of Christ then opened his eyes, and at the same time he understood the whole Scripture, and he "believed" (John xx. 8). The New Testament does not mention that he was granted to John, like Peter and James (Luke xxiv. 34; 1 Cor. xv. 5, 7), any appearance of the Lord after his resurrection; but if those appearances of Jesus which are recorded were fictitious, the very first would certainly have been attributed to John. Pentecost accomplished the work commenced by the resurrection. John makes us understand what took place within him on that day, recalling with predilection in his Gospel those promises of Jesus, "When the Spirit of truth is come, he shall glorify me;" "At that day ye shall know that I am in my Father, and ye in me, and I in you" (John xvi. 13 and xiv. 20). In spite of the very particular privilege with which he had been honored, John performed only a secondary part in the foundation of the Church, compared with his associates, Peter and James. Peter was the great instrument for the establishment of the Church in Israel (Acts i.-v.). James died in 44 as the first martyr, a fact which by itself proves the power of his influence on the Jewish people (Acts xii. 2). Of the activity of John we know nothing except the two traits of little importance recorded in Acts iii. 1 *seq.* and viii. 14; and we should have considered his influence on the apostolic Church as very small but for the words of St. Paul (Gal. ii. 9), who ranks him among the three "pillars" of the Church. A modern school has attempted to establish, by the aid of this and some other texts, that John and the other apostles belonged, even after Pentecost, to that narrow Jewish-Christian party which would impose the circumcision and the Mosaic law on the Gentiles as a condition of their entering the Church. But the above text proves exactly the opposite, since Paul here expressly distinguishes between the representatives of the apostolate, James ("the brother of the Lord"), Peter, and John, who would not improve the law (v. 9), and the "false brethren" who had come in privily into the Church in order to establish the principle of the law (v. 4). (1) Compare the "But of these" (v. 6), which plainly indicates an opposition. John himself, no doubt, observed the law, as did his associates, but only from a feeling of national piety and Israelitish fellowship; he would not impose it on the Gentiles who believed, for if so he could not have given "the right hand of fellowship" to St. Paul (v. 9). It was not until after the death of Peter (about 64) and Paul (about 66), and after the destruction of Jerusalem, that the activity of John assumed its grand proportions. According to a unanimous tradition in the churches of the second century, he went to Asia Minor, where Paul had founded a magnificent circle of churches. The truth of this tradition has been disputed, however, quite recently. It has been said that the Church fell into this error by attributing falsely the Revelation to John the apostle, and then inferring that he lived in the centre of the Asiatic churches (Rev. i.-iii.). But the historical testimonies are with respect to this fact so old and so authoritative that to deny it would be to overthrow all history. In his great work, *Against the*

*Heretics* (about 185), Irenæus, who in his youth had been a disciple of Polycarp, speaks frequently of the relations of Polycarp to the apostle during the sojourn of the latter in Asia. He refers to what the presbyters of Ephesus and Polycarp have heard John record of the Lord; and he adds, "There are people who have heard from the mouth of Polycarp how John, the disciple of the Lord, once went to take a bath in Ephesus, but suddenly, on seeing Cerinthus, left the house without taking any bath, exclaiming, 'Let us flee before the house falls down on us, for Cerinthus, the enemy of truth, is here.'" In a celebrated letter he refers to his old friend Florinus, and the time which they, while young people, spent together in the presence of Polycarp, recalling how this bishop taught people and told them of his "connections with John and others who had seen the Lord." In another letter, addressed to Victor, bishop of Rome, he reminds him of his predecessor, Anicetus—how, in spite of certain ritualistic differences, he had celebrated Easter together with Polycarp, and how this latter had defended his form of the celebration by the fact that in this manner he had always commemorated the event with "John, the disciple of our Lord, as well as with the other apostles with whom he had been together." Besides this decisive testimony by Irenæus we have another by Apollonius, a writer from Asia Minor, living about 175, who attributes to John the resurrection of one dead at Ephesus; and a third by Clement of Alexandria, who in his essay, *Who is the Rich that shall be Saved?* (par. 145), records the interesting story of the young Christian from Asia who had become the chief of a band of robbers, but was reclaimed by John, on which occasion he represents the apostle as visiting the churches of Asia Minor for the purpose of appointing bishops and regulating their affairs. And last we have the testimony of Polycrates, seventh bishop of Ephesus, in whose family this office had been, so to speak, hereditary since the times of the apostles, and who in the name of the bishops of Asia reminds Victor of the incontestable fact that among the founders of the Church of Ephesus was John, the disciple "who had leaned on the bosom of the Lord, and that he was buried at Ephesus." Before such testimonies the criticism which denies accuses itself of partiality. Jerome represents how the old apostle, in the last days of his life, was carried into the assemblies of the Church, but confined himself to the repetition of the command, "Little children, love one another;" and how, when asked "Why do you never say anything more?" he answered, "Because when this is done, enough is done." Irenæus states that John lived in Asia in the time of Trajan (97-117), and Jerome adds that he died in extreme old age "in the sixty-eighth year after the death of the Lord" (which, if Jesus died in 30, brings us down to 98), and that he was "buried in Ephesus." These authors ignore entirely a strange story contained in a newly discovered fragment of a chronicle written in the ninth century by a certain Georgius Haumartolos, who says that he has read in a work of Papias, written in the second century, but now lost, that John was "put to death by the Jews." This legend has been used as an argument against the residence of John in Asia, as if there had been no Jews in Ephesus! Even this very day those who visit the tomb of Polycarp at Smyrna, and pass through the Jewish quarter, know what such a boldness may cost. At all events, we attach no importance to this story, since it has never been mentioned by Irenæus, Eusebius, and the many others who were possessed of the work of Papias.

2. *Writings.*—Of the twenty-seven writings of the New Testament, five are attributed to the apostle John by the more or less unanimous tradition of the primitive Church—the fourth Gospel, one large and two smaller epistles, and the Revelation. In the evangelical collection the fourth Gospel shows a character of its own. It is a work composed in one train of inspiration, and not a redaction of a tradition already circulating in the Church, such as are the three others, at least to some extent. It opens with an introduction in which is given the essence of the history that follows: (1) The glory of the creative Word; (2) the crime and misery of the Jews who have rejected it in its humiliation; and (3) the fortune of the Church which has received in faith the incarnate Son of God. These three ideas of the introduction are also the fundamental ideas of the whole Gospel: Jesus makes his glory manifest by his words and acts; presently the world is divided, some taking part against him, others for him. Thus, the *glory of Jesus*, the *unbelief*, and the *faith* are the three facts on which the whole narrative rests. (1) Chs. i.-iv., first revelations of Jesus, and first impressions of unbelief and faith, as yet intermingled; (2) chs. v.-xii., special development of the constant progress of unbelief, both with the chiefs and the mass of the people, as each appearance of Jesus at Jerusalem on the festivals is the signal to a new outburst of hatred; (3) chs. xiii.-xvii., special development of the faith with

the disciples during the last times preceding the death of Jesus: (4) chs. xvii. and xix., the external defeat of Jesus by the Jewish incredulity (his judgment and punishment); (5) chs. xx. and xxi., the glorious victory of Jesus over death by his resurrection, and the consummation of faith with his disciples by his appearances. Such is the plan of this marvellous work; and thus on a beautiful day in spring, when the sun rises radiant and sending his warm rays to the earth, the last snow melts, life awakens, and nature sets to work. But after a few hours the vapors of the humid soil arise and form dense clouds; the sun hides, the storm threatens, and when the day is at its highest the tempest bursts on the earth and nature seems delivered up to its destructive forces, having lost its life star. Nevertheless, when evening comes the clouds float away, calm reigns, and more resplendent and more magnificent than when rising, the setting sun sends a last happy smile to nature before disappearing. But who has composed this work, this unique work? The Church has never hesitated in answering. No other name than that of John has ever been inscribed in the title of this work. It bears a formal testimony of itself in the last words of chapter xvi., affixed by the editors of the book, according to which the author was the disciple whom Jesus loved, and who was still living at the time when the publication took place: "This is the disciple which testifieth of these things and wrote these things" (xxi. 24). The author himself declares that he has been an eyewitness of the events he records (i. 14; xiv. 22). Moreover, the whole narrative has an autobiographical character. It does not commence with the history of the ministration of Jesus, but with the first meeting between Jesus and the author—for the second disciple (i. 35 *seq.*) must be the author himself; the anonymity guarded with respect to this disciple, and the picturesqueness of the narrative, prove it sufficiently; and it does not extend to the ascension, but ends at the moment when the author's faith becomes full, when he can exclaim from the depth of his heart, with Thomas after his conviction, "My Lord and my God!" This last word of the Gospel corresponds with its first, "The Word was God." The faith of the disciples has at last reached the height of its object.

In our days the authenticity of this book is attacked with particular eagerness; and this is quite natural. If the divinity of the Lord is the palladium of the Church, the Gospel of John is the palladium of this truth. Matthew has demonstrated the Messianic office of Jesus; Mark has described his powerful daily activity; Luke has traced the progress of his work of salvation from Bethlehem to Jerusalem, and from Jerusalem to Rome; but it is John who has unveiled the eternal divinity of his person, thus offering at the same time to the Church its most perfect food and to unbelievers the heaviest stone of offence. But to whom could such a work be attributed if it were not written by St. John? A great unknown, it is answered, composed it in the first half or in the middle of the second century. But we know the great authors of the second century—Ignatius, Papias, Polycarp, men of deep piety certainly, but of mediocre talent. And this superior genius who should have composed the fourth Gospel, and who surpasses all the known authors, he should have remained completely unknown himself, and passed through the Church of the second century without leaving the smallest vestige of his personal existence! No; here unbelief demands too much belief. Renan himself acknowledges that it is not possible to trace a probable place in the ministration of Jesus without the dates of the fourth Gospel. He points out in this book a multitude of "precise traits" which necessarily indicate an eyewitness. Credner, a critic who by no means belongs to the orthodox school, ends his essay on the fourth Gospel by saying, "If we had no historical dates at all referring to the author of the fourth Gospel, . . . the nature of the language, the freshness and vividness of the narrative, the precision of the dates, . . . the author's love and tenderness towards the person of Jesus, the irresistible charm diffused throughout the whole narrative, . . . would lead us to infer that the author could be no other person than a native of Palestine, an eyewitness, an apostle, one beloved by Jesus. John, indeed, whom the Lord had personally captivated by the celestial charm of his teaching, . . . and who, during his residence in a city like that of Ephesus, had become able to vindicate his place among the Greeks, so distinguished for their literary culture." *Introduction to the New Testament*, § 291. It seems, indeed, that John wrote the Gospel in Ephesus, and between 80 and 90. This is sufficiently proved by the only contradictions worth mentioning. The Alogians, a small Phrygian sect formed towards the end of the second century, attributed this Gospel to Cerinthus, the adversary of John in Ephesus, and thus they testify themselves to the great antiquity and to the birthplace of the book.

The larger Epistle bearing the name of John is evidently Vol. II. 290

by the same author as the Gospel. Here too he represents himself as an eyewitness to the life of Jesus (i. 1 *seq.*). From the beginning of the second century it has been used by Ignatius, Papias, and Polycarp. It contains the celestial philosophy which the author has drawn from the teaching, the labor, and the person of Jesus. This he opposes to the heresy already breaking in, and he offers it to the Church as the ideal of Christian life; not that he considers this ideal as perfection, as something inaccessible; on the contrary, it is a holiness which the presence of Jesus in the believing soul realizes every moment. The two small Epistles seem to have spread very slowly in the Church, on account of their smaller importance. This explains also why they have not as many testimonies in their favor as the two preceding writings, to which they form a beautiful contrast. In the first, John praises the firmness of a Christian lady called *Kyria* in breaking with the preachers of heresy; in the second he praises the charity of his beloved Gaius, whose house is always open to the preachers of the gospel. It is on the one side the holy exclusiveness, on the other the generous broadness, of the Christian faith. Of the Revelation we do not speak here, as a special article will be given to it.

3. *Character and Influence.*—John seems not to have possessed either the bold initiative of Peter or the penetrating dialectical power of Paul. The part, little conspicuous, which he plays before and after Pentecost, and up to his residence in Asia Minor, indicates a character discreet, reserved, even timid, and which must arrive at a sure feeling of its own maturity before it can act in the external world. But this trait reveals a profound nature, meditative, well balanced, and capable of receiving much. By giving to John and James the surname of "Boanerges" (that is, "the sons of thunder") Jesus has unveiled the mystery of their characters. We understand at once those rare and passionate manifestations. It is they who will command fire to come down from heaven on the Samaritan village which did not receive Jesus (Luke ix. 52 *seq.*). It is also John who silences the disciple who, without following with him, casts out devils in the name of Jesus (Luke ix. 49). Like the electric cloud which gathers silently the lightning within its bosom, and then suddenly lets it flash forth with a crash, the sons of Zebedee accompany Jesus, deeply touched, but generally silent and composed; but suddenly they give utterance to their impressions by an explosion, unforeseen like the lightning and terrible like the thunderclap. We also understand how the John of the Gospel can be the John of the Revelation. Nothing is falselier, indeed, than the idea which is generally entertained of the sweet tenderness and feminine softness of John. Such natures generally attach themselves passionately to the object of their love; there is something absolute in their feeling. From the moment St. John met Jesus he belonged to him entirely. Never a soul more longing after the ideal met with an object more capable of satisfying it. The first glance melted the two characters, one in the other. While the other apostles admired the miracles of Jesus, and more especially retained his moral precepts, John contemplated his person, and pondered in his heart over those mysterious testimonies emanating from the consciousness of Jesus concerning his relation to the Father—testimonies which escaped all the others. Renan has said that the Semite proceeds by intuition, not by deduction. This remark is in the highest degree applicable to the intellectual tendency of John. He does not dissect the argument of his adversary, as does St. Paul, dissolving it with his irresistible dialectical power; he crushes it with one blow. He sees the light on the one side, and on the other the darkness, and when he has given each of them its true name, he has said his all. The upright soul cannot hesitate, according to him. Having seen this vision, he who still searches after the way is lost. Thus constituted, St. John was not charged either with the foundation of the Church among the Jews and the Gentiles, such as were the missionary apostles, or, such as Paul, with the emancipation of the New Testament from the Old through a profound and penetrating study. His mission was to place the crown on the work of his two colleagues. He gave to the Church of Asia Minor that powerful organization which enabled it to stand against the floods of heresy in the beginning of the second century, and made this Church the centre of the whole Church during this epoch, on account of the power of its spiritual life. By his writings, more especially, he led the Church to a perfect understanding of the salvation which is in Christ, developing in his Gospel the idea of the *Redemption*; in his Epistles that of the *Christian*; and in the Revelation, that of the *Church*. In him the Church of the first century reached its epoch, which is the type of the history of the whole Church. FRÉDÉRIC GÖBLER.

John I., SAINT, Pope a Tuscan, was chosen pope in 520, and in 526 was compelled by Theodorus the Ostrogoth to



visit Constantinople and intercede for the Arians. On his return he was imprisoned, and d. at Ravenna May 26, 526.—**JOHN II.**, a Roman, was chosen pope by simoniacal means in 532, and was acknowledged by Justinian as the head of the Church. D. May 26, 530.—**JOHN III.**, a Roman, became pope in 560, and d. July 13, 573.—**JOHN IV.**, a Dalmatian, became pope in 640, was distinguished for zeal and doctrinal strictness, and d. Oct. 11, 642.—**JOHN V.**, a Syrian, became pope in 685. D. Aug. 1, 687.—**JOHN VI.**, a Greek, became pope in 701, and d. Jan. 9, 705.—**JOHN VII.**, a Greek, became pope in 705; d. Oct. 18, 707.—**JOHN VIII.**, a Roman, became pope in 872, was zealous for the papal primacy and the extension of the temporal authority of the holy see. His reign was vexed by the incursions of the Saracens into Italy. Was murdered Dec. 15, 882.—**JOHN IX.**, b. at Tibur, became a Benedictine, and was chosen pope in 898, and strove for the reform of many abuses. D. Nov. 30, 900.—**JOHN X.**, bishop of Bologna and archbishop of Ravenna, became pope in 914, and though reputed a man of impure life, was an able prelate. He led in person the armies which routed the Saracens and expelled them from Italy, but was imprisoned by the infamous Marosia, and d. in 929.—**JOHN XI.**, natural son of Marosia, probably by Pope Sergius III., was made pope in 931 by his mother, and is supposed to have d. by poison in 936.—**JOHN XII.**, son of Alberic and grandson of Marosia, became pope in 956 when sixteen years old. His name was Octavian, and he is regarded as the first pope to assume a new name on consecration. He was a man of extreme licentiousness, and was condemned by a council called by Otho I. at Rome for murder, incest, sacrilege, idolatry, and witchcraft. D. May 14, 964. The most important event of his reign was his coronation of Otho I., regarded as the first German emperor.—**JOHN XIII.**, a Roman bishop of Narni, became pope in 965, and after a disturbed pontificate d. Sept. 5, 972.—**JOHN XIV.** (*Peter*, bishop of Pavia), a native of Pavia, was arch-chancellor of Otho II., who made him pope in 984 in place of Boniface VII., who returned soon after, and John d. in prison, probably of starvation.—**JOHN XV.**, became pope in 986, and was chiefly remarkable for avarice and nepotism. D. Apr., 996.—**JOHN XVI.** (*Philagathus*), a Greek, and bishop of Piacenza, became pope in 997 in opposition to Gregory V., who mutilated and killed him.—**JOHN XVII.** (*Sieco*), b. at *Ripet Jacti*, in the March of Ancona, of noble family; after a pontificate of four and a half months d. June 9, 1003.—**JOHN XVIII.** (*Phosimus*) became pope in 1003, and abandoned the papal chair for a monk's cell in May, 1009.—**JOHN XIX.**, a son of the count of Tuscany, succeeded his brother, Benedict VIII., having obtained the election by force and bribes, in 1024; was chiefly remarkable for avarice. D. Nov. 8, 1033.—**JOHN XX.**, usually omitted from the list of popes, was a rival of Gregory VI., Benedict IX., and Sylvester III. There were at one time (1045) three reigning popes at Rome, who divided the revenues and expended them in excesses.—**JOHN XXI.** (*Pedro*), b. at Lisbon, studied at Paris, and won great applause by his learning. He became cardinal-priest, archbishop of Braga, and first physician to Gregory X.; became pope in 1276. D. May 16, 1277, at Viterbo.—**JOHN XXII.** (*Jacques d'Ence*), b. at Cahors about 1244, became in 1300 bishop of Fréjus, archbishop of Avignon 1310, in 1312 cardinal-bishop, and in 1316 pope at Avignon. He was learned in the canon law, and was remarkable for avarice.—**JOHN XXIII.** (*Balthazar Cosca*), b. at Naples, became cardinal in 1402, and succeeded Alexander V. in 1410; convoked the Council of Constance 1413; was deposed in 1415, and d. Nov. 22, 1419. CHARLES W. GREENE.

**John I.** (*JUAN*), king of Aragon, b. Dec. 27, 1350; married in 1384 Yolande, daughter of the duke of Bar, granddaughter of John II. the Good of France; succeeded to the throne on the death of his father, Peter IV., Jan. 5, 1387; imprisoned Sibylle, his wife's mother, on the charge of having poisoned the late king, and seized upon her property; recognized Clement VII. as pope at Avignon, and devoted himself to literature and pleasure, leaving the cares of state to his queen. He sent a formal deputation to France to enlist the most famous troubadours, with whose aid he founded at Barcelona an academy of poetry on the model of the Floral Games of Toulouse, much to the disgust of the rude Aragonese. He successfully repelled the invasion of the count of Armagnac, a pretender to the throne, 1390; reconquered the island of Sardinia 1392; and d. May 19, 1395.

**John II.** (*JUAN*), king of Aragon and Navarre, b. June 29, 1397, son of Ferdinand the Just; married in 1419 Blanche, daughter of Charles III. of Navarre, and succeeded to the throne of that kingdom in right of his queen Sept., 1425; took an active part in intrigues at the court of Castile against Alvaro de Luna; in 1428 aided his

brother, Alfonso V. of Aragon, in a war against Castile, and accompanied him in an expedition against Naples, in which both kings were taken prisoners by the Milanese in the celebrated naval battle of Ponza, near Gaeta, Aug. 5, 1434. Released shortly after, he administered the government of Aragon for many years in his brother's absence, and renewed his attempts to obtain supreme influence in Castile. Queen Blanche having died Apr. 3, 1441, Carlos, prince of Viana, claimed the throne of Navarre in his mother's right, but John refused to surrender it to his son, thereby giving rise to a long and lamentable family feud. John invaded Castile in 1445, and was defeated at Olmedo; married in 1447 Joanna Henriquez, daughter of the admiral of Castile; suppressed a revolt in Navarre in 1452, taking prisoner his son, Prince Carlos; disinherited that prince in 1455 on account of a second rebellion, and deposed him at Estella in 1456; John succeeded to the throne of Aragon July 5, 1458; declared Sicily and Sardinia annexed to Aragon, and soon had new troubles with his son, whom he unwillingly recognized as heir, but afterwards threw into prison (1460), and whose sudden death (1461), attributed to poison, was the pretext for a formidable revolt in Catalonia, lasting eleven years. He had similar troubles with his daughter Blanche, who died in prison at Orthes Dec. 2, 1464; took Barcelona in 1472; made war in Roussillon against Louis XI. of France in 1473; and d. at Barcelona Jan. 19, 1479, being succeeded by his son Ferdinand, known as *the Catholic*. (See Prescott's *Ferdinand and Isabella*.)

**John I.** (*JUAN*), king of Castile and Leon, b. at Epila Aug. 20, 1358; married Leonora of Aragon in 1375, and succeeded to the throne on the death of his father, Henry II. (of Trastámara), being crowned July 25, 1379. He immediately convoked the Cortes, who after long deliberation recognized the Avignon claimant to the papacy (Clement VII.). **JOHN OF GAUNT**, duke of Lancaster (which see), having assumed the title of king of Castile in right of his wife, a daughter of Peter the Cruel, and Ferdinand of Portugal having entered into a secret alliance with the English duke, John attacked Portugal by sea and land, obtaining several victories, but concluded peace by marrying Beatrice, then aged ten years, only child and heir of the Portuguese monarch. Ferdinand, however, dying in 1383, John of Castile had to wage another war in support of the rights of Beatrice against the claim of the grand master of Avis (see **JOHN I. THE GREAT**, king of Portugal), and would have captured Lisbon (1384) had not the yellow fever driven him away. His defeat next year at Aljubarrota was fatal to the claims of Blanche. After several years' delay the duke of Lancaster invaded Castile in 1386, but peace was made the following year by the marriage of Prince Henry to the daughter of the English duke, who also received an indemnity in money. John created his son prince of Asturias (1388), convoked Cortes, which settled many important constitutional questions (1390), and d. Oct. 9, 1390.

**John II.** (*JUAN*), king of Castile and Leon, b. Mar. 6, 1405, succeeded his father, Henry III., in Dec., 1406, under the regency of his mother and his uncle Ferdinand, afterward king of Aragon. The infant monarch was crowned at Segovia Jan. 15, 1407; married his cousin, Mary of Aragon, in 1418 or 1420, and fell under the influence of ALVARO DE LUNA (which see), formerly a page, whom in 1423 he created constable of Castile. Prince Henry of Aragon, grand master of Santiago, brother of the queen, endeavored to gain possession of supreme power (1420) by seizing upon the persons of the king and the favorite. After many alternations of fortune in a struggle for power between Luna and the infantes of Aragon, lasting for many years, the former was beheaded at Valladolid June 7, 1453. John meanwhile had made two wars against the Moors (1431 and 1435), and several against the intrusive princes of Aragon and Navarre, who were constantly inciting the nobles of Castile to revolt. John was a feeble prince, but possessed some literary ability, and his reign was a notable one in the intellectual history of Spain. D. July 21, 1454.

**John**, king of England, surnamed **LACKLAND** (*Sans Terre*), either as a younger and portionless son, or on account of his loss of a large part of his French possessions in 1203, b. at Oxford Dec. 24, 1166, the son of Henry II.; declared lord of Ireland by papal authority, his short-lived government of that country was an utter failure; and during the reign of his brother, Richard Lionheart, who made him feudal lord of almost one-third of England, he was guilty of treason and ingratitude. Nevertheless, Richard appointed him his successor, ignoring the claims of his nephew Arthur, the rightful heir. John became king in 1199, and an expensive war with Arthur and Philip Augustus of France ensued, in which John lost the best part



of his French territories. The tale of the king's cruelties to Arthur has been called in question. Soon after followed the controversy concerning investitures with Innocent III., the most powerful of the popes, who excommunicated and deposed John, laid an interdict on England, and let loose the armies of France upon the king, who retaliated, we are told, by an alliance with the Moors of Spain (1212), promising to turn Mussulman. But John, not sustained by his own people, was compelled to yield and become the vassal of the pope, greatly to the indignation of the English. In Wales, Scotland, and Ireland his arms were successful. A rising of his barons compelled him to sign Magna Charta (1215); the aid of the pope and an army of mercenaries enabled him to repudiate that charter and make head against the barons; but during the war he died at Newark Oct. 19, 1216. John's rapacity and cruelty to Jews and Englishmen alike, his partiality for his Aquitanian and Poitevin subjects, his punishments by mutilation and starvation, his cowardice and impiety, rendered his name odious, but his memory has found recent defenders, and it is certain that nearly all our knowledge of him has been derived from his bitter enemies.

**John II.**, king of France, surnamed *THE GOOD* (LE BON), b. Apr. 26, 1319, was son of Philip VI., the founder of the Valois line; succeeded to the throne Aug. 22, and was crowned at Rheims Sept. 26, 1350. The chief event of his reign was the war with England, in which he was defeated and taken prisoner by the Black Prince at Poitiers, Sept. 19, 1356. His captivity in Bordeaux and London (1356-60) was brought to an end by the humiliating peace of Brétigny (May, 1360), which surrendered several provinces to the English, in addition to a ransom of 3,000,000 crowns. His son, the duke of Anjou, was left in London as a hostage for the fulfilment of the treaty, but it was rejected by the States General. The prince having escaped from London in violation of his parole, John returned to London as a prisoner early in 1364, and died there Apr. 8 of the same year.

**John II.**, *Casimir*, king of Poland from 1648 to 1668, b. Mar. 21, 1609, the second son of Sigismund III. After a somewhat adventurous life he entered in 1640 the order of the Jesuits, and was made a cardinal soon after. Nevertheless, on the death of his elder brother, Ladislas (Nov. 20, 1648), he succeeded to the throne, and married his widow, Maria Gonzaga. His reign was very unhappy. To Sweden he lost, by the Peace of Oliva (May 3, 1660), Estonia and Livonia, and to Russia, by the Peace of Andrussov (Jan. 14, 1667), White and Red Russia. In the interior his government was utterly distracted by the feuds and intrigues of the nobles; and, entirely unable to master the situation, he abdicated Sept. 16, 1668, went to France, and lived in retirement. D. at Nevers Dec. 16, 1672.

**John III.**, *Sobieski*, king of Poland from 1674 to 1696, b. June 2, 1624, at Olesko in Galicia; received an excellent education at home and in foreign countries, and distinguished himself so much in the wars against the Swedes, Russians, and Transylvanians that in 1667 he was made commander-in-chief of the whole Polish army. The successor of John II., Casimir, Michael Korybut, having made a humiliating treaty with the Turks, Sobieski had it rejected by the Polish diet, hastened at the head of his army to meet the Turks, and routed them completely at Khotin (Nov. 11, 1673). Shortly after Michael Korybut died, and Sobieski was unanimously elected king of Poland (May 21, 1674). In 1683 the Turks besieged Vienna with an army of 300,000 men. The emperor had fled, and not only was Austria on the very verge of ruin, but Europe was in danger. With an army of hardly 50,000 men Sobieski attacked the Turks Sept. 12, 1683, and after a frightful contest he utterly defeated them and pursued them into Hungary. As a ruler, however, John III. was much less fortunate than as a general, and the latter part of his life was much disturbed by civil and domestic troubles. D. June 17, 1696.

**John** (JOAN), the name of six kings of Portugal, four of whom require mention.—**JOHN I. THE GREAT**, b. at Lisbon Apr., 1357, was a natural son of Peter I. and brother of Ferdinand, at whose death, in 1383, he became regent and seized upon the throne, in violation of the rights of the infanta Beatrix, married to John I. of Castile. The war which ensued was decided by the victory of Aljubarrota (Aug. 14, 1385), in favor of the former. He made an expedition into Africa, and took Ceuta (1415) from the Moors. Under his reign the islands of Madeira, Cape Verde, the Canaries, and Azores were discovered, and the coasts of Africa explored as far as the Gulf of Guinea. D. Aug. 14, 1433.—**JOHN II. THE PERFECT**, b. at Lisbon May 3, 1455; married Leonora of Lancaster in 1471; took part in an African campaign the same year; was conspicuous for bravery at the battle of Toro (1476); succeeded his father, Alfonso

V., Aug. 29, 1481; put to death the duke of Braganza and his own brother-in-law, the duke of Visco, for conspiracy (1483-84). Under his auspices a series of great navigators explored the coasts of Africa, B. Diaz discovered the Cape of Good Hope, and Da Gama visited India. He was unwise enough to refuse the services of Columbus, but after the discovery of America he sent a fleet thither (1493). The conflicting claims of the crowns of Portugal and Castile were decided by Pope Alexander VI. (1493) by establishing the famous meridian line. D. 1495.—**JOHN IV.**, b. at Villaviciosa Mar. 19, 1604, was duke of Braganza, and by a successful revolution overthrew the Spanish usurpation in Portugal (1640), which had lasted sixty years, placing himself on the throne of his ancestors. His reign of fourteen years was entirely passed in hostilities with Spain. D. in Lisbon in 1656.—**JOHN VI.**, b. at Lisbon May 13, 1767; married Charlotte (Carlota), infanta of Spain 1785; was named prince of Brazil 1788; governed the kingdom in consequence of his mother's illness 1789; assumed the title of regent 1799, and after a series of wars with Spain and France removed with his court to Brazil in Nov., 1807, on the approach of the French army of occupation; became king on the death of his mother, Mar. 16, 1816; returned to Portugal 1821; modified the constitution 1823; recognized the independence of Brazil 1825, and d. Mar. 10, 1826.

**John of Austria**, generally known under the name of *DON JUAN DE AUSTRIA*, was a son of Charles V. and the beautiful Barbara Blomberg, a daughter of a wealthy citizen of Ratisbon, where he was b. Feb. 24, 1545, but was taken to Spain soon after his birth, and his parentage was kept a secret for many years. He received an excellent education, however, in the house of the imperial steward, Don Luis Mendez Quixada, and after the death of Charles V. in 1559, Philip II. publicly acknowledged him as a brother, and established a princely household for him, first in Valladolid and then in Madrid. He was a brilliant person, gifted with great talents both as a general and as a statesman, beautiful, commanding, chivalrous, and magnanimous. In 1568 he led with great success an expedition against the African pirates. In 1569 he subdued the Moorish rebellion in Granada, and gave striking proofs not only of personal valor, but also of tactical skill. In 1571 he commanded the magnificent Spanish-Italian armament against the Turks, and routed their fleet completely in the battle of Lepanto (Oct. 7, 1571), the greatest military exploit of the century. In 1573 he conquered Tunis, and in 1576 he was made viceregent in the Netherlands. Here he did not succeed in managing the prince of Orange, William the Silent. He was foiled by him in his political measures, but when it came to an open rupture he defeated him at Gemblours (Jan. 31, 1578). In spite of all these brilliant achievements, the final result of his life was nevertheless only a romantic apparition, a poetical dream. He passed through history like a meteor. His half-brother, Philip II., loved him, but was too despotic to allow him an independent career. He used him very freely, but was too suspicious to place full confidence in him. In this ambiguity his own character seems to have suffered. His earlier plans of founding a kingdom in Greece or in Tunis were sensible, but were opposed by Philip. His later plans of rescuing Mary Stuart and becoming king of Scotland were rather fantastical, and the policy which he pursued in the Netherlands was so singularly many-sided that his sudden death in his camp at Namur (Oct. 1, 1578) gave rise to a quite general suspicion of his having been poisoned by the Spaniards. Interesting accounts of his life may be found in Ranke, *Ersten und Völker von Süd-Europa* in XVI. und XVII. Jahrhundert, and in Prescott, *Philip II.* CLEMENS PETERSÉN.

**John** (JUAN) of Austria, b. at Madrid in 1629, was a natural son of Philip IV. of Spain. He became a distinguished general, having commanded the Spanish army in Naples in 1648, in Catalonia in 1652, in Flanders in 1656, and in Portugal in 1660. He was defeated by Turcotte at the Dunes, June 11, 1658; was afterwards viceroy of Aragon and minister under Charles II. D. at Madrid Sept. 17, 1679.

**John of Gaunt** (*Ghent*), duke of Lancaster and Aquitaine, and titular king of Castile, was the fourth son of Edward III., and was b. at Ghent in 1339; married Blanche, daughter of the duke of Lancaster, 1359; became duke of Lancaster 1362; served with honor under the Black Prince, and in 1370 married the daughter of Peter the Cruel of Castile; served with distinction in various wars in Scotland and France; invaded Castile in 1386 in pursuance of his claim to that kingdom; married his daughter to Henry of Castile 1388; was the friend and defender of Wickliffe, and the ancestor of the Lancastrian and Tudor families of English kings. His mistress and third wife, Catharine Swynford, was the ancestress of the Beauforts and Tudors. D. Feb. 3, 1399.



**John of Leyden**, whose true name was JOHANN BOCKELSON, b. at Leyden in 1510, was a tailor by profession, but a poet and actor by talent and business. Having come in contact with the Anabaptists, he was caught by religious fanaticism, and started as a strolling preacher. In 1533 he came to Münster, and so great was his power over the minds of people that in 1534 he succeeded in overthrowing the constitution of the city and establishing a new one of his own make. He was crowned as king of Zion, appointed ministers, coined money, introduced polygamy, married fifteen wives, lived in royal splendor and luxury, and for more than a year the city was the stage for the most frightful scenes of fanatical cruelty and sensual dissipation. In 1535 it was conquered by the neighboring princes, and again reduced to order. John was tortured to death by hot pincers, and his body was hung in a cage on the tower of St. Lambert's church; many of his followers were also severely punished. John of Leyden furnishes the historical subject of Meyerbeer's well-known opera *Le Prophète*.

**John of Salisbury**, b. at Salisbury about 1110; went to France in 1136; studied under Abelard; returned in 1151; became secretary to Thomas à Becket, and was appointed in 1176 bishop of Chartres, where he d. Oct. 24, 1182. His theological system he developed in his *Polycriticus* and *Metaphysicus*, but the most interesting of his writings are his *Vita ac Passio S. Thomæ*, and his letters, numbering 302, edited by Mason (Paris, 1811). A collected edition of his works was published at London (1848, 2 vols.).

**John of Swabia**, generally known under the name of JOHANNES PARREIDA, b. in 1289, a son of Rudolph of Swabia and a grandson of Rudolph of Hapsburg. When he attained his majority he demanded his inheritance from his uncle, the emperor Albert I., but Albert refused to deliver up any of the estates he had taken possession of. John then formed a conspiracy with several nobles, overtook the emperor (May 1, 1308) at Winndisch on the Reuss in Switzerland, and murdered him. The impression which this crime produced on the German people was one of horror and revenge. The conspirators themselves escaped, but their families and friends suffered severely. John vanished, and nothing certain is known of his life afterwards.

**John, Prester** ("Priest John"), a semi-mythical character who figured largely in the geographical romances of the Middle Ages, whose true country and period are difficult to be fixed with certainty. According to general belief, there was somewhere in the interior of Asia or Africa a kingdom which had been converted from Islam to Christianity, governed by a priest-king named John, who was exceedingly anxious to open friendly intercourse with the Church of Rome. Numerous embassies were during two centuries sent to Central Asia, and even to Abyssinia (1481-95), in search of the lost Christian nation, but the search proved fruitless. The origin of the legend appears to date from the Nestorian missions which in the eleventh and twelfth centuries penetrated to Karakorum in Toorkistan, and converted the khan of that district, named *Ung*, who was overthrown and killed by Genghis Khan in 1202. He appears to have authorized the Nestorians to make in his name certain requests of the pope, and to their glowing narratives, sent to the Greek emperor and to the kings of France and Portugal, Europe was indebted for a favorite cycle of legends which may be read in Assemani's *Bibliotheca Orientalis*. Father Rubruquis, sent by St. Louis, king of France (1253), in search of Prester John, penetrated to Karakorum. (See his interesting narrative in Purchas's *Pilgrims*.)

**John Scotus**. See ERIGENA.

**John the Constant**, elector of Saxony, b. June 30, 1467; succeeded his brother, Frederick the Wise, in May, 1525; took part in a war against the Hungarians, and put an end to the Peasants' war in his own dominions. In 1526 he formed an alliance with the landgrave, Philip of Hesse, and with other states and free cities, in support of the principles of the Reformation, lately inaugurated by Luther. He protested in 1529 against the decision of the Diet of Spires adverse to the Reformation, and was influential in causing the proclamation of the Augsburg Confession. Still later, he helped to form the "League of Schmalkald," and d. Aug. 16, 1532.

**John Frederick, the Magnanimous**, elector of Saxony, b. at Torgau June 30, 1503, son of John the Constant, on whose death, in 1532, he became administrator of the government in the joint name of himself and his younger brother, John Ernest; gave official sanction to the Reformation throughout his states 1533; was recognized as elector by the emperor at Vienna in 1534, and in 1546 was at the head of the armies of the Schmalkaldic League in the contest with Charles V., by whom he was put under the

ban of the empire in 1547, and defeated at Mühlberg Apr. 24 of the same year, being taken prisoner and condemned to death (May 10), but his life was spared on condition of renouncing his claims to the electorate. He was liberated in 1552 through the vigorous interposition of his cousin, Maurice of Saxony, who had formerly been his rival for the electoral domains. John Frederick succeeded to the full title by the death of his brother, John Ernest, in 1553, and d. at Weimar Mar. 3, 1554.

**John George I.**, elector of Saxony, b. Mar. 5, 1585; succeeded his brother, Christian II., in 1611; supported the emperor Ferdinand against the Bohemians in 1620, at the outset of the Thirty Years' war; formed an alliance with Gustavus Adolphus, king of Sweden (1631); contributed to the victory of Leipsic, and took Prague (Nov. 11), but lost it, with all Bohemia, to Wallenstein in 1632; made peace with the emperor at Prague (May 10, 1635), and declared war against Sweden; was defeated by the Swedes at Domnitz and at Wittstock (1636); aided the imperialists against France in the battle of Dülzlingen (1643), and d. Oct. 8, 1656.

**John** (JOHANN BAPTIST JOSEPH FABIAN SEBASTIAN), archduke of Austria, b. at Florence Jan. 20, 1782, the thirteenth child and the ninth son of Leopold II. and Maria Louisa of Spain. When he was very young he was generally believed by his family to be possessed of great military talents, and he consequently commanded the Austrian armies in 1800, 1803, 1805, and 1809. But he was always beaten, and when at the battle of Wagram he failed, for reasons not well understood, to bring his brother, the commander-in-chief, the proper support, he resigned his command and lived during the subsequent years in retirement in Grätz. The ill favor, however, with which he was considered by the court made him very popular, and in 1848 he was generally believed by the people to be possessed of great political virtues. He was chosen Reichsverweser by the Parliament of Frankfurt. But once more he had the misfortune of disappointing his admirers. He was a most obstinate defender of the interests of the house of Austria, and as these did not always coincide with the interests of the German people, he resigned his Reichsverweserschaft Dec. 29, 1849. D. Mar. 10, 1859.

**John, King of Saxony**. See JOHANN.

**John, von** (FRANZ), BARON, b. in 1815 at Bruck, Lower Austria; entered when twenty years old the 52d regiment of infantry as lieutenant. His ability procured him a place on the staff. In the war of 1848 against the revolution in Italy he accompanied Field-marshal Radetzky as a captain, and was ever afterwards employed in important positions. He was chief of staff (1849-57) of the Austrian army of occupation in Tuscany and the papal states, and received there the command of the regiment Kaiser Franz Joseph No. 1. In 1859 he was chief of staff of the 6th army corps, and in 1861 was created a major-general; in 1866 was appointed chief of staff of the southern army under Archduke Albrecht, and created a field-marshal-lieutenant on the day after the victory at Custoza; and when Archduke Albrecht was appointed commander-in-chief of the whole Austrian force, including the army defeated at Königgrätz, John became chief of his staff. After the war he was appointed minister of war, but retired in 1868 from this office, and was in 1869 made commander-general of Styria, Carinthia, Carniola, and Littoral. In 1874 he was made master of the ordnance and chief of staff of the whole army—a position which in Austria has become of great importance since the organization of the Prussian staff has been taken as a model. D. May 25, 1876. AUGUST NIEMANN.

**John Quincy Adams**, tp., Warren co., Ind. Pop. 809.

**Johns**, tp. of Appanoose co., Ia. Pop. 895.

**Johns'burg**, post-tp. of Warren co., N. Y. It is traversed by the Adirondack R. R.; is very mountainous; has iron ores and several tanneries. Pop. 2599.

**John's Island**, one of the sea islands of Charleston co., S. C. Pop. 2016.

**Johnson**, county of N. W. Arkansas, bounded on the S. by the Arkansas River. Area, about 550 square miles. The soil is partly hilly and partly bottom-land. It is well wooded and generally fertile. Tobacco, live-stock, cotton, and grain are staple products. Excellent semi-bituminous coal and iron ore are found. Cap. Clarksville. Pop. 9152.

**Johnson**, county of E. Central Georgia. Area, 250 square miles. It has a diversified surface. Cotton and corn are staple products. Cap. Wrightsville. Pop. 2964.

**Johnson**, county of S. Illinois. Area, 340 square miles. It is quite level and fertile. Tobacco, grain, cattle, and wood are staple products. It is traversed by the Cairo and Vincennes R. R. Cap. Vienna. Pop. 11,248.

**Johnson**, county of S. Central Indiana. Area, 320 square miles. It is undulating and very fertile. Cattle,

grain, and wool are staple products. Lumber, carriages, flour, and brick are leading articles of manufacture. The county is traversed by the Jeffersonville Madison and Indianapolis and the Cincinnati and Martinsville R. Rs. Cap. Franklin. Pop. 18,566.

**Johnson**, county of S. E. Iowa. Area, 616 square miles. Its surface is varied, its soil remarkably fertile. Cattle, grain, hay, and wool are staple products. The county is traversed by the Chicago Rock Island and Pacific and the Iowa Central R. Rs. Cap. Iowa City. P. 24,898.

**Johnson**, county of Kansas, having the Kansas River on the N. and Missouri on the E. Area, 172 square miles. It is well timbered, and has coal and limestone and a deep, fertile soil. Cattle, grain, and wool are staple products. The county is traversed by various railroads centring at Olathe, the capital. Pop. 13,684.

**Johnson**, county of E. Kentucky, traversed by the W. fork of Big Sandy River. Area, about 375 square miles. It is mountainous, and abounds in bituminous coal. The fertile valleys produce live-stock, grain, tobacco, and wool. Cap. Paintsville. Pop. 7,494.

**Johnson**, county of W. Missouri. Area, 790 square miles. It is partly forest and partly prairie, having a good soil, with abundant coal and water-power. Cattle, grain, tobacco, and wool are staple products. It is traversed by the Missouri Pacific R. R. Cap. Warrensburg. Pop. 24,648.

**Johnson**, county of S. E. Nebraska. Area, 378 square miles. It is traversed by the Great Nemaha River and the Atchison and Nebraska R. R. It has an excellent soil, but is deficient in timber and building-stone. Wheat and corn are staple products. Some coal is found. Cap. Tecumseh. Pop. 3,429.

**Johnson**, county of N. E. Tennessee, bounded on the N. by Virginia and on the S. E. by North Carolina. Area, about 200 square miles. It is mountainous, heavily timbered, and has iron and other mineral wealth. Cattle, wool, and tobacco are staple products. Cap. Taylorsville. Pop. 5,852.

**Johnson**, county of N. Texas, bounded on the W. chiefly by Brazos River. Area, 594 square miles. The soil is excellent. Live-stock, cotton, and grain are staple products. Timber and limestone are abundant. Cap. Cleburn. Pop. 19,237.

**Johnson**, tp. of Greene co., Ark. Pop. 683.

**Johnson**, tp. of Little River co., Ark. Pop. 271.

**Johnson**, tp. of St. Francis co., Ark. Pop. 788.

**Johnson**, tp. of Union co., Ark. Pop. 1,309.

**Johnson**, a. v. of Henry co., Ga. Pop. 662.

**Johnson**, tp. of Christian co., Ill. Pop. 640.

**Johnson**, tp. of Clark co., Ill. Pop. 823.

**Johnson**, tp. of Brown co., Ind. Pop. 685.

**Johnson**, tp. of Clinton co., Ind. Pop. 1,666.

**Johnson**, tp. of Crawford co., Ind. Pop. 652.

**Johnson**, tp. of Gibson co., Ind. Pop. 2,616.

**Johnson**, tp. of Knox co., Ind. Pop. 1,513.

**Johnson**, tp. of La Grange co., Ind. Pop. 1,322.

**Johnson**, tp. of La Porte co., Ind. Pop. 170.

**Johnson**, tp. of Ripley co., Ind. Pop. 2,409.

**Johnson**, tp. of Scott co., Ind. Pop. 1,454.

**Johnson**, tp. of Plymouth co., Ia. Pop. 80.

**Johnson**, tp. of Webster co., Ia. Pop. 402.

**Johnson**, tp. of Maries co., Mo. Pop. 1,257.

**Johnson**, tp. of Polk co., Mo. Pop. 898.

**Johnson**, tp. of Ripley co., Mo. Pop. 280.

**Johnson**, tp. of Scotland co., Mo. Pop. 1,219.

**Johnson**, tp. of Washington co., Mo. Pop. 747.

**Johnson**, tp. of Champaign co., O. Pop. 2,297.

**Johnson** (JOHNSTOWN P. O.), a v. of Monroe tp., Licking co., O. Pop. 241.

**Johnson**, tp. of Williamsburg co., S. C. Pop. 1,218.

**Johnson**, post-v. and tp. of Lamoille co., Vt., 32 miles N. by W. of Montpelier. It has a State normal school, 4 churches, and manufactures of furniture, lumber, starch, and woollen goods. Pop. 1,688.

**Johnson** (ALEXANDER BRYAN), born Gosport, England, May 29, 1786; came to the U. S. in 1801, and established himself as a banker at Utica, N. Y. He wrote several works on political economy, language, and education, which have received high commendation. D. at Utica in 1857.

**Johnson** (ANDREW), LL.D., the seventeenth president of the U. S., b. at Raleigh, N. C., Dec. 29, 1808. His

father died when he was four years old, and in his eleventh year he was apprenticed to a tailor. He never attended school, and did not learn to read until late in his apprenticeship, when he suddenly acquired a passion for obtaining knowledge, and devoted all his spare time to reading. After working two years as a journeyman tailor at Laurens Court-house, S. C., he removed in 1826 to Greenville, Tenn., where he worked at his trade and married. Under his wife's instructions he made rapid progress in his education, passing from writing and arithmetic to the higher branches, and manifested such an intelligent interest in local politics as to be elected as "workingmen's candidate" alderman (1828-30) and mayor (1830-32), being twice re-elected to each office. During this period he cultivated his talents as a public speaker by taking part in a debating-society consisting largely of students of Greenville College. In 1835, and again in 1839, he was chosen to the lower house of the legislature as a Democrat; was a candidate for elector at large in 1840, when he canvassed the State for Van Buren; was elected State senator in 1841, and Representative in Congress in 1843, being re-elected for four successive periods until 1853, when he was chosen governor of Tennessee. In Congress he supported the administrations of Tyler and Polk in their chief measures, especially the annexation of Texas, the adjustment of the Oregon boundary, the Mexican war, and the tariff of 1846. He was re-elected governor in 1855, after an exciting contest with the combined Whigs and "Know-nothings," and in 1857 entered the U. S. Senate, where he was conspicuous as an advocate of retrenchment and of the Homestead bill, and as an opponent of the Pacific R. R. He was supported by the Tennessee delegation to the Democratic convention of 1860 for the Presidential nomination, and lent his influence to the Breckenridge wing of the party. When the election of Lincoln had brought about the first attempts at secession in Dec., 1860, Johnson took in the Senate a firm attitude for the Union, and in May, 1861, on returning to Tennessee, he was in imminent peril of suffering from popular violence for his loyalty to the "old flag." He was the leader of the Loyalists' Convention of East Tennessee (May and June), and was very active during the following winter in organizing relief for the destitute loyal refugees from that region, his own family being among those compelled to leave. By his course in this crisis Johnson came prominently before the Northern public, and when in Mar., 1862, he was appointed by Pres. Lincoln military governor of Tennessee, with the rank of brigadier-general, he vastly increased his popularity by the vigorous and successful manner in which he labored to restore order, protect Union men, and punish marauders. On the approach of the Presidential campaign in 1864, the termination of the war being then plainly foreseen, and several Southern States being partially reconstructed, it was felt that the Vice-Presidency should properly be given to a Southern man of conspicuous loyalty. For no candidate could a juster title be alleged than for Gov. Johnson, who was accordingly elected on the same platform and ticket with Lincoln, and on his assassination succeeded to the Presidency, Apr. 15, 1865. That Pres. Johnson should very soon be involved in bitter feud with the Republican majority in Congress was certainly a surprising and deplorable incident; yet in reviewing the circumstances after a lapse of ten years, it is easy to find ample room for a charitable judgment of both the parties to the heated controversy, since it cannot be doubted that any President, even Lincoln himself had he lived, must have sacrificed a large portion of his popularity in carrying out any possible scheme of reconstruction. Pres. Johnson retained the cabinet of Lincoln, and exhibited considerable severity towards "traitors" in his earlier acts and speeches, but soon inaugurated a policy of reconstruction, proclaiming a general amnesty to the late Confederates, and successively establishing provisional governments in the Southern States. These States accordingly claimed representation in Congress in the following December, and the momentous question of what should be the policy of the victorious Union towards its late armed opponents was forced upon that body. Two considerations impelled the Republican majority to reject the policy of Pres. Johnson: first, an apprehension, certainly exaggerated but sufficiently plausible at the time, that the chief magistrate intended to make the results of the war in regard to slavery; and second, the sullen attitude of the South, which seemed to be plotting to regain by policy what arms had lost. The credentials of the Southern members-elect were laid on the table, a civil rights bill and a bill extending the sphere of the Freedman's Bureau were passed over the executive veto, and the two highest branches of the government were soon in open antagonism. The action of Congress was characterized by the President in a popular language Feb. 27, 1866, as a "new rebellion;" the cabinet was reconstructed in July,



Messrs. Randall, Stanbery, and Browning taking the places of Messrs. Denison, Speed, and Harlan, and an unsuccessful attempt was made by means of a general convention at Philadelphia (Aug. 14) to form a new party on the basis of the administration policy. In an excursion to Chicago for the purpose of laying the corner-stone of a monument to Stephen A. Douglas (Aug. 28), Pres. Johnson, accompanied by several members of the cabinet, passed through Philadelphia, New York, and Albany, in each of which cities, and at many other places on the route, he made speeches justifying and explaining his own policy and violently denouncing the action of Congress. In the ensuing winter session Congress enacted over the President's veto a series of measures for extending the right of suffrage to the freedmen, dividing the Southern States into military districts, and excluding them from self-government until they should have ratified the late amendments to the Federal Constitution and adopted State constitutions in accordance therewith. An opinion of the attorney-general against the validity of this legislation led to conflicts between the military commanders and the new State governments, and to new acts of Congress defining the powers of the former, making them independent of the President's authority. On Aug. 12, 1867, Pres. Johnson removed the secretary of war, replacing him by Gen. Grant. Secretary Stanton retired under protest, based upon the Tenure-of-office act, which had been passed in the preceding March. The President then issued a proclamation (Aug. 20) declaring the insurrection at an end, and that "peace, order, tranquillity, and civil authority existed in and throughout the whole of the U. S." Another proclamation (Sept. 3) enjoined obedience to the Constitution and laws, and an amnesty was published Sept. 7, relieving nearly all the participants in "the late rebellion" from the disabilities thereby incurred, on condition of taking an oath to support the Constitution and laws. In December, Congress refused to confirm the removal of Secretary Stanton, who thereupon resumed the exercise of his office, but on Feb. 21, 1868, Pres. Johnson again attempted to remove him, appointing Gen. Lorenzo Thomas in his place. Stanton refused to vacate his post, and was sustained by the Senate. On Feb. 24, the House of Representatives voted to impeach the President for "high crimes and misdemeanors" (yeas 126, nays 47, not voting 17), and presented (Mar. 5) eleven articles of impeachment, on the ground of his resistance to the execution of the acts of Congress, alleging, in addition to the offence lately committed, his public expressions of contempt for Congress in "certain intemperate, inflammatory, and scandalous harangues" pronounced in Aug. and Sept., 1866, and thereafter, declaring that the 39th Congress of the U. S. was not a competent legislative body, and denying its power to propose constitutional amendments. The impeachment trial began Mar. 23, the President appearing by counsel, and resulted in acquittal May 16 and 26, the votes on the two leading articles standing 35 guilty to 19 not guilty, thus lacking one of the two-thirds required for conviction. The remainder of Pres. Johnson's term of office was passed without any such conflicts as might have been anticipated. He failed to obtain a nomination for re-election by the Democratic party, though receiving 65 votes on the first ballot. New proclamations of pardon to the participants in the rebellion were issued July 4 and Dec. 25, but were of little effect. On the accession of Pres. Grant, Mar. 4, 1869, Johnson returned to Greeneville, Tenn. Unsuccessful in 1870 and 1872 as a candidate respectively for U. S. Senator and Representative, he was finally elected to the Senate in 1875, and took his seat in the extra session of March, in which his speeches were comparatively temperate. D. July 31, 1875, and was buried at Greeneville. Several biographies of Pres. Johnson have been published, generally with a selection of his speeches, among which may be mentioned those of Savage (1865), Frank Moore (1865), and Foster (1866). (See also the official record of *Proceedings in the Trial of Andrew Johnson*, Washington, 1868.)

PORTER C. BLISS.

**Johnson** (LADY ARBELLA), daughter of Thomas, fourteenth earl of Lincoln, married Isaac Johnson, one of the principal founders of New England, and accompanied him to Massachusetts. In her honor Winthrop changed the name of the Eagle, the principal ship of the emigrant squadron, to Arbella. D. at Salem about Aug. 30, 1630.

**Johnson** (BUSHROD R.), b. in Ohio Sept. 6, 1817; graduated at West Point in 1840; served in the Florida and Mexican wars; resigned in 1847, and at the outbreak of the civil war was professor in the Nashville Military University. He became a brigadier-general in the Confederate army; was captured at Fort Donelson, but soon escaped; was severely wounded at Shiloh; became major-general in 1864, and commanded a division under Lee at the time of the surrender at Appomattox Court-house.

**Johnson** (CAVE), b. in Robertson co., Tenn., Jan. 11, 1793; became a lawyer and a circuit judge; was a member of Congress 1829-37 and 1839-45; was postmaster-general during Mr. Polk's Presidency; president of the Bank of Tennessee 1850-59; and during the civil war was elected to the State senate as a Unionist, but on account of feeble health he never took his seat. D. at Clarksville, Tennessee, Nov. 23, 1866.

**Johnson** (EASTMAN), b. in Lovell, Me., July 29, 1824. Took up drawing regularly at about eighteen; in 1845 went to Washington, had a room in the Capitol, and made many portraits of distinguished men. In 1846 established himself in Boston, and made crayon portraits of Longfellow and his family, Sumner, Felton, Hawthorne, and Emerson. In 1849 went to Düsseldorf; studied a year in the Royal Academy; occupied for a time a studio with Leutze. In 1851 spent a few weeks in London; thence to the Hague to copy a head by Rembrandt; stayed there four years, and sent thence his first pictures of consequence, *The Card-Players* and *The Savoyard*. Went to Paris, but was unexpectedly called home, after six years of absence. Spent two winters in Washington and two summers on Lake Superior among the Indians. Came to New York in the fall of 1858, with his picture *The Old Kentucky Home*, and still resides in New York. Mr. Johnson is a painter of genre pictures, but in a broader style than that term indicates. His pieces are all figure pieces, but with a wide range of subject. He views life on the pathetic, humorous, tender, heroic, and even on the comic side, always with keen perception and honest intent. He is a master of drawing and color, and rarely fails to convey effectively his whole thought. He has also been successful in portraits. The civil war furnished him subjects for his best-known works—*The Pioneer Boy*, *The Pensioner*, *Chin-Ann*, *The Boyhood of Lincoln*, *The Old Kentucky Home* depicts the South as it was before the abolition of slavery. *The Kitchen at Mr. Vernon* is another reminiscence of old times in America. *The Stage-coach*, *Savoyard Boy*, *Drop on the Sly*, *The Little Storekeeper*, *The Chimney sweep*, *The Chimney Corner*, *Post-boy*, *Organ-boy*, *Lordy at Prayer*, *Mating*, illustrate the variety of his themes. Mr. Johnson belongs to no school, native or foreign. His works are numerous, and, though of unequal merit, are highly prized. *The Old Kentucky Home* was sent to the Paris Exhibition in 1867. As a painter of human life as it is before him Mr. Johnson stands foremost among American artists.

O. B. FROTHINGHAM.

**Johnson** (EDWARD), b. at Herne Hill, Kent, England, in 1599, came to New England about 1630, settled at Woburn, and for many years represented that town in general court, of which body he was Speaker in 1655. He is chiefly known as the author of the curious and valuable historical work, *Wonder working Providence of Sion's Saviours in New England*, printed at London in 1654, reprinted by the Massachusetts Historical Society, and again edited, with notes, by W. F. Poole in 1867. D. at Woburn Apr. 23, 1672.

**Johnson** (EDWARD), b. in Chesterfield co., Va., Apr. 16, 1816; graduated at the U. S. Military Academy in 1838, and entered the army as second lieutenant; brevetted captain in 1847 for meritorious services in Florida, and major in 1848 for gallantry at Chapultepec and the city of Mexico; also presented with swords of honor by his native State and native county; commissioned captain in 1851; resigned from the army June, 1861, to join the Confederacy, and was at once appointed colonel of the 12th Georgia Vols.; brigadier-general 1862, and major-general the following year; commanded a division at Gettysburg, and in the Richmond campaign of 1864 taken prisoner, with his entire division, at Spottsylvania Court-house, May 12, as also subsequently at Nashville, Dec., 1864; retired to his farm in Chesterfield co., Va., at the close of the war. D. at Richmond, Va., Feb. 22, 1873.

G. C. SIMMONS.

**Johnson** (HERMAN MERRILLS), D. D., LL. D., b. Nov. 25, 1815, at Butternuts, Otsego co., N. Y.; graduated at the Wesleyan University in 1839; was 1839-42 professor of ancient languages in St. Charles College, Mo.; in 1842 was called to the same chair in Augusta College, Ky.; held the professorship of ancient languages and literature in the Ohio Wesleyan University, Delaware, O., 1844-50, and was for a part of the time its acting president; in 1850 became professor of English literature in Dickinson College, and was its president 1860-68. D. at Carlisle Apr. 5, 1868. Dr. Johnson was an able scholar, and a student of modern Greek, Hebrew, Anglo-Saxon, Gaelic, Irish, Welsh, Ethiopic, Syriac, Arabic, and other tongues. He was an instructive preacher and a careful writer; edited *Orientalia Antiquaria Herodoti*; also an edition of the *Clio* of Herodotus, with notes (1850), and wrote much for periodicals.

**Johnson** (HERSCHEL V.), b. in Burke co., Ga., Sept. 18, 1812; graduated at the State University 1834; adopted the



profession of law, and in 1840 entered the political arena as the advocate of the principles of Jeffersonian Democracy; was a Presidential elector on the State Democratic ticket in 1844, and was appointed in 1848 to fill a vacancy in the U. S. Senate; was elected to the bench in his judicial circuit in 1849; in 1853 was elected governor of the State, and reelected to the same office in 1855. In 1860 he was run for Vice-President of the U. S. on the ticket which was headed by Stephen A. Douglas for the Presidency; he was in the State secession convention of 1861, and took an active and prominent part against the policy adopted by that body; he voted against the ordinance of secession, but afterwards, when it was passed by a majority of the convention, he resolved to go with his State and sustain her in the course she had in her sovereign character adopted. Brought up in the State Rights school in politics, he believed his ultimate allegiance was due to his State. In 1863 he was elected to the Confederate States Senate, where he took and held a high position until the close of the war. He was president of the constitutional convention of the State in 1865. After the removal of the disabilities imposed by the fourteenth amendment to the Constitution of the U. S., he was again, in 1873, placed on the circuit bench for a term of eight years. In the mean time (that is, from the close of the war to the removal of the disabilities referred to) he had resumed the practice of law, which he prosecuted with great success. In Jan., 1866, on the restoration of the State to the Union under the proclamation of Pres. Johnson, he was chosen as one of the two U. S. Senators to which Georgia was entitled under the Constitution. The duties of this office, however, he was not permitted to enter upon; his seat was denied him by the reconstruction acts of Congress. As an orator, constitutional lawyer, and jurist Mr. Johnson has few superiors in the U. S.

A. H. STEPHENS.

**Johnson (ISAAC)**, b. at Clispsam, Rutlandshire, England, about the close of the sixteenth century; married the Lady Arbella, daughter of the earl of Lincoln, and associated himself with Winthrop in the settlement of New England, being the wealthiest of the colonists and much respected. He is considered one of the chief founders of Boston, where he d. Sept. 30, 1630.

**Johnson (JAMES)**, b. in Robinson co., N. C., in 1811. His father moved to Georgia and settled in Macdonough when he was but a boy. After an academic course in this village he graduated with high honor at the State University in 1832, taught school for a short time, and then commenced the practice of law as a profession, in which he soon attained high eminence; was a member of Congress from Georgia from 1851 to 1853. Being a strong Union man, and opposed to secession, though he went with his State during the war, at its close, in 1865, Pres. Johnson chose and appointed him as provisional governor of Georgia under what was known as the President's policy. This position Mr. Johnson held, and discharged the duties incident to it to the general satisfaction of the people, until the State was restored to the Union on the conditions and requirements then prescribed. In 1866 he was appointed collector of the customs at Savannah, which office he resigned in 1869. Soon after he was placed on the circuit court bench of the State, which position he still (Apr., 1875) holds.

A. H. STEPHENS.

**Johnson (Sir JOHN)**, b. in 1712, was a son of Sir William Johnson; was knighted in 1763, and succeeded in 1774 to his father's great estates and influence in the Mohawk Valley. In 1776 he fled to Canada with 700 followers, raised two battalions called the Royal Greens, was commissioned a colonel, invested Fort Stanwix in Aug., 1777, defeated Gen. Herkimer, and was himself defeated in Oct., 1780. His property was confiscated by the U. S., but the British government made him several grants of lands in Canada, where he became a member of the colonial council and superintendent of Indian affairs until his death at Montreal Jan. 4, 1830.

**Johnson (JOSEPH)**, M. D., b. at Charleston, S. C., June 5, 1776; studied medicine at the University of Pennsylvania, and practised at Charleston with Dr. Elisha Poinsett. From 1818 to 1835 was president of the U. S. branch bank at Charleston, was active in literary, professional, and political associations, president of the South Carolina Medical Society from 1807 for many years; long mayor of Charleston, commissioner of schools, and leader of the Union party in the nullification troubles. He published in 1851 a valuable work, *Traditions and Reminiscences of the Revolution*.

**Johnson (JOSEPH TABER)**, M. D., b. at Lowell, Mass., June 30, 1845; graduated A. M. at Columbian University, D. C., in 1864; took his degree at Bellevue Medical College, N. Y., in 1867, and completed his medical studies in Europe in 1871; was professor of obstetrics in the medical

department of Howard University, surgeon to the Freedmen's Hospital and St. John's Hospital, and in 1874 became lecturer on midwifery at the medical department of the University of Georgetown, D. C.; wrote *Peculiarities of Parturition in the Negro Race*, and *Angina Pectoris*, illustrated by the case of Hon. C. Sumner.

**Johnson (MANUEL JOHN)**, F. R. S., b. in England in May, 1805; studied at Addiscombe Military School; joined the East India Company's artillery at St. Helena in 1821, and remained there eleven years, during which he cultivated astronomy and prepared a catalogue of 606 stars of the southern hemisphere; returning to England, he entered Magdalen College, Oxford, at the mature age of twenty-eight, and graduated in 1839, when he was immediately appointed Radcliffe astronomer. In that capacity he greatly extended the lists of stars by his annual catalogues, and introduced improved astronomical instruments. His observations of double stars with the great heliometer, and his photographic registration of stars, were especially important. Prof. Johnson was president of the Royal Astronomical Society in 1857 and 1858. D. at Oxford Feb. 28, 1859.

**Johnson (MARY ANNE)**, first wife of Oliver Johnson, and daughter of Rev. Broughton White, b. in Westmoreland, N. H., Aug. 24, 1808; d. in New York June 8, 1872. For three years (1844-47) she was associated as assistant matron with Mrs. Eliza W. Farnham in the memorable effort to reform the State prison for females at Sing Sing. She subsequently became a lecturer to her own sex upon anatomy, physiology, and the laws of health, traveling extensively in the pursuit of that object in different parts of the U. S.

**Johnson (OLIVER)**, b. in Peacham, Vt., Dec. 27, 1809; served an apprenticeship to the printing business in the Watchman office, Montpelier, Vt.; Jan. 1, 1831, became the editor of a new paper, the *Christian Sublime*, and was from this time, and up to the year of 1865, busily engaged in the service of the anti-slavery cause as a lecturer and as an editor, manager, and contributor to newspapers. During the next five years and a half he was the managing editor of the *Independent*, resigning at the end of 1870 to become editor of the *Weekly Tribune*. After two years' service at this post he resigned at the end of 1872 to become managing editor of the *Christian Union*.

**Johnson (PERCIVAL NORTON)**, F. R. S., b. in England about 1793, was the son of a London assayer, and early acquired great skill in the same profession. He was the first to determine with accuracy the exact proportions of gold and silver in bullion. He introduced into England from Germany the alloy known as German silver, extracted palladium and platinum from gold bullion, and manufactured them for commercial purposes. He invented several pottery colors, especially the much-admired "rose-pink." His services were in great request as a consulting metallurgist at the great English mines, and he introduced numerous improvements into the machinery of the Cornish mines. He was elected a fellow of the Royal Society in 1846, and d. in London June 1, 1866.

**Johnson (REVERDY)**, b. at Annapolis, Md., May 21, 1796, son of Chancellor John Johnson of that State; educated at St. John's College; studied law in his father's office, and admitted to the bar in 1815; removed to Baltimore in 1817, and was shortly after appointed deputy attorney-general of Maryland; was a State senator 1821-25, resigning in the latter year to attend to the increasing duties of his profession, in which he gained a leading position in his native State, as well as at the bar of the Supreme Court of the U. S. In 1845 he was elected to the U. S. Senate from Maryland, and in 1849, Pres. Taylor appointed him attorney-general of the U. S., which office he held until the death of Pres. Taylor, when he retired and resumed the practice of his profession; was member of the peace commission in 1861; U. S. Senator 1862-68; succeeded Mr. Charles Francis Adams as U. S. minister to England in 1868, and negotiated a treaty for the settlement of the Alabama claims, which was rejected, however, by the U. S. Senate. Recalled in 1869. D. Feb. 9, 1876.

**Johnson (RICHARD MENTOR)**, b. in Kentucky Oct. 17, 1780; was educated at Transylvania University; studied law and was admitted to the bar; in 1801 was elected to the legislature, and was a member of Congress 1807-19; in 1812, after the declaration of war by Great Britain, he raised a regiment of Kentucky mounted riflemen, which he commanded on the Canadian frontier during the fall of that year. After the adjournment of Congress, Mar. 1813, he raised another mounted regiment of volunteers, with which he guarded the Indian frontier during the summer months, and joined Gen. Harrison in time to render brilliant service in the battle of the Thames on Oct. 5. It was by his hand the celebrated Indian warrior Tecumseh is reported



to have fallen. In this engagement Col. Johnson was desperately wounded. He was, however, able to resume his seat in Congress in February ensuing; in 1819 was elected to the U. S. Senate, and remained a member of that body until 1829; after this he was again a member of the House 1829-37; in 1836 was run for the Vice-Presidency of the U. S. in most of the States, on the same ticket which supported Mr. Van Buren for the Presidency. He received 147 of the electoral votes, but this was a few votes short of a majority of the whole, though largely above the number received by any other one of the candidates voted for. In this state of things the choice for Vice-President devolved on the Senate under the Constitution of the U. S. In the discharge of this duty the Senate in Mar., 1837, made choice of Col. Johnson for the office of Vice-President for the four years ensuing. In Mar., 1841, he returned to his home in Kentucky, after having devoted thirty years of his life continuously to the public service. Perfect retirement, however, was not allowed him. He was again retained a member to the State legislature, and while holding this position d. at Frankfort, Ky., Nov. 19, 1850, at the advanced age of a little over eighty years. He was distinguished throughout his life for kindness of heart and urbanity of manners. He was the author of the law abolishing imprisonment for debt in Kentucky. A. H. STEPHENS.

**Johnson** (RICHARD W.), A. B., A. M., b. in Livingston co., Ky., Feb. 7, 1827; graduated from the U. S. Military Academy in 1849, and entered the army as brevet second lieutenant of infantry; transferred to the cavalry 1855 as first lieutenant; promoted to be captain 1857, major 1862; engaged in campaigns against Indians in Texas 1849-61; appointed brigadier-general of volunteers Oct., 1861, and in command of a division of infantry at Stone River, Liberty Gap, Chickamauga, Missionary Ridge, and all the battles on the line of march from Nashville to New Hope church, near Atlanta, Ga., where he was severely wounded; subsequently commanded a division of cavalry at the battle of Nashville and the pursuit of the enemy through Tennessee. Received successive brevets from lieutenant-colonel to major-general U. S. A. for gallant conduct; retired on the full rank of major-general Oct., 1867, on account of wounds received at New Hope church; reduced to the rank of brigadier-general under a subsequent law of Congress retiring officers on rank actually held at the time when disabled. Military professor in the University of Missouri 1868-69, University of Minnesota 1869-70. G. C. SIMMONS.

**Johnson** (ROBERT W.), b. in Kentucky in 1814; moved to Arkansas, and was a member of Congress from that State 1847-53; he was then elected to the U. S. Senate, in which body he was an active and distinguished member until Arkansas passed her ordinance of secession in 1861; he was then elected a member to the provisional Congress of the Confederate States; in 1862 he was elected Senator from Arkansas to the Confederate States Senate. He was a leading member of that body to the close of the war, when he pursued the practice of his profession, the law, in the city of Washington. D. July 26, 1879. A. H. STEPHENS.

**Johnson** (SAMUEL), D. D., b. in Guilford, Conn., Oct. 14, 1696, was the son of Samuel and Mary (Sage) Johnson. His grandfather, William Johnson, who was twelve years old when the family emigrated from England to this country, married, July 2, 1651, at the age of twenty-two, a daughter of Francis Bushnell of Saybrook, whose sister, Sarah Bushnell, was the grandmother of Benjamin Hoadley, the celebrated bishop of Bangor and Winchester. The subject of this notice was in early childhood very much under the training of his grandfather William, a leading man in Guilford, who held, as did his son after him, the office of deacon in the Congregational church. He taught him to read, and stimulated his desire for learning. At fourteen young Samuel joined the infant college at Saybrook, and graduated after a course of four years. He subsequently became a tutor in the institution, and was connected with it in its transition period, and a chief agent in securing its establishment at New Haven as Yale College. He resigned his tutorship in 1719, and was ordained the next year as pastor of the Congregational church at West Haven, a village so near the college that he continued to associate intimately with its officers and to avail himself of a free use of the library. Here he frequently met his literary friends, among them several of the neighboring ministers, and discussed and examined with them the doctrines and practices of the primitive Church, and the form and authority of their own government and worship. The result was that he and Rector Cutler and Tutor Brown declared for episcopacy, and, relinquishing their positions, sailed from Boston Nov. 5, 1722, to obtain holy orders in the Church of England. He returned to Connecticut after a year's absence, and was settled at Stratford as a missionary of the Society for the Propagation of the Gospel in Foreign Parts. For a long

time he was the only Episcopal clergyman in the colony, and had strong adversaries around him in those from whose fellowship he had withdrawn. He married, Sept. 26, 1725, Mrs. Charity Nicoll, widow of Benjamin Nicoll, Esq., of Brookhaven, L. I., by whom he had two sons, whose preliminary education, and that of his step-sons as well, he personally superintended. His inquiring mind led him to seek the society of scholars and to read all the philosophical works that came in his way. The residence of Dean Berkeley at Newport, R. I. (1729-31), was an interesting episode in his life. Before that dignity came to America he had read his *Principles of Human Knowledge*, and was in a measure a convert to his metaphysical opinions. He corresponded with him, visited him at his Whitehall palace, and when the dean was about to return to England, disheartened by the failure of his great scheme, Johnson interested him in American education, and secured from him for Yale College the donation of many valuable books, and a deed of his farm at Newport for the founding of scholarships. He maintained a steady correspondence with Secker and other bishops and divines of the Church of England, and was a profound philosopher for his day, comprehending Berkeley and going deeply into Hutchinsonianism. He wrote numerous controversial pamphlets, and labored earnestly to secure the establishment of an American episcopate. The University of Oxford conferred upon him in 1743 the degree of D. D., and three years later he published a *System of Morality*, in two parts—one treating of ethics in a speculative aspect, and the other of the practical duties that result from established truths. This, again, appeared with additions under the title of *Elementa Philosophica*, which was dedicated to Berkeley and printed by Benjamin Franklin. When the project was entered upon to found a college in Philadelphia, Franklin, one of the gentlemen most interested in it, urged him to assume the presidency, but he finally declined it, and accepted shortly after the oversight of King's (now Columbia) College, N. Y. He guided this institution through its early troubles, and gave shape to its policy and course of study. Subscriptions toward the endowment were obtained at home and abroad through his instrumentality, and when things had been well settled he intimated his desire for retirement, and applied to Archbishop Secker for a suitable person to take his office. The Rev. Myles Cooper, an Oxford graduate, was sent over, and, sooner than he himself expected, Johnson, crushed by the death of his second wife from smallpox—a disease which had been the great bane and terror of his whole life—resigned the presidency of the college Feb., 1763, and retired to Stratford. Here he passed the remainder of his days, resuming the charge of his old parish, and continuing his correspondence upon the affairs of the Church in America. It was in this retirement that he composed an English and Hebrew grammar, the structure of the two languages bearing in his view a close resemblance. A second and revised edition of the work, which was first printed in London, was republished there, and attracted the attention of several Hebrew scholars, among them Bishop Lowth. Dr. Johnson never ceased to plead that one or more bishops might be sent to the colonies, but he did not live to see his desire fulfilled. He had expressed the wish that his death might resemble that of his good friend Bishop Berkeley, and Heaven granted it, for he sank to rest tranquilly, sitting in his chair, on the morning of Jan. 6, 1772. E. E. BEARDSLEY.

**Johnson** (SAMUEL), LL.D., b. at Lichfield, Eng., Sept. 18, 1709, the son of a bookseller of limited means; commenced the study of the classics at the age of ten at the Lichfield free school, making great proficiency; spent a year at a private academy at Stourbridge, and two years in his father's shop, during which, by desultory reading, he laid the foundation of that immense store of miscellaneous knowledge for which he was distinguished. His father's poverty seemed to forbid all hopes of a university education, but when nineteen years of age he found an opportunity to enter Pembroke College, Oxford (1728), supporting himself by assisting the studies of a former companion at Lichfield school. He became noted for his proficiency in the classics, and produced a Latin translation of Pope's *Messiah*, which won a high encomium from that poet. In 1731, after three years of assiduous study, he was compelled by want of resources to leave Oxford; was employed for some time as usher in a school at Market Bosworth, Leicestershire, and afterwards lived some time at Birmingham, writing for a newspaper and publishing one or two books translated from the Latin. In 1736 he improved his circumstances by marrying a widow lady nearly double his age who had £800 in the funds, and opened a private academy near Lichfield. After a brief and unsatisfactory experience in teaching, Johnson went to London in 1737, accompanied by his pupil Garrick, and thenceforward devoted himself to literature as a profession. His first



serious employment was on *Cave's Gentleman's Magazine*, for which he continued to write until 1754. The publication of *London*, a satire imitated from Juvenal (1738), and of two or three political pamphlets, brought him into public notice, and procured him the friendship of Pope, Richardson, and other leading authors. In 1740, Johnson undertook to report the debates in Parliament for the *Gentleman's Magazine*, and acquired considerable celebrity by his practice of improving upon the real utterances of the speakers; in 1744 appeared his *Life of Savage*; in 1749, his poem, *The Vanity of Human Wishes*, and a drama, *Irene*; and in 1750-52 he wrote the *Rambler*, a semi-weekly series of literary essays which extended to 208 numbers and had great success. From 1747 to 1755 he was chiefly occupied upon his great work, the *Dictionary of the English Language*. His wife had died in 1752, his mother in 1759, and it was to pay the expenses of the latter's funeral that Johnson wrote *Rasselas* within a single week. The *Idler*, an imitation of the *Rambler*, appeared in 1758 to 1760. It was not until about 1762 that Johnson acquired that settled position in the republic of letters which is so familiar to the world in the pages of Boswell—a position apparently dating from the receipt of a pension of £300. He now became an authority on all points of erudition, and his wonderful conversational powers began to attract the attention of an admiring circle, which in 1764 formed the nucleus of the famous Literary Club. It was in 1763 that he first met his future biographer, James Boswell, and in 1765 that he made the acquaintance of the Thrale family. In 1773 he visited Scotland and the Hebrides, accompanied by Boswell, publishing in 1775 the *Journey to the Western Islands*, and a pamphlet against the American rebellion, entitled *Taxation and Tyranny*. His last literary work of any importance was the *Lives of the Poets* (1779-81). D. in London Dec. 13, 1784, and was buried in Westminster Abbey. It is scarcely necessary to say that the character and career of Dr. Johnson are, or may be, better known than those of any other author that ever lived through the incomparable biography in which Boswell has edited his conversations for a series of years. The only complete edition of his works is that in 11 volumes (Oxford, 1825). Johnson's character was pure and devout, but his mind was not free from an unhealthy gloom bred of poverty. He had strange superstitions, inherited from infancy, which colored his life. He was a man of vast learning and of masculine grasp of thought, but his judgment was warped by prejudices. In some respects his taste was singularly unrefined. A pleasing trait in his character was kindness towards the poor and suffering.

PORTER C. BLISS.

**Johnson (SAMUEL)**, b. at Salem, Mass., Oct. 10, 1822; graduated at Harvard in 1842 and at the Divinity School in 1843; became in 1853 pastor of a "Free" church at Lynn. A deep thinker, brilliant writer, and eloquent speaker, Mr. J. has written much on subjects of philosophy, religion, and reform. He was prominent in the anti-slavery movement. In 1846 he compiled, in connection with Samuel Langhellow, *A Book of Hymns*, some of the finest of which were his own. In 1868 he published *The Worship of Jesus*. Of his great work, *Oriental Religions*, only the first volume has appeared (Boston, 1872).

**Johnson (SAMUEL WILLIAM)**, A. M., b. at Kingsboro', Fulton co., N. Y., July 3, 1839; studied in the Yale Scientific School and at the universities of Leipzig and Munich. In 1866 he became professor of analytical and agricultural chemistry in the Sheffield Scientific School at Yale College, New Haven, Conn. He is a member of the National Academy of Sciences and of the American Academy of Arts and Sciences, and has published *Essays on Manures* (1859), *Peat and its Uses* (1866), *How Crops Grow* (1868, republished in England in 1869), etc., besides translating Fresenius's *Qualitative Chemical Analysis*, and the same author's *Quantitative Chemical Analysis*.

**Johnson (Rev. THOMAS)**, b. in Virginia July 11, 1802; began his ministry in Missouri in 1825. His greatest and most successful labors were performed as missionary to the Indians, by whom he was much beloved and revered. He belonged to the St. Louis conference of the Methodist Episcopal Church, South, at the time of his death. He was killed by men who hated the cause he was laboring so zealously to promote, Jan. 3, 1865. T. O. SUMMERS.

**Johnson (WALTER ROBERT)**, b. at Leominster, Mass., June 21, 1794; graduated at Harvard in 1819; was for many years a teacher in Framingham and Salem, Mass., and in Germantown, Pa., and the Philadelphia High School; was 1839-43 professor of physics and chemistry in the University of Pennsylvania. He made important researches in physics; made an official report (1844) to Congress on the character of the varieties of coal; was engaged (1845) in examining the proposed sources of water-supply for Boston, Mass.; was the first secretary of the

Association for the Advancement of Science; became in 1848 connected with the Smithsonian Institution, and in 1851 with the World's Fair, London. D. Apr. 26, 1852. His principal works are *Use of Anthracite* (1841), *Report on Coals* (1844), *Memoir of L. D. von Schœnitz* (1835), *Coal Trade of British America* (1850).

**Johnson (Sir WILLIAM)**, BART., b. at Warrentown, co. Down, Ireland, in 1715; came in 1738 to America to manage some landed estates belonging to his uncle, Admiral Sir Peter Warren, and settled among the Mohawk Indians, being the earliest white resident of that immense and fertile region, and by his prudence in dealing with the Indians acquired their confidence and esteem. He learned the Mohawk language, and was made an honorary chieftain of that tribe. In 1743 he was appointed superintendent of Indian affairs for the province, and held this post under different titles for the remainder of his life. In the French war of 1755, Johnson was commissioned a major-general and commander-in-chief of the provincial forces in the expedition against Crown Point, in which he defeated Baron Dieskau at Lake George (so named by him), and destroyed his army in Sept., 1755. Johnson was severely wounded in this engagement, which was considered so important that it procured him the thanks of Parliament, a grant of £5000, and a baronetcy. In 1756-57, Sir William was engaged in the expeditions for the relief of Oswego and Fort William Henry, was with Abercrombie at Ticonderoga in 1758, and was second in command under Gen. Prideaux in the expedition against Fort Niagara in 1759. On the death of Prideaux, who was killed before that fort, Sir William prosecuted the siege with great vigor, aided by 1000 Indian allies, defeated a French force sent to relieve the fort, and received its unconditional surrender. In 1760 he participated in Amherst's expedition to Montreal. For all these services Sir William received from the king a grant of 100,000 acres of land N. of the Mohawk, long known as "Kingsland" or the "Royal Grant," and in 1764 he built Johnson Hall, around which soon sprang up the village of Johnstown, the capital of Tryon co., which then embraced all Central and Western New York. Here Sir William passed the remainder of his life, exercising a baronial hospitality to Indians and backwoodsmen, giving great attention to improvements in agriculture, and introducing the first sheep and blood-horses into the Mohawk Valley. He made the Indian treaty of Fort Stanwix in 1768, and d. July 11, 1774. (See his *Life*, by W. L. Stone, 2 vols., 1865.)

**Johnson (WILLIAM)**, LL.D., b. at Charleston, S. C., Dec. 27, 1771, was brother of Joseph; graduated at Princeton in 1790; studied law at Charleston under C. C. Pinckney; was a member of the legislature for three terms, being Speaker the last term; was elected judge of circuit courts, and appointed by Jefferson a justice of the Supreme Court, with jurisdiction in South Carolina and Georgia. He edited for the family of that officer the *Life and Correspondence of Maj.-Gen. Nathaniel Greene* (1822), with copious and learned annotations. He inclined to support the Federal government in the nullification question (1832), and d. in New York Aug. 4, 1834.

**Johnson (WILLIAM SAMUEL)**, LL.D., the elder son of the Rev. Dr. Samuel Johnson, b. in Stratford, Conn., Oct. 7, 1727; graduated at Yale College with great distinction in 1740; studied law, and rose at once, when admitted to the bar, to the highest rank in his profession. He was an eager student of English politics and English literature, and early took an active interest in the relations of the American colonies to the home government. In 1761 he was chosen to represent the town of Stratford in the lower house of the general assembly, and was one of the council or upper house when he was selected to attend the first Colonial Congress, that met at New York in 1765 to consider the Stamp Act. He drew up the petitions and remonstrances which were sent to the king and two houses of Parliament. At the October session of the general assembly of Connecticut in 1766, Dr. Johnson—for by this time the University of Oxford had honored him with the degree of doctor of laws—was appointed to proceed to England and defend in a cause pending before the king and lords in council concerning the title to a large tract of land obtained for the colony from the Mohegan Indians; and those who heard him speak on this occasion were not only astonished but charmed by his eloquence. After the battle of Lexington he and another gentleman were deputed to wait on Gen. Gage, then in command of the British forces at Boston, with a letter from the governor of Connecticut, the object of which was to stay hostile proceedings, and inquire if means could not be adopted to secure peace. The embassy was unsuccessful, the progress of events hurrying on the war. Retiring from the council after the Declaration of Independence, Johnson set himself quietly down to



his studies at Stratford, but when the independence of the colonies was established he resumed the practice of his profession, and was reinstated in his old office as a member of the upper house of the general assembly. He was a delegate from Connecticut to the convention which framed the Federal Constitution, and president of the committee of five appointed to revise the style of the instrument and arrange its articles. He proposed the organization of the Senate as a separate body, and was elected the first Senator from Connecticut, and in concert with his colleague, Oliver Ellsworth, drew up the bill to organize the judiciary. After King's College, N. Y., became Columbia under the new organization of trustees established in 1787, he was chosen to the presidency—an office which his father had filled under the royal charter. After 1800 he lived in retirement at Stratford, and d. there Nov. 14, 1819.

E. E. BEARDSLEY.

**Johnson City**, post-v. of Washington co., Tenn., on the East Tennessee Virginia and Georgia R. R., 25 miles S. W. of Bristol, Tenn.

**Johnson's**, tp. of Shelby co., Ala. Pop. 729.

**Johnson's Creek**, post v. of Jefferson co., Wis., on Chicago and North-western R. R., 8 m. S. of Watertown.

**John'sonville**, post-v., cap. of Sunflower co., Miss.

**John'sonville**, post-v. of Pittstown tp., Rensselaer co., N. Y., at the junction of the Troy and Boston and John'sonville and Greenwich R. Rs., 17 miles N. E. of Troy. Pop. 500.

**Johnsonville**, tp. of Harnett co., N. C. Pop. 483.

**Johnsonville**, post-v. of Humphreys co., Tenn., on the Tennessee River and the Nashville and North-western R. R., 78 miles W. of Nashville.

**John's River**, tp. of Caldwell co., N. C. Pop. 883.

**John'ston** (formerly **JOHNSON**), county of E. Central North Carolina. Area, 670 square miles. It has a varied surface, a good soil, and is reported to contain ores of iron, lead, gold, silver, zinc, etc. Live-stock, corn, and cotton are staple products. It is traversed by Neuse River and the Atlantic and North Carolina R. R. Cap. Smithfield. Pop. 16,897.

**Johnston**, tp. of Trumbull co., O. Pop. 893.

**Johnston**, tp. of Providence co., R. I. It contains several manufacturing villages. Pop. 4192.

**Johnston**, tp. of Scott co., Va. Pop. 1870.

**Johnston**, tp. of Shennandoah co., Va. Pop. 1889.

**Johnston** (ALBERT SIDNEY), b. in Kentucky in 1803; graduated at the U. S. Military Academy July 1, 1826, and entered the army as second lieutenant 6th Infantry; after serving in the Black Hawk war, he resigned from the army, and, in 1836, emigrated to Texas, arriving there shortly after the battle of San Jacinto. Entering the Texan army as a private, he was soon promoted to succeed Gen. Felix Houston in chief command, in consequence of which a duel occurred in which Johnston was wounded. He held the office of senior brigadier-general till 1838, when he was appointed secretary of war of Texas, and in 1839 organized an expedition against the Cherokees, who were totally routed in an engagement on the Neches. In 1840 he retired from public life and settled upon a plantation. He was an ardent advocate for the annexation of Texas to the U. S., and in 1846, at the request of Gen. Taylor, he took the field against Mexico as commander of the Texan volunteer rifle regiment. Subsequently he served as inspector-general on the staff of Gen. W. O. Butler, and distinguished himself at the battle of Monterey. In 1849, President Taylor re-appointed him in the army as paymaster, with the rank of major, in which capacity he served until 1855, when he was appointed colonel 2d U. S. Cavalry. In 1857 he commanded the U. S. forces sent to coerce the Mormons into obedience to Federal authority, conducting the expedition in safety to Salt Lake City, and commanded the department of Utah. For energy, zeal, and prudence displayed in his conduct of this expedition he was brevetted brigadier-general. In 1860 he was removed to the command of the department of the Pacific. In May, 1861, he resigned from the service and travelled overland to the seat of the Confederate government. He was at once appointed a general in the Confederate army, and assigned to an important command in the West. At the battle of Shiloh he was commander-in-chief, and on the first day of that battle was killed, Apr. 6, 1862.

G. C. SIMMONS.

**Johnston** (ALEXANDER KEITH), b. at Kirkhill, Scotland, Dec. 28, 1804; travelled extensively, and studied the principal modern languages to avail himself of their resources in geographical data, and published in 1843 a *National Atlas*, which gained him extensive reputation. His *Physical Atlas of Natural Phenomena* (1847-49; 2d ed.

1854-56) contained important contributions from Sir R. Murchison, Sir David Brewster, Prof. Rogers of Boston, and other eminent scientists. Mr. Johnston was chosen a member of the geographical societies of Paris and Berlin, received the appointment of geographer to the queen for Scotland, and issued numerous educational, manual, and special atlases. D. at Ben Rhydding July 9, 1871. His son, bearing the same name, has succeeded him in his geographical enterprises.

**Johnston** (GABRIEL), b. in Scotland about the end of the seventeenth century; was educated at the University of St. Andrew's, and became professor of Oriental languages in the same institution. He was appointed governor of North Carolina in 1734, and held that office till his death in Aug., 1752. He was esteemed the ablest of the colonial governors, and successfully cultivated literature. He gave the name of Wilmington to the place of that name in North Carolina, in honor of his chief patron at court, the earl of Wilmington.

**Johnston** (GEORGE), b. at Simprin in 1798; graduated at the University of Edinburgh in 1819, after serving a medical apprenticeship with Dr. Abercrombie, and became a physician at Berwick-on-Tweed. He pursued the study of natural history with great enthusiasm and success, and was one of the founders of the Ray Society. He published important works on the *History of British Zoophytes* (1838), *History of British Sponges and Lithophytes* (1842), *Introduction to Conchology* (1850), and *Natural History of the Eastern Borders* (1854). D. July 3, 1855.

**Johnston** (JAMES F. W.), b. at Paisley, Scotland, about 1796; was for many years a classical and scientific teacher at Glasgow and Durham; went to Sweden in 1830; studied chemistry under Berzelius; became professor of chemistry and mineralogy at the University of Durham, and prepared numerous treatises on agricultural chemistry, most of which have enjoyed a wide circulation in America. Prof. Johnston visited the U. S. about 1848. Among his works are *Elements of Agricultural Chemistry and Geology* (1842), *Catechism and Lectures* (1844), on the same sciences, *Notes on North America* (1849), and *Chemistry of Common Life* (1854-55). D. at Durham Sept. 18, 1855.

**Johnston** (JOHN, LL.D.), b. Aug. 22, 1806, in Bristol, Me.; graduated at Bowdoin College in 1832; after being principal of a seminary at Cazenovia, N. Y., he became connected in 1835 with the Wesleyan University at Middletown, Conn., first as assistant, and subsequently as professor of natural science, where he has (1875) since remained. He published several textbooks on chemistry and natural philosophy, most of which have undergone several thorough revisions, and been extensively used in the colleges and schools of the country. A history of Bristol (his native town) and the adjoining town of Bremen, from his pen, made its appearance in 1873. This work is the result of extended and thorough research, embracing a critical investigation of several important questions relating to the early history of Maine; and is justly regarded as one of the most valuable contributions that have been made to American local history. He was a frequent contributor to various periodicals, as the *American Journal of Science*, the *National Magazine*, *Methodist Quarterly Review*, and the *New England Historical and Geographical Register*, and was a member of the historical societies of several of the States and of various scientific associations. D. at Clifton, Staten Island, N. Y., Dec. 1, 1879.

**Johnston** (JOHN TAYLOR), b. in New York City Apr. 8, 1820; was educated partly in New York and partly in Edinburgh; graduated at the University of the City of New York in 1839; was admitted to the bar in 1843, and became interested soon after in the control of railroads. He was elected president of the Central Railroad of New Jersey in 1848, which position he now holds. He is president of the council of the University of the City of New York, and also president of the Metropolitan Museum of Art in the same city. J. B. BISHOP.

**Johnston** (JOSEPH ECCLESTON), b. in Prince Edward co., Va., Feb. 1807; graduated at West Point, and entered the army as second lieutenant of artillery July, 1829. From the date of graduation until 1837 he served mainly on garrison duty, being, however, actively engaged for some two years in Florida against Seminole Indians, a portion of which time on the staff of Gen. Winfield Scott. In 1837 he resigned his commission to follow the profession of civil engineer, but re-entered the service on July 7, 1838, as first lieutenant of topographical engineers, and for former gallantry in Florida was now brevetted captain. From this time until the outbreak of the war with Mexico he was engaged upon river and harbor improvements, surveys of Texas boundary-line and that between the U. S. and the British provinces, etc. At the siege of Vera Cruz



(Mar., 1847) he served on engineer duty; was appointed Apr. 9 lieutenant-colonel of voltigeurs, and at Cerro Gordo on the 12th received severe wounds while engaged in reconnoitring the enemy's position, and brevetted major and colonel. In the subsequent battles of Contreras, Churubusco, Molino del Rey, Chapultepec, and the final assault of the city of Mexico he participated, and was wounded at the latter assault. Upon the disbandment of the voltigeurs in 1848, Johnston, by act of Congress restoring officers of the old army to their former positions, returned to duty as captain of topographical engineers, serving as such until 1855, when he was appointed lieutenant-colonel of cavalry, and was engaged in frontier duty and on the Utah expedition as inspector general. On June 28, 1860, he was appointed quartermaster general with the rank of brigadier general, which position he resigned Apr. 22, 1861, to follow the fortunes of his native State. At once appointed major-general in the Confederate army, he commanded the force which occupied Harper's Ferry, May, 1861, and which subsequently, in the vicinity of Winchester, held in check the Union force under Gen. Robert Patterson, and which still later reinforced Gen. Beauregard in his position about Manassas. At the battle of Bull Run, Gen. Johnston waived his right to command in favor of Beauregard, the latter being familiar with the ground and troops, while the former was not. In the Peninsula campaign he was in command of the Confederate army, and at the close of the first day's fighting at Fair Oaks (May 31, 1862) was severely wounded and disabled for several months, being succeeded by Gen. R. E. Lee. Upon his recovery he was assigned to command the S. W. department, with the rank of lieutenant-general, and during the siege of Vicksburg made several ineffectual attempts to relieve that place, being finally defeated at and driven beyond Jackson, Miss. In Dec., 1863, Johnston, now a general, succeeded Gen. Bragg in command of the Confederate army of Tennessee; but failing to prevent the invasion of Georgia the following spring by the Union forces of Gen. Sherman, he was superseded July 17, 1864 by Gen. J. B. Hood, after having been forced to retire from the strong positions at Dalton, Resaca, Kenesaw, etc., and beyond the Chattahoochee. In 1865 Johnston was restored to command in the Carolinas to collect and command an army to oppose the advance of Gen. Sherman, but was defeated at Fayetteville, Bentonville, etc., and upon receiving intelligence of the surrender of Lee entered into correspondence with Gen. Sherman, which led to the surrender of his army at Durham Station, N. C., Apr. 26, 1865. In 1874 he published a *Narrative of Military Operations*. G. C. SIMMONS.

**Johnston** (RICHARD M.), b. in Hancock co., Ga., Mar. 8, 1822; graduated at Mercer University with the first honor of his class in 1841; studied law and was admitted to the bar, and entered upon the practice at Sparta in 1843. The presidency of Mercer University was unanimously tendered him by the board of trustees in 1857; this he declined, preferring to accept a professorship of *belles-lettres* in the State University tendered him at the same time. This position he held until 1861, after the war broke out; he then established a select classical school at Rocky in his native county, which became famous in the Southern States; in 1867, after the adoption of the reconstruction policy by Congress, he moved his school to Chestnut Hill, 2 miles N. of Baltimore, Md., where it is now known as Pen Luey Institute. Hundreds of young men have gone forth into active usefulness from the training of this eminent instructor. The labors of Prof. Johnston have not been confined to teaching only; by his pen he has contributed extensively to the literature of the country, his most noted works of this character being his *English Classics* (1869), and the *Dukesborough Tales* (1872). A. H. STEPHENS.

**Johnston** (SAMUEL), LL.D., b. at Dundee, Scotland, Dec. 15, 1733, nephew of Gov. Gabriel Johnston, was brought in infancy to North Carolina, where his father became surveyor general and acquired large landed estates. Samuel was admitted to the bar, was chosen to the assembly in 1769, and espoused the cause of resistance to the British cabinet; was an active member of the first two provincial Congresses, and presided over the third and fourth. In 1775 he was chairman of the provincial council, was a member of the Continental Congress in 1781-82, governor of North Carolina 1788-89, presiding over the State convention which adopted the Federal Constitution; was U. S. Senator 1789-93, and justice of the Supreme Court 1800-03. D. near Edenton, N. C., Aug. 18, 1816.

**Johnston** (WILLIAM FRANK), b. at Greensburg, Westmoreland co., Pa., Nov. 29, 1808, of Scotch Irish paternity. His father was a prominent iron manufacturer and merchant. W. F. Johnston became a successful lawyer of Armstrong co., Pa., having been admitted to the bar in 1829. In the State legislature he early won distinction by

his financial ability. In 1847 he became president of the Senate. On July 9, 1848, Gov. Shunk died, Mr. Johnston becoming governor *ex-officio*; but the statutes and the State constitution being in apparent conflict, he ordered a new election, and was himself chosen governor for three years. He afterwards was an iron and salt manufacturer and oil-refiner of Pittsburg, and was for a time collector of the port of Philadelphia. D. at Pittsburg Oct. 25, 1872.

**John'stone**, town of Scotland, in the county of Renfrew, has large manufactures of cotton fabrics and of articles of iron and brass. The vicinity contains rich coal-mines. Pop. 6401.

**Johnstown** (or LANG RUN), post-tp. of Garrett co., Md. (formerly in Allegany co.). Pop. 673.

**Johnstown**, post-tp. of Barry co., Mich. Pop. 1296.

**Johnstown**, post-v. of Fulton co., N. Y., on the Fonda Johnstown and Gloversville R. R., 4 miles N. of Fonda, and on the Cayabutta Creek; has 2 banking-houses, 10 churches, 3 weekly newspapers, an academy, county buildings, good hotels, gasworks, and various manufactures, prominent among which is that of gloves and mittens. The township of Johnstown includes Gloversville and other villages. Pop. of v. 3282; of tp. 12,273.

W. H. DOUGLASS, for Ed. "FREEDOM CO. DEMOCRAT."

**Johnstown**, post-b. of Cambria co., Pa., on the Pennsylvania Canal and R. R., 79 miles E. of Pittsburg; has a rolling-mill and Bessemer steel works (employing 6000 men), a woollen-mill, tannery, mechanical works, cement-works, and other industries, gas and water supply, 1 daily and 5 weekly newspapers, a national and a savings bank. The surrounding mountains are rich in iron, bituminous coal, limestone, cement, and fireclay. The Conemaugh River flows on the N. and Stony Creek on the S. of the town. Pop. 6028, greatly increased since the census.

G. T. SWANK, Ed. "TRIBUNE."

**Johnstown**, a v. of Porter tp., Schuylkill co., Pa. Pop. 70.

**Johnstown**, post-tp. of Rock co., Wis. Pop. 1299.

**John'sville**, post-v. of Frederick co., Md., 13 miles N. E. of Frederick City. Pop. of tp. 1612.

**Johnsville**, v. of Ferry tp., Morrow co., O. Pop. 159.

**John'ton**, post-v. of Marion co., W. Va. Pop. 55.

**Joigneaux'** (PIERRE), b. at Varennes, department of Côte d'Or, France, in 1815, agronomist, agricultural writer, and representative. He passed through the Paris École Centrale des Arts et Manufactures, and launched himself in politics, writing for the opposition papers. He was sentenced to prison under the Louis Philippe government, and elected in 1848 representative to the National Assembly, where he took his seat on the extreme Left. After the *coup d'état* of Dec., 1851, Joigneaux was exiled to Belgium, from whence he returned after the proclamation of amnesty to devote himself exclusively to his former agricultural writings. He published many articles, founded agricultural journals, and wrote *The Peasants under Royalty*, *Dictionary of Practical Agriculture*, *Consuls to the Young Farming women*, *Culture and Fabrication of Wine in Belgium*, *Treatise of the Seeds of the Small and Large Husbandry*, etc. FÉLIX AUCAGNE.

**Joigny'**, town of France, in the department of Yonne, on the Yonne, noted for its fine claret wines. Pop. 5971.

**Join'der of Actions in Law** is the union of two or more causes of action in the same declaration or complaint. A plaintiff may have several distinct claims against the same defendant, either wholly or partly arising out of contract, or wholly or partly founded upon tort, and in such cases it becomes an important question whether he can unite all these claims and obtain the remedy appropriate to each in a single action, or whether several actions must be brought. At common law the rule was in civil cases that when the same plea might be pleaded and the same judgment given on all the counts of the declaration, or when the counts were of the same nature and the same judgment was to be given on them all, several causes of action might be joined. Thus, in an action on contract, a count for debt upon a bond might be united with a count for debt upon simple contract. So in an action of tort several claims for trespasses might be joined. But a demand upon contract could not be united with a claim grounded in tort. The subject of joinder of actions, particularly in civil cases, is now frequently regulated by statute. There are also special rules as to joinder in criminal cases.

GRONCE CHASE. REVISED BY T. W. DWIGHT.

**Joinder of Parties in Law.** By this expression is meant the collection of rules requiring that persons having a common interest or subject to a common liability should be joined together in litigation at law or other legal proceeding. The details of this subject, being of a tech-



nical character, should be sought in the books of legal practice. The subject is one of great consequence to the legal practitioner, and should be carefully understood, as a failure to join the necessary parties is frequently fatal in its consequences.

In contrasting the rules prevailing in courts of law with those adopted in courts of equity upon this subject, it will be found that the latter are much the more liberal. The former are frequently in a high degree technical; the latter, on the other hand, are so framed as to make it proper to bring in all persons whose presence is necessary to a complete determination of the matter in controversy. There is also an important and salutary rule, that when the parties are numerous, and it is impracticable to bring them all before the court, one or more may sue for the benefit of the whole. An illustration of it is found in the case where an administrator is called upon to account in respect to the assets of an estate in his hands. One or more of a numerous body of creditors may sue, not only for himself, but also for the other creditors. Recurring to the rules of the common-law courts, it may be useful to state that the question as to uniting parties arises in the main out of joint contract, ownership, or wrong (tort). It is a general rule that when the interest in a contract is joint the cause of action is of the same nature, and all the parties should be united. A like rule prevails in the case of a joint liability. A distinction must here be made between a "joint" liability and one that is "joint and several." (See JOINT AND SEVERAL.) This rule gives way when one of two joint parties dies. The action is then prosecuted by or against the survivor. In a court of equity the representatives of the deceased will still be liable in some instances to the survivor for contribution. (See CONTRIBUTION.) In the case of wrongs it is not necessary, though proper, to join all the wrongdoers, a wrong being regarded in its nature as joint and several. Where two or more persons are jointly injured, they should be united as plaintiffs. Special rules exist in the case of husband and wife, growing out of the technical rule that the legal existence of the wife is merged in that of the husband. These rules, requiring them to be united as parties to actions, give way when one of them dies. The fiction of a merger is then abandoned, and the true owner of the claim or the author of the wrong is recognized as the proper person to sue or to be sued. There is a tendency in modern law to abandon this fiction in many respects. Thus, under the New York code of procedure the wife may sue alone concerning her separate property, and by other statutes to recover for her services or for injuries that she has sustained, or for her profits in trade, etc. A similar rule prevails in many other States. A like tendency is observable in England. It cannot be said that the common-law rule has been wholly abandoned, but only modified.

The penalty in the common-law courts for failure to make the proper persons parties is very severe. Error in this respect is in some instances fatal in every stage of the cause. By modern legislation in some States of this country the general course of the action is unaffected by the presence of too many plaintiffs or defendants. Thus, in New York, where there are defendants in excess the question can only be raised by them, and they may claim that as far as they are concerned there is no cause of action. On this theory, the cause proceeds against those who are properly made defendants. This, it can scarcely be denied, is a very salutary reform. Where the parties are too few, the objection must be raised at an early stage in the cause, or it will be deemed to be abandoned. So now in England errors of this kind may be amended before or at the trial by force of the "common law procedure act" of 1852 and later statutes. (Reference may be made for further information to Dacey on Parties; Barbour on Parties; Brown, do.; Calvert, do.; and to general works on Practice.)

T. W. DWIGHT.

**Join'ery** differs from CARPENTRY (which see) in the nicer and more exact workmanship required. The house-joiner finishes the work which the carpenter and builder have left. So of the shipjoiner, whose work is sometimes almost a work of art rather than one of artisanship. The making of nice wooden-wares, ornamental boxes, and the like is a still more delicate kind of joinery.

**Joint**, in anatomy, an articulation, or the connection existing between the several bones of the skeleton. The tissues entering into its formation are bones, the ends of which are covered by cartilage, and bound together by ligaments; in the more movable a membranous sac is interposed, which secretes a lubricating fluid called synovia. The construction of joints differs in various parts of the body, according to the function which they have to perform; and in consequence of this they have been divided into three classes—viz., synarthrosis, amphiarthrosis, and diarthrosis, which have been subdivided as follows:

I. *Synarthrosis*, an immovable articulation: (a) *Suture*, in which the bones are dovetailed into each other, as in the skull. (b) *Harmonia*, in which the joints are but slightly marked, as union of superior maxilla. (c) *Gomphosis*, in which a conical point fits into a socket, as the teeth into the alveoli. (d) *Schindylesis*, an articulation by furrowing, as it were—vomer.

II. *Amphiarthrosis*, an articulation permitting limited motion: (a) *Syndesmosis*, the articulation of two or more bones by means of ligaments, as radius and ulna. (b) *Synchondrosis*, the articulation of bones by means of cartilage, as that of the ribs with the sternum. (c) *Symphysis*, the union of bones by fibro-cartilage, as the pubes.

III. *Diarthrosis*, a movable articulation: (a) *Arthrodia*, a gliding joint, as sterno-clavicular. (b) *Enarthrosis*, a ball-and-socket joint, as the shoulder and hip joints. (c) *Ginglymus*, a hinge-like articulation, as at the elbow and knee. (d) *Diarthrosis rotatoria*, as the atlo-axoid joint.

The diseases to which the joints are most liable are Synovitis, Chondritis, and Osteitis. EDWARD J. BERMINGHAM.

**Joint and Several**, a legal phrase used to denote that the liability of two or more debtors is of such a kind that they may be sued either collectively or individually. If any one of them, when the liability rests upon contract, is sued and compelled to discharge the entire debt, he has a claim for contribution against the others upon an implied contract, and may recover from them such a portion of the whole amount as they ought justly to pay. And if the debt be a valid and subsisting obligation, a single debtor may pay it in full, even though no suit is brought against him, and will still have a valid claim for contribution. So, if the payment made by one be less than the entire debt, but larger than his own proper share, he will be entitled to receive from the others a proportionate part of the excess according to the extent of their respective liabilities upon the contract. If one or more of the other debtors be insolvent, the one who pays the whole, or more than his share, can recover at law from those who remain solvent only such sums as they would be obliged to pay if all were solvent. In equity, however, those who remain solvent must contribute equally towards the discharge of the entire indebtedness, in accordance with the maxim that "equality is equity." A joint and several obligation may be created by the express language of the agreement, or may arise by implication from its terms. Usually, the words are employed, "We jointly and severally promise (or covenant)," but a contract by two or more persons, in which they agree "for ourselves and each of us" or "for ourselves and every of us," is also an express joint and several contract. A joint and several liability is implied when several persons sign a contract in the obligatory part of which the pronoun *I* is used instead of *we*. Moreover, a joint and several obligation may sometimes arise by reason of the legal relations of the parties by whom a contract is entered into. Thus, in England the liability of the members of an ordinary partnership in regard to the debts and engagements of the firm is joint and several in courts of equity (though not in courts of law), except under special circumstances. If one of several co-contractors upon a joint and several agreement dies, the action may, at common law, be brought either against his personal representative (executor or administrator) or against the survivors. The rule is different, however, in regard to parties who are jointly liable; and if one of them dies the action must be brought against the survivors. When the joint and several contract is for the performance of a single act or duty, a release under seal to one will operate as a release to all. But a judgment recovered against one, if not satisfied, will be no bar to an action against either of the others. A joint and several obligation cannot be treated as several in reference to some of the obligors and joint as to the rest. The creditor must proceed either jointly against all or severally against each. This rule, however, has in some of the States been changed by statute. The phrase "joint and several" is only applied to the liability of debtors, and not to the claims of creditors. There can be no form of contract by which the obligees are entitled to sue either collectively or singly. Their claim can be only joint or only several. There may also be a joint and several liability in cases of tort, as well as in cases of contract. Thus, if two or more persons unite in the commission of a tortious offence, one, any, or all of them may be sued by the party suffering the injury. Full damages may be recovered from the party sued, and there will not, in general, be any claim for contribution against the other wrongdoers. In some cases, however, where the person who is compelled to make full payment was not wilfully nor intentionally a participant in the wrong committed, he will be entitled to recover a proportional amount of the damages from the others. (For an illustration of this kind, see CONTRIBUTION.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.



**Joint Firs** (Gnetaceae), a small natural order of exogenous plants (gymnogens) closely allied to the Conitaceae. They are small trees and shrubs of the genera *Gnetum* and *Ephedra*, found in tropical and warm countries. Their stems are jointed, their juices not resinous, but very watery, or sometimes even gummy. Several grow in the far West.

**Joint Ownership.** As employed in a comprehensive sense in law, joint ownership denotes the ownership of property, whether real or personal, by two or more persons. But it is more appropriately applied to personal property, and is, by this restriction of meaning, distinguished from joint tenancy, which is customarily used with reference to real estate, of which only can tenure be properly predicated. Both these phrases are, however, sometimes loosely employed as synonymous. By a still further qualification of meaning, joint ownership is distinguished from ownership in common, and joint tenancy from tenancy in common, in the accurate technical application of these various terms, the interest of a number of owners being characterized strictly as joint when the property, whether real or personal, is held by them with a unity of interest, of title, of time, and of possession, and with a right of survivorship; while it is termed common when the only unity is that of possession, and there is no survivorship. In this article ownership of personal property will only be considered; that of real property will be considered under the topics **JOINT TENANCY** and **TENANCY IN COMMON**; ownership by several persons who stand in the relation of partners will be discussed under **PARTNERSHIP**. (For ownership by several who form the members of a corporation see **CORPORATIONS**.)

There are four unities which, as has just been stated, are necessary to constitute joint ownership. By unity of interest is meant that the interest of each owner in the property should be, by its original limitation, for the same duration and of the same nature and quantity. Unity of title exists when the title of each is derived from the same instrument or from the same act of transfer of interest. That there may be unity of time the interest of each should vest at the same moment; while unity of possession requires that each owner should be entitled to the possession of the whole property and every parcel, and that it should not be divided in separate portions between them. There is an exception, however, to the rule requiring unity of time when the joint ownership is created by will. Thus, if a bequest be made to A for life, and after his death to the children of B, all the children born in A's lifetime will become entitled jointly, though some may not be living when the interests of the others become vested. All property held in joint ownership is subject to the right of survivorship. In the application of this doctrine, whenever one of the owners dies, the survivors take the entire interest, to the exclusion of his personal representatives. Joint ownership always arises by the act of parties, and not by the operation of law. Hence, though it might be created by a transfer of property by deed or by gift, it would not subsist in relation to property which passed after the decease of the previous owner to the next of kin. The creation of a joint interest in personal property may either be by the use of express language to that effect in the instrument of transfer, or it may result from necessary implication, as where chattels are given to two or more persons without the use of any words indicating a severance of interest. But this implication will not be made in relation to stock used in joint undertakings of trade or agriculture. A limitation of this to two or more persons will be held generally to create a tenancy in common. This exception to the general doctrine has been established on account of the effect of the rule of survivorship in interfering with the unrestricted management of property, and with the usual mode of distribution after the owner's death. In courts of equity, moreover, joint ownership is not favored, except in the case of property given in trust, and will not, as a rule, be held to exist unless that be the expressed or clearly presumable intention of the parties. In this country, also, the tendency of legislation is to do away with the incident of survivorship, except in the case of legacies and where persons are appointed co-executors or co-trustees. In regard to legacies limited to several persons, it is a general rule that they take a joint interest. When several executors or trustees are appointed, they are usually deemed to hold in joint ownership, since in these cases it is desirable that the principle of survivorship should apply, and that the property should pass to the remaining executors or trustees to be managed for the purposes designated in the will or in the instrument creating the trust, rather than that others should interfere with its disposition.

Every kind of personal property may be held in joint ownership, whether it be property in possession or property in action. (See **CHOSE IN ACTION**.) Thus, there may be

joint owners of stock, of a legacy, of a promissory note, of a patent right, or of a lease for years, which is termed a chattel real, as well as of a horse, furniture, etc. The interest of any owner cannot be disposed of by will, but will pass to the survivor unaffected by the bequest. Joint ownership in chattels, like a joint tenancy in lands, may be terminated by destroying any one of the four requisite unities, except that of time, and may thus be changed into an ownership in severalty or in common. Then the owners may, by mutual agreement, divide the property among themselves, or sell it and divide the proceeds, thus becoming independent owners of distinct shares. Or the interest of any one may be assigned or transferred to a third person, who will thereupon become tenant in common with the others.

In ownership in common of chattels, as in tenancy in common of real property, there is but a single unity, that of possession, and there is no right of survivorship. Each owner has an undivided share, and upon his death this passes to his executor or administrator, to be administered in the same way as the rest of his personal estate. Ownership in common may arise by a gift or transfer of chattels, which by the terms of the limitation are to be held in common; or, as has been already seen, it may result from the disposal of his interest to a third person by one of several joint owners. By common-law rules, however, the interest of a joint owner in a chose in action cannot be transferred so as to effect an ownership in common, since choses in action are not assignable. But in equity a different rule prevails, and an assignment will be deemed valid. In some of the States, also, choses in action have been made assignable by statute, so that the common-law rules would no longer be applicable. A number of persons may also become owners in common by an innocent admixture of their chattels, which are of such a kind that it becomes impossible to distinguish the particular property of each, as where quantities of grain belonging to different persons are mingled together accidentally, or are mixed in elevators in the course of transportation; so several owners may agree to hold their property in common. This form of ownership may arise by operation of law as well as by the act of parties. Thus, the next of kin of a deceased person, among whom his personal property is distributed, may be said to stand in relation to one another like tenants in common until a distribution is made, since if one of them should die in the intervening time, his personal representatives, and not the survivors, would be entitled to his share. An owner in common may dispose of his interest as freely as an owner in severalty. The purchaser becomes an owner in common with the other owners. Ownership in common may be destroyed by a division of the property among the various owners according to the extent of their respective shares.

There are certain principles applicable to joint and to common ownership which are quite similar, and may therefore be considered together. Thus, both joint and common owners have a right to dispose of their own interests, but not of the shares of their fellow-owners. If they attempt to transfer a larger portion of the property than they are rightfully entitled to, the transaction will only be valid to the extent of their own interests. The share of each owner may also be sold on execution against him by the sheriff. If the sheriff sell the entire chattel, the other co-owners, who are thereby deprived of their property, may sue him for conversion. Each joint or common owner is entitled to the possession of the property, and his possession is deemed to be the possession of all. One co-owner in actual possession even has the right to maintain that possession against the others. The legal remedy of the other co-owners is to take the chattel wherever an opportunity is afforded, but they cannot bring an action for conversion simply on this ground. As a general rule, joint owners and owners in common must unite in all actions for injuries to the general property by third persons, as in actions of trespass and trover. In some instances one co-owner may maintain an action against another for a misuse of, or wrongful interference with, the joint or common property. An intentional destruction or spoliation of the chattel by one will amount to a conversion, for which he will be responsible. In some States it is held that a sale by one owner of more than his share will render him liable to an action of trover. In a few States, also, statutes have been enacted permitting an action to be brought by one co-owner against another merely for the exercise of an exclusive control over the property. A change in the identity of the article which forms the general property, as where iron owned in common is melted together and manufactured into various utensils, would constitute a conversion. A partition of the property held in common cannot be obtained by any form of proceeding at law, though sometimes courts of equity will decree that a division be made. When the property is severable in its nature, and of the same common quality, any owner may separate a portion equal to his share, if it



can be ascertained by weight or measurement, and appropriate it to himself. There is no necessity of obtaining the consent of the other owners in such a case in order that a severance may be made. But when the property is indivisible, as a horse, a partition can only be made at law by obtaining the consent of all the owners to a sale and a division of the proceeds. (For the rules of law relating to part ownership of vessels see PART OWNERS.)

(GEORGE CHASE. REVISED BY T. W. DWIGHT.)

**Joint-Stock Company,** an association of individuals formed for the purpose of carrying on some mercantile, industrial, or other lawful undertaking, and having a capital divided into shares which are transferable by the respective shareholders at their own option, and the ownership of which is a condition of membership. As formed in accordance with common-law rules governing their organization and defining their powers, such associations are unincorporated and constitute a species of partnership. In recent times, however, it has been the tendency of legislation to invest them with corporate powers which they did not possess at common law, and in England statutes have been enacted, the effect of which is to render them actual corporations, provided certain formalities prescribed by the statutes are complied with in the mode of organization. The term joint-stock company, therefore, as frequently employed at the present day, particularly in English practice, would include both incorporated and unincorporated associations. It will be most convenient, however, to employ it in the present article in the restricted distinctive sense prevailing at common law, irrespective of statutory modifications of its extent of application, except when the character and effect of such statutes are specifically considered. In this view a joint-stock company is in the nature of a partnership, though it is attended with different incidents and liabilities, in many respects, from an ordinary partnership. In the early history of the common law the only forms of association of individuals for the accomplishment of any object by a combination of capital and effort, which were known, were partnerships and corporations. Joint-stock companies, as subsequently introduced in mercantile communities and recognized by the law, were intermediate between these modes of association, which had been of earlier origin, and partook to a considerable extent of the peculiarities of both. Like common partnerships, they are formed solely by a voluntary union of individuals, who combine for purposes of mutual profit and benefit, and are not created by legislative authority, nor endowed by legislative act with the powers and functions which they possess and exercise. So a joint-stock company, like a partnership, is not a fictitious person capable of suing and being sued, and of acting generally in legal transactions like a natural person, as is true with regard to a corporation, nor is it regarded as having any distinct legal existence independently of the members who compose it. The members, like partners, must sue and be sued in the same way as all individuals who have engaged in a joint enterprise and have acquired joint rights and incurred joint liabilities. All must regularly be joined as plaintiffs or as defendants, and suit cannot be brought in the name of the company. One or more members of the company may represent it and act in its interests if they are specially appointed as agents, managers, or directors, in much the same way as one or more partners may represent the firm; but in such a case they represent the whole body of the members, not as forming a collective whole and constituting a legal individuality, but merely as a number of persons having common interests.

Again, it is a fundamental peculiarity of a partnership that each one of the partners is responsible individually for the full amount of the indebtedness incurred by the firm in the course of its legitimate business. This is also true of a joint-stock company, however great may be the number of its members. Even though it be stipulated in the articles of association that the members shall only be subject to a limited liability, a creditor who enters into dealings with the company without knowledge of the stipulation may enforce the payment of his entire claim against any one of the associates, leaving him to reimburse himself by contribution from the others. It is, however, competent for any one transacting business with the company, as with a firm, to contract not to hold the partners to an unlimited extent of liability, and he will then be bound by the terms of his contract.

But a joint-stock company differs from an ordinary partnership in several important respects. It is usually composed of a much larger number of members, though this is not an essential diversity, since there is no necessary limit in either form of association as to the number of individuals who may combine. A company also, as a general rule, receives some specific name by which it is known, and is not, like a partnership, designated merely by the names

of the members. This is, however, only a nominal and not a substantial difference, since a company cannot sue nor be sued nor be designated in legal proceedings involving its interests by the name which it has assumed, but must in such instances be regarded as simply a partnership, in reference to which proceedings must be instituted in the names of all the partners. The important principle in relation to partnerships, that each partner is the agent of the firm as regards transactions with third persons, and can bind the firm by any contracts into which he enters appertaining to the partnership business, does not prevail to the same extent in respect to companies. If each shareholder in such large associations, into which new members are introduced not by the consent of the others, but by purchasing or otherwise acquiring shares, were allowed to bind the company by any contracts into which he might enter within the scope of the company's business, the continued existence of such societies would be hardly practicable. Men would hesitate to contribute capital towards the support of such organizations when it might be squandered at the pleasure of any shareholder. It is therefore the almost invariable practice to commit the management and direction of the company's business to a board of directors or agents chosen by the votes of the stockholders, and every person who has dealings with the company is presumed to know that the managers appointed alone have power to make binding contracts. A claim against the company on the ground of dealings with an unauthorized member will not be enforceable. It is like the case of a partnership in which a stipulation between the partners limiting each one's capacity to bind the firm has been made known to a person, who transacts business with any one of them upon that understanding. Moreover, in the modes of conducting business and managing the affairs of the association there is an important difference between a partnership and a company. The stockholders, as has just been seen, are excluded from the ordinary management of business, but they control the election of directors, and generally regulate and define to a considerable extent the powers which these agents are permitted to exercise by the adoption of by-laws or the passage of resolutions. In the same way they may appoint the times at which meetings shall be held, determine the manner in which they shall be conducted, provide for the investment of the profits of the business or the declaration of dividends, and adopt various regulations of the same general nature for conducting the affairs of the company, provided these are not repugnant to general principles of law. Each member is entitled to as many votes as he has shares.

The general nature of the association and the object of its formation, together with many provisions for its management, are, however, usually stated in the articles of association which are agreed upon at the time the company is organized. These correspond with the articles of copartnership into which partners enter, and contain stipulations of a similar character. A covenant of this kind is commonly known in England as a "deed of settlement." The articles usually define the amount of the capital stock, and the number of shares into which it is to be divided, state the number of directors or trustees who are to be appointed, regulate to a greater or less degree the assignment and disposal of the shares, provide for assessments upon the shareholders, declare sometimes the way in which they shall be sued by the directors upon their respective obligations to the company, and provide in a comprehensive way for the general direction and control of the interests of the association. Such an instrument is not required to be in any general form, and may contain any stipulations upon which the parties may agree, provided these are not in contravention of established legal rules determining the capacity and liabilities of the shareholders, or do not provide for the prosecution of an unlawful enterprise. But the chief diversity between a partnership and a joint-stock company, and the one upon which the others mainly depend, lies in the fact that the capital stock of a company is divided into transferable shares. As a result of this, the doctrine of *electus personarum* (Lat., "choice of persons"), which prevails in regard to all partnerships, has no application to a stock company. No partner and no number of partners can introduce a new member into the firm without the consent of the others. If one partner sells out his interest, the purchaser does not become a member of the firm, but the partnership is immediately dissolved. But in a company the purchase of shares makes a person a member irrespective of the consent of the previous shareholders, and the membership may be constantly changing without destroying the existence of the company or interrupting the exercise of its usual functions. Therefore, while a partnership usually consists of a small number of persons familiarly known to one another, and associated in business relations on account of mutual trust and confidence, and taking sev-



erally an active part in the management of the affairs of the firm, a company is generally composed of a large number of individuals, who are, as a rule, little known to each other or entirely unknown, and whose business connection depends upon the circumstance that they have become without a agreement owners of stock in the same association. In an ordinary partnership the death, lunacy, or bankruptcy of one of the partners, or an assignment or transfer of his interest to another, effects a dissolution of the firm. If the remaining partners continue their business connection, it is only by forming a new partnership. But in a stock company these are not causes of dissolution. The person to whom the ownership of the shares passes becomes thereby a member of the company, whose existence is continued as long as the stock is held by shareholders, unless it be terminated by a decree of the proper court for the usurpation of illegal powers or other like reasons, or by the mutual agreement of the members. A joint-stock company therefore possesses the attribute of perpetual succession by reason of the transferable nature of its shares, and in this respect resembles a corporation. The other features of similarity to a corporation which it possesses are those already mentioned—the use of a common name other than the names of the members, the appointment of directors or managers to whom the business affairs of the company are entrusted, the power to adopt by-laws and resolutions, the right to vote upon stock, and a large membership. A company therefore possesses some of the attributes of an ordinary partnership and some of those pertaining to corporations. It is sometimes not inappropriately termed a *quasi* corporation. (See CORPORATION.)

Before the year 1700 the formation of joint-stock companies was hardly known in England. But within a few years subsequent to 1711, when the South Sea Company was formed, and largely as a result of its speculative enterprises, a feverish spirit of speculation and adventure was widely prevalent throughout the kingdom, and gave rise to large numbers of private commercial companies for the prosecution of various visionary undertakings. Some of these companies were founded upon obsolete charters, while the larger number were organized without any pretensions of such a nature. These were commonly denominated "bubbles," and were deemed so detrimental to the public welfare that in 1720 an act of Parliament (known as the "Bubble Act") was passed for their repression. This declared such companies illegal and void, and to be public nuisances, principally on the following grounds: the acting or presuming to act as a corporate body; the raising or pretending to raise transferable stock; the transferring or pretending to transfer or assign the shares in such stock without legal authority. This act was not repealed until 1826, so that for more than a hundred years such companies were illegal in England. Since the time of this repeal the tendency of English legislation has been to favor such associations, and to render them more efficient and beneficial by remedying the defects in their organization at common law. The chief legal disadvantages under which these companies labored were the necessity that in actions at law all the members should be joined as plaintiffs or defendants, and the responsibility of each member for the entire indebtedness of the association. The earliest modification of common-law rules was by the enactment of statutes empowering companies of a specified character to sue and be sued by a public officer. Subsequently, the formation of companies was authorized in which the shareholders should only be held to a limited liability, and finally many particular kinds of companies were actually incorporated, though not receiving full corporate powers. The English statutes which now govern this subject are the Companies' act, passed in 1862 (25 and 26 Vict., ch. 99), with the amendatory acts, 30 and 31 Vict., ch. 29 (1867), and 33 and 34 Vict., ch. 104 (1870). The provisions of these acts are applicable to the formation and incorporation of all joint-stock companies, require their registration in proper offices, and permit the shareholders to agree that their liability shall be limited either to the amount unpaid on their shares or to such amount as they may respectively undertake to contribute to the assets of the company in the event of its being wound up. Any seven or more persons associated for any lawful purpose may form such a company, and are required to subscribe a memorandum of association stating the name of the company, the amount of capital, the object of the association, the place of business, and the limit of liability, if any is agreed upon. If there is no declaration that the liability shall be limited, the company is called an unlimited one, and each shareholder is responsible for the entire debt of the company, as at common law. There are also provisions in the act relating to the management and administration of companies, their inspection by boards of examiners, and the method of winding them up. The effect of this legislation has not

been, however, to confer upon companies the entire powers which corporations regularly possess, since there is still retained the principle of the individual liability of the members, even though this may be limited in extent. In a true corporation legal responsibility does not attach to the individual corporators as separate persons, but only appertains to the fictitious person or body corporate which they have united to form.

In some of the U. S. joint-stock companies have at certain periods been formed in accordance with common-law rules, but generally at the present day their organization is governed by statutory provisions. Thus, in New York it is enacted that such associations may provide by their articles of association that the death of any stockholder or the assignment of his stock shall not work a dissolution of the association, and may commit to any three or more of the shareholders the sole management of the business; such companies are not to be dissolved except by judgment of a court for fraud or other good cause. They may purchase, hold, and convey real estate for certain specified purposes. If the association consists of seven or more shareholders, it may sue or be sued in the name of the president or treasurer for the time being. If judgment be recovered against the company upon a suit thus instituted, and execution thereon shall be returned unsatisfied, suits may be brought against any or all of the shareholders individually, as at common law. It has been decided that one of the shareholders may, in certain instances, bring an action against the president as representing the company. But such companies are not incorporated, and possess only the corporate powers specially conferred. They are still to be considered a species of partnership. In a number of the States there are no such associations as joint-stock companies distinct from corporations. Provision has been made by statute for the formation of associations of a similar character by modifying the general principles relating to corporations in regard to the personal liability of the members. The practice has been, not as in England to assimilate partnerships to corporations, and to designate the new form of association as a joint-stock company, but to assimilate corporations to partnerships by making the associates personally responsible to a greater or less degree for the common indebtedness, while the associations formed in accordance with such statutory regulations have been still designated as corporations. It is evident, however, that they are in important respects distinguishable from regular and true corporations, and bear a close resemblance to joint-stock companies. (See Wordsworth on *Joint-Stock Companies*, and the works of Lindley, Collyer, Parsons, and Story on *Partnership*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Joint Tenancy**, the tenure or ownership of an estate in real property by two or more persons, with the incidents of unity of interest, unity of time, unity of title, and unity of possession. (See these unities explained in the article JOINT OWNERSHIP.) The estate held by joint tenants may be either a fee simple, an estate for life, for years, or at will, but each must have the same quantity of interest. One cannot be tenant for life and the other tenant for years. This rule, however, does not prevent a remainder from being limited to one joint tenant to be vested in possession at the expiration of his joint interest, as where an estate is granted to two persons to be held by them jointly for life, with remainder to one of them in fee. To the rule requiring unity of time there are important exceptions. Thus, it does not apply to estates given to a person's use in accordance with the doctrine of uses (see USES), nor to provisions in a will known as executory devises. An estate granted to the use of a man and such wife as he shall afterwards marry, for the term of their lives, has been held to be a joint estate. The estate of the wife is in abeyance until the marriage, and then it relates back, and is deemed to take effect from the original time of creation. In consequence of the unity of interest and of possession, joint tenants are said to be seized *per my et per tout*—"by the half and by the whole;" i. e., each of them is regarded as having the possession as well of every parcel as of the entire estate. By this, however, it is not to be understood that each joint tenant owns the whole estate for every purpose. He is the owner of the whole for purposes of tenure and survivorship, but has only his own particular share for the purpose of alienation or partition. This share to which each co-tenant is specifically entitled separately from his co-tenants is an equal undivided portion of the entire estate. If, therefore, there are two joint tenants, each may convey an undivided half. If there are an undivided third. From the doctrine of union and entirety of interest and possession, the principle of survivorship, which is a distinguishing characteristic of joint tenancy, is a natural consequence. As one of two joint tenants has a concurrent interest in the whole estate, the extinguishment of the



co-existing claim of the other tenant by the death of the latter must necessarily result in leaving the survivor in undisputed ownership of the entire premises as proprietor in severalty, merely by the continuance of his original interest. So, if there are more than two co-tenants, upon the death of each in succession the estate will pass to those who remain until it vests in the last survivor of all. Upon his death the estate would pass, like any estate held in severalty, to his heirs or personal representatives. It is an important result of this theory of survivorship that a joint tenant cannot devise his interest in the land, for the devise does not take effect until after the death of the devisor, while the interest of the surviving tenant is but a continuation of his previous ownership, and suffers no interruption by reason of the death of his co-tenant. The estate passes to the survivor exempt from all charges made by the deceased co-tenant, and is not subject to any claim of courtesy or dower. An estate in joint tenancy can only be created by purchase or the act of the parties, and not by descent or the operation of law. Children of a deceased person who inherit the land of which he was seized in fee are tenants in common, and not joint tenants. (See TENANCY IN COMMON.) The mode of creation of an estate in joint tenancy at common law is either by the use of express words in the instrument of conveyance, declaring that the grantees or devisees are to hold by a joint title, or simply by naming two or more persons as those to whom the property is to be transferred. In the latter case it was a presumption of law that the parties intended to create a joint tenancy; and this construction was also preferred because this mode of tenure was favored on account of the right of survivorship. This was a result of the feudal doctrine that the services due to the lord should be kept entire. But in this country it has been the policy of the law to convert estates which in England would by construction of law be deemed joint tenancies, into tenancies in common. In New York estates granted or devised to two or more persons were as early as 1786 declared to be tenancies in common, except when limited to joint trustees or joint executors, unless the estate was expressly declared, in the deed or will creating it, to be in joint tenancy. Similar legislation exists in a large number of the States. In some States the mode resorted to has been to abolish the right of survivorship. In courts of equity also joint tenancies are not favored except when granted to co-trustees, and a limitation to two or more will sometimes be held to create a tenancy in common. Thus, when two persons purchase an estate, advancing the purchase-money in unequal portions, equity regards them as tenants in common. Such is not the case, however, when the money is advanced in equal portions. From the principle of identity of title and interest in joint tenants, it results that they all constitute a single owner as to third persons, and that all must be united as parties in suits by or against them in respect to their joint estate. If one tenant purchases in an outstanding adverse claim to the property, it enures to the benefit of his co-tenants if they will contribute towards discharging the expense incurred. For this and other purposes each is deemed to be a trustee for the other. Possession of the premises by one tenant is deemed the possession of all, and no action can be brought against him by the others merely on the ground of such exclusive possession. One tenant, however, may by express and unequivocal acts hold adversely to the other, so as to gain a title in severalty by force of the statute of limitations. (See LIMITATIONS, STATUTE OF.) Entry by one joint tenant upon land is deemed the entry of all, and a conveyance to one is a conveyance to all. If one receive the rents and profits of the estate, he may be compelled to account to the others, and pay to them their proportionate shares. One tenant is responsible to the others for the commission of waste upon the estate. If he will not join with them in making necessary repairs to the premises, after having been duly requested to contribute, an action may be maintained against him. At common law the remedy in this case was by a special writ, *de reparatione facienda*. All persons may be made joint tenants who are qualified severally to receive a grant of lands. As husband and wife, however, are considered in law as a single person, an estate limited to them is not a joint estate, but an "estate by the entirety," having peculiar and special characteristics. Two corporations cannot be joint tenants with each other, nor can an individual be a joint tenant with a corporation. A joint estate may be terminated or dissevered by a transfer of the property to one tenant by the application of the doctrine of survivorship or by release, by a destruction of any one of the various unities (except that of time) which are incident to such a tenure, or by partition. If one of two co-tenants conveys his undivided share to a third person, the grantee will become a tenant in common with the other co-tenant. If there be more than two co-tenants, the pur-

chaser would be tenant in common as to the share which he had acquired, while the remaining tenants would still hold the remaining shares in joint tenancy as between themselves. In transferring his interest to a third person a joint tenant must use an ordinary conveyance, but when the transfer is to a co-tenant a release is proper, since the grantee is already seized of the estate as a whole. (For the rules of partition see the topic PARTITION. See also ESTATES.) (The following works may be consulted: Washburn on *Real Property*; Kent's *Commentaries*; Cruise's *Digest*; Hilliard on *Real Estate*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Jointure**, an estate or property settled upon a wife in lieu or satisfaction of dower, to be enjoyed after her husband's death. The origin of the modern English doctrine of jointure is referable to a statute, known as the Statute of Uses, enacted in the reign of Henry VIII. (27 Hen. VIII. ch. 10). Before this period there was no method by which a wife's right of dower could be barred, except by a conveyance of the husband's lands in which dower might be claimed to some third person, to be held for the husband's use. The husband in such a case would retain merely a beneficial interest in the property, and this was a species of equitable estate, in which, by the law of uses, neither courtesy nor dower could be given. (See USES, DOWER.) It had therefore become a common practice for husbands who wished to remove the incumbrance of a claim of dower from their estates, to convey their lands to be held to their own use; and the result had been that most of the lands in the kingdom were held under this form of equitable ownership. In order, however, that a wife might not be left entirely without provision for her support after her husband's death, it became customary to settle lands before marriage to the use of the husband and his intended wife for the term of their lives in joint tenancy. If the wife outlived the husband, the entire estate would be vested in her for life by the right of survivorship. (See JOINT TENANCY.) Such an estate was termed a "jointure," on account of the joint nature of the interest created. The statute of uses had the effect to render wives dowerable in lands conveyed to uses by uniting the legal and the beneficial ownership in the same person; but in order that some method of barring dower might still exist, and that wives upon whom jointures had already been settled might not receive both dower and jointure, it furthermore provided that if estates had been or should be conveyed by way of jointure, the right to demand dower should, under certain conditions, be extinguished. In pursuance of these provisions, settlements in jointure were frequent in English practice until the enactment of the so-called Dower act in 1834, which introduced other methods of barring dower, which are now more commonly resorted to. The conditions or requisites which must be observed under the statute of uses in order that the settlement in lieu of dower may be valid are the following: (1) The estate must vest in possession immediately after the death of the husband; (2) it must be for the life of the wife at least, though it may be a greater estate, as an estate in fee; (3) it must be given to the wife herself, and not to another in trust for her; (4) it must be given and expressed in the deed to be in full satisfaction of her dower. It is not necessary that the estate should be limited to both husband and wife, in conformity to the mode of conveyance adopted before the statute, but it may be given to the wife alone. The settlement may be made not only by the husband, but by the wife's parents, relatives, or friends, or any third person. The provision must always be an estate in lands in order to be a valid legal jointure, and not a chattel interest or a pecuniary gift. If the settlement be made before marriage, the consent of the wife to accept it in lieu of dower need not be obtained, and whether the estate be of great or little value, the right to demand dower will be extinguished. Even though the wife be a minor, a jointure settled upon her before marriage will be an absolute bar to dower, though neither her assent be given nor that of parents or guardian. It was said by Lord Coke that "the jointure must be a competent livelihood of freehold for the wife," but the law provides no test of competency, nor will the jointure be invalid even though it be insufficient for the wife's support. If the jointure be settled upon the wife after marriage, she has a right of election after the husband's death between this provision and her dower, and may accept either as she may prefer. But after having once made her election and properly signified her choice, she cannot again exercise the privilege, but is obliged to retain the estate which she has determined to accept. Her acceptance of the jointure might be indicated by entry upon the lands given by the settlement and receipt of the rents. Her refusal of it would be shown by accepting the lands assigned in dower, or by bringing an action to have them assigned. If, however, after an acceptance of the jointure, the widow is evicted



from the whole or any portion of the property, she will be remitted to her right of dower *pendente lite*, i. e. to an extent equivalent to the loss she has sustained. No act answering to assignment in the case of dower (see DOWER) is necessary in order to place the widow in possession of the jointure lands after the death of her husband, but she may enter upon them immediately. Under the English law, adultery causes no forfeiture of jointure, though it is a bar to dower.

In courts of law there is a strict adherence to the provisions of the statute of uses, and settlements not made in accordance with its requirements will not be valid in extinguishment of dower. But courts of equity exercise an independent jurisdiction not derived from the statute, and apply different rules in regard to the nature of the provision which may be made and the manner in which it may be entered upon the wife. A distinction is therefore made between legal jointure and equitable jointure. The doctrines of equitable jointure are only applicable when the forms of legal jointure have not been complied with, and a court of equity is striving to effectuate the intent of the parties. In equity it is not necessary that an estate or provision in jointure should be actually created or conferred upon the wife, but an executory agreement to make such a settlement or provision will be sufficient, and will be carried into effect according to its terms. It is not requisite, moreover, that the provision should be a freehold estate in lands. Any inferior estate, as an estate for years or at will, will be sufficient, or even an interest in personal property or a pecuniary provision. The provision need not be entered directly upon the wife, but may be given to another in trust for her benefit. It is not possible, moreover, in equity to make a provision for the wife which shall deprive her of her right of dower without her own consent. If she assents to a provision made before marriage, this will bar her dower, but if she does not assent, she will have a right of election between the provision and dower, unless the requisites necessary to constitute a legal jointure have been complied with. If the settlement is made after marriage, she will always have a right of election. If the wife be an infant, the rule in equity is that the consent of parents or guardian must be obtained. But in equity, as at law, the intention that the provision shall be in lieu of dower must be clearly expressed in making the settlement, or it must appear manifestly inconsistent with the intention of the grantor that the wife should have both jointure and dower. If the value of the provision be wholly or partially destroyed, the right of dower will revive so far as is necessary to afford compensation for the loss she has sustained.

In this country the English law in regard to jointures is substantially in force in most of the States, though it has been to a considerable extent modified by statute. The tendency of legislation has been to assimilate the rules in relation to legal jointure to those prevailing in equity. In some of the States the distinction between legal and equitable jointure has been entirely abolished, and the entire subject is regulated by express statutory provisions. Thus, in New York it is provided that either an estate in lands or a pecuniary provision may be given in lieu of dower, and that if the jointure be created before marriage it must be consented to by the intended wife in order to be a bar of dower. Her consent may be evidenced, if she be of full age, by her becoming a party to the conveyance by which the jointure shall be settled—if she is a minor, by her joining with her father or guardian in such conveyance. If the settlement be made after marriage, she will have her choice between jointure and dower. The election is to be made within one year after the husband's death, or she will be deemed to have accepted the jointure. Jointure may, it is also provided, be barred by the same causes as dower.

Another mode by which a wife's right of dower is sometimes barred is by a testamentary provision in the husband's will, which is either expressed to be in satisfaction or lieu of dower, or which cannot, consistently with the other provisions of the will, be received by the wife in addition to her dower. A provision of this kind is not properly a jointure, but is governed by substantially the same principles. The effect of such provisions is usually regulated by statute. The general rule is that the intention to bar the right of dower must be clearly ascertainable from the terms of the will, or the widow shall reserve both the devise or bequest and her dower. And even when such intention is apparent, the provision does not bar her right of dower absolutely without her consent, but she has an election between her dower and the provision. When it is expressly declared in the will that the provision shall be "in lieu of dower," an election will unquestionably have to be made. Unless some positive expression of the same purport be used, the inquiry will be necessary whether the

receipt of both dower and the testamentary provision would be inconsistent with a reasonable construction of the entire will, or prevent its appropriate and complete legal effect and operation. If there be such an inconsistency, an election between dower and the provision will in this case also be requisite. But the law favors dower, and it will not be readily inferred that a devise is intended to be in lieu of dower if no express declaration to that effect is contained in the will. It has been held that if a provision for the wife is embodied in the will, and a clause is also inserted that the residue of the estate shall pass to a residuary devisee or legatee, the right of dower will not be extinguished, for the phrase "residue of the estate" means the remainder of the estate subject to all legal claims or incumbrances, among which the right of dower would be included. If, however, it be declared that the property shall be vested in trustees to receive the rents and profits and pay a certain portion over to the wife, she will not be entitled to receive the bequest without relinquishing her dower. Her possession of a life estate by her right of dower would be inconsistent with the control and management of the entire property by the trustees. Any kind of property may be given to the wife by will in lieu of dower. In many of the States it is provided that the wife shall signify her election between a devise and her dower within a certain time. If dower be not claimed within that period, it will be presumed that she has chosen the provision in the will. The statutes of the several States must be specially consulted on this subject. (See Washburn on *Real Property*; Cruise's *Digest*.) GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Joinville'**, town of France, in the department of Haute-Marne. In its vicinity the ancient castle of the dukes of Guise was situated. The title of prince of Joinville is derived from a baronial fief, erected into a principality by Henri II., of which Joinville was the capital. The title is now held by the third son of the late king, Louis Philippe. Pop. about 4000. AUGUST NIEMANN.

**Joinville** FRANCIS FERDINAND PHILIPPE LOUIS MARIE D'ORLÉANS, PRINCE DE, the third son of Louis Philippe, the last king of the French, b. at Neuilly Oct. 14, 1818. At the age of thirteen he commenced his naval career as pupil on board the frigate *Artemise*; was appointed a lieutenant in 1836, and in 1838 commanded the corvette *La Créole* of the fleet of Admiral Baudin before Vera Cruz. In the attack upon Fort San Juan d'Uloa and the city of Vera Cruz he distinguished himself in a shore-expedition against the city, in which in a hand-to-hand combat he captured the Mexican general Arista, for which he was made chevalier of the Legion of Honor and *capitaine de vaisseau*. In 1840 he, in command of the frigate *La Belle Poule*, was charged with conveying the remains of Napoleon from St. Helena to France. In the same frigate he visited America, and was warmly received in Philadelphia and Boston. In 1841 he married the princess Francesca di Braganza, daughter of Pedro I. and sister of the present emperor of Brazil. Made at the same epoch (1841) *contre-amiral* (rear-admiral), he in 1844 commanded the fleet which bombarded Tangiers and seized Mogador, displaying on the latter occasion conspicuous personal gallantry. The revolution of 1848 found the prince still commanding the fleet off Algiers, near his brother, the duc d'Angoulême, governor of the African possessions and commander of the military forces in Africa, numbering 80,000 men. Yielding to what purported to be the popular will, the two brothers relinquished their commands (which *might*, perhaps, had the word been said, have escorted them to Paris), and in company embarked for Gibraltar. For the next thirteen years the prince, banished from France, was an incessant traveller, filling the intervals of time with the occupations of an author or artist. On the breaking out of the American civil war in 1861, he embarked for New York, bringing with him his son, the duc de Penthièvre (who entered as a cadet the U. S. Naval School, then at Newport), and accompanied by his nephews, the comte de Paris and the duc de Chartres. The latter received military commissions from the government, and were members of the personal staff (A. D. C.) of Gen. McClellan during the latter part of the year, and during what is known as the Virginia Peninsular campaign against Richmond (Apr. May, June, 1862), showing on various occasions, and especially at the battle of Games's Mill, great efficiency and personal gallantry. The prince himself accompanied the headquarters of Gen. McClellan, who appreciated and gladly availed himself of his military experience, sound judgment, and statesmanlike qualities. Immediately on his return to France he commenced to the *Revue de Deux Mondes*, under the name de plume of "A. Freeman," an able sketch of the events of the campaign under the title of *L'Armée du Potomac*, etc. Subsequently he collected and published in two volumes, entitled *Études sur la guerre et les effets de*



*guerre*, his various contributions to that periodical, among which may be mentioned the one just referred to and *La marine en France et aux États-Unis en 1865*. With other members of his family he made urgent but vain appeals to the French government to be permitted to serve France in the war with Germany which broke out in 1870. When the French armies had been almost annihilated, and disaster overwhelmed their native land, the prince and his nephew, the duc de Chartres, disappeared from the family reunion at Claremont to find their way to serve their country. Repelled by the government, which regarded his presence as dangerous, and denied permission to serve even under a borrowed name, he was finally compelled to return to England, where he remained until the edict of banishment resting upon his family was abrogated by decree of the French assembly (1871). By his marriage with the princess of Brazil the prince de Joinville has two children—Pierre Philippe Jean Marie d'Orléans, duc de Penthièvre (b. Nov. 1, 1845) and a daughter, Françoise Marie Amélie (b. Aug. 11, 1844), who married (June 11, 1863) her cousin, the duc de Chartres. J. G. BARNARD.

**Joinville, de (JEAN), SIRE, b.** at the château of Joinville in Champagne about 1224; was at an early age attached as seneschal to the court of the count of Champagne, and afterwards to that of the king of Navarre. In 1248 he took part with St. Louis, king of France, in his first crusade, having in his train 700 men-at-arms; was a companion of the king in his battles and his captivity, becoming his intimate friend and counsellor. Returning to France in 1254, he was for many years employed at court, but declined to take part in the second crusade (1270), which was directed against Tunis, and proved fatal to that monarch. Joinville was one of the principal witnesses in behalf of the sanctity of Louis in the inquest (Aug., 1282) preliminary to his canonization, and his closing years were employed, at the request of Queen Jeanne of Navarre (1309), in writing his celebrated *Mémoires*, which have ever since been a favorite French classic. He lived to a great age, and d. probably in 1318. The best edition of his *Mémoires* is that of Natalis de Wailly (Paris, 1873).

**Jokjoker'ta**, the name of a former kingdom of Java, now a Dutch presidency. Its capital, Jokjokerta or Mataram, situated in lat. 7° 47' S., lon. 10° 21' E., has 50,000 inhabitants, many European settlers and European institutions, and a most curious palace of the sultan. It is built on a terraced island with entrances under the water, and the heavy gilding of its towers and windows shows that it was once a gorgeous building, though it now is falling rapidly into decay.

**Joliba.** See NIGER.

**Jo'liet**, city, cap. of Will co., Ill., on the Aux des Plaines River, and the Illinois and Michigan Canal, 36 miles S. W. of Chicago, on the Chicago Rock Island and Pacific and the Chicago and Alton R. Rs., at the terminus of the Michigan Central R. R. It is also on the Chicago and Illinois River R. R. The town is built mainly in the river-valley, but partly on bluffs on either side. Very fine calcareous building-stone underlies the whole city and vicinity, and is extensively quarried. Cement, gravel, and fireclay are largely obtained, the latter being found in a great mound. Firebrick and drain-tile are made from it. Near the city is the State penitentiary, built of stone. Its wall, averaging 35 feet in height, encloses 16½ acres. The usual number of convicts is some 1300, employed in making, on contract, boots, shoes, stone-work, cooperage, butts, hinges, harnesses, cigars, etc. It has been pronounced the largest and best conducted institution of the kind in the country. Joliet has a manufactory of iron and steel, built at an estimated cost of \$3,000,000; it employs from 2000 to 2500 men, and turns out steel, steel and iron rails, machinery, castings, and the varied products of the blast furnace, converter, puddling-mill, machine-shop, and foundry. Joliet has 12 churches, 2 national and 2 private banks, a public library, 2 convents, 1 semi-weekly and 4 weekly newspapers, a paid fire department, 16 artesian wells, and varied minor industries. Its water-power and the proximity of the Wilmington coal-fields give it great advantages as a manufacturing centre. Pop. 7263; of tp. 2940, greatly increased since the census. JAMES GOODSPEED, Ed. "REPUBLICAN."

**Joliet (CHARLES), b.** at Saint Hippolyte, in the department of Doubs, Aug. 8, 1832; entered littérature as a journalist and miscellaneous writer, and attracted great attention both by his *Le roman de deux jeunes mariés* (1866) and *Mademoiselle Cherubin* (1870), and by his novels treating of subjects from the Franco-German war of 1870-71.

**Joliet (LOUIS), b.** at Quebec in 1645; was educated in the Jesuits' college in that town, but engaged in the Western fur-trade. Commissioned by Frontenac to explore the Mississippi River, he started in 1673 up the Fox River and

down the Wisconsin and Mississippi rivers to a point below the mouth of the Arkansas, returning to Green Bay via the Illinois River. Thence he proceeded alone to Quebec, losing his MSS. on the way; but he prepared a map and narrative of the expedition from memory. He was appointed royal hydrographer, and received the island of Anticosti, of which he was dispossessed by the British. In 1697 the seigniory of Joliet in Canada was granted to him. D. 1700.

**Jo'hiette**, county of Quebec, Canada, extending N. W. from the St. Lawrence River. It has much timber, mines of iron, and stone-quarries; much of the soil is very fertile. It is intersected by the St. Lawrence and Industry Railway. Cap. Joliette. Pop. 23,075.

**Joliette**, a large town, the capital of Joliette co., Quebec, Canada, has fine water-power, excellent building-stone, large manufactures of lumber, leather, and castings. It has a benevolent society, college, hospital, convent, mechanics' institute, court-house and jail, and 1 semi-weekly newspaper. It has an important trade, and is the N. W. terminus of the St. Lawrence and Industry Railway. Pop. of sub-district, 3047.

**Jollivet' (PIERRE JULES), b.** at Paris June 27, 1803; studied first architecture, then painting; lived 1822-25 in Madrid; and gained the great medal in 1835. He has painted a great number of subjects of Spanish life and history: *Lara*, in the Luxemburg; *Battle of Aïcha*, at Versailles; *Le Massacre des Innocents*, at Rouen. The *Time of Pericles* is one of his latest works.

**Jolly Boat** [*jolly* is kindred to the word *gay*], a small boat carried on board ships, and used for communicating with shore or with other ships. It is usually propelled by oars, but sometimes a mast and sail are set up. The jolly boat is often short, wide, and capacious, and is particularly adapted to the steward's use.

**Jomard' (EDME FRANÇOIS), b.** at Versailles Nov. 17, 1777; studied in the École Polytechnique, and accompanied the expedition to Egypt as a member of the scientific committee. After his return to Paris in 1802 he was employed for more than twenty years in the redaction and publication of the celebrated work, *Description de l'Égypte*, of which he wrote 6 volumes himself. In 1821 he took part in the founding of the Geographical Society of Paris, and from 1828 he held a position in the geographical department of the Royal Library. He has aided in the publication of many valuable works concerning Egypt and Africa, and wrote a number of minor essays on different geographical, archeological, and educational subjects. D. Sept. 22, 1862, at Paris.

**Jomini' (HENRI), BARON, b.** at Payerne, canton of Vaud, Switzerland, Mar. 6, 1779; entered the French army in 1804 with the rank of major; served as aide-de-camp to Marshal Ney in Germany and Spain; was made a brigadier-general in 1808, and distinguished himself on the retreat from Moscow in 1812. But when Napoleon, instigated by Berthier, refused to promote him after the victory at Bautzen, Jomini left the French army and entered the service of the emperor Alexander, who made him his aide-de-camp; he took, however, no part in the campaign against France, and the rumor that he had revealed the French plans of operation to the allies was denounced by Napoleon himself. In the Russian service he distinguished himself in the war against the Turks in 1828, and was very active in the foundation of the Military Academy of St. Petersburg. During the latter part of his life he devoted himself wholly to literary pursuits. D. at Passy, near Paris, Mar. 24, 1869. His principal works are—*Traité des Grandes Opérations militaires*, ou *Histoire critique des Guerres de Frédéric le Grand, comparées au Système Moderne*; *Histoire critique et militaire des campagnes de la Révolution* (5 vols., Paris, 1806); *Vie politique et militaire de Napoléon* (4 vols., Paris, 1827); *Précis de l'art de la guerre* (Paris, 1838, 2 vols.; with an appendix, Paris, 1849).

**Jo'nah** [Heb., a "dove"], a Hebrew prophet, b. at Gath-hepher in the tribe of Zebulun. He was no doubt the "Jonah, son of Amittai," who is mentioned in 2 Kings xiv. 25, so that he lived about 800 B. C. The book which bears his name does not contain his prophecies, but a story about him, an incident from his career. Some assert that the story is purely mythical, others that it has a historical foundation, but has undergone the influence of popular tradition; others that it is a poetical invention with a didactic purpose. In any view its didactic purpose is evident. It teaches that man cannot escape from God by flight; that man has only to do what he is called to do, and leave results to God; and that God does not, when he employs a human agent to threaten judgment, bind himself not to show mercy lest he should bring his agent to shame.

**Jo'nas (JUSTUS), b.** June 5, 1493, at Nordhausen, in the Prussian province of Saxony; studied law, and was pro-

fessor of jurisprudence, first at Erfurt, and then at Wittenberg, where in 1521 he changed his chair for that of theology; became ecclesiastical superintendent at Halle in 1541, and at Coburg in 1546; and d. at Eislefeld Oct. 9, 1555. He was an intimate friend of Luther and Melancthon, and one of the most prominent among the German Reformers. He accompanied Luther to Worms, and him in the translation of the Old Testament, and contributed much to the furthering of the Reformation by his preaching and by his powerful translations into German of the Latin writings of Luther and Melancthon.

**Jon'athan** [Heb. *Yonathan*], a son of Saul, king of Israel, b. near the close of the twelfth century B. C.; became, on the establishment of the kingdom, a conspicuous leader in the war against the Philistines, which owed its origin to his daring exploit in killing a Philistine general at Geba (1 Sam. xiii. 3, 4). His attachment to David, whom he defended against the jealousy and murderous designs of his father, is the best known feature of Jonathan's career, and has made his name a synonym for disinterested friendship. Jonathan was killed in battle against the Philistines at Mount Gilboa, about B. C. 1053, together with his father and two brothers, and his body was exposed upon the walls of Beth-shan until it was secretly carried away and buried by the men of Jabesh-Gilead, and his remains were ultimately placed in the family sepulchre at Zelah. On the death of Jonathan, David penned an elegy (2 Sam. i. 22 seq.) which is one of the most beautiful productions of its kind.

**Jonathan ben Uzziel**, b. in Palestine in the first century B. C.; was a pupil of Hillel, and became one of the most celebrated expositors of the books of the Old Testament. He was the author of a Chaldee paraphrase or translation of the prophets, and to him is also attributed the authorship of a Targum known by his name, and another called the *Five Megilloth*. The Targum of Jonathan was first printed at Venice in 1590-91, and afterwards at Bale (1607), Hanau (1614), Amsterdam (1640), Prague (1646), and Vienna (1859). A Latin translation was given in Walton's *Polyglot*, and an English one by Rev. J. W. Etheridge (London, 1862). But recent criticism has decided this Targum to be several centuries posterior to the Christian era, and the genuine works of Jonathan are reduced to the *Paraphrase on the Prophets* embracing also Joshua, Judges, Samuel, and Kings), first published at Venice in 1494, now found in all rabbinic Bibles, also in Walton's *Polyglot* and Buxtorf's Hebrew Bible. It is especially valuable for its expositions of the minor prophets.

**Jonathan Creek**, tp. of Moultrie co., Ill. Pop. 1001.

**Jonathan's Creek**, tp., Haywood co., N. C. Pop. 987.

**Jones**, county of Central Georgia. Area, 378 square miles. The Ocmulgee washes its S. W. border. It is hilly and fertile. Iron ore and granite exist here. Cotton and corn are staple crops. The S. part is traversed by the Georgia Central R. R. Cap. Clinton. Pop. 9436.

**Jones**, county of the E. of Iowa. Area, 576 square miles. It is partly forest and partly prairie. It is well watered, and has a fertile calcareous soil. Cattle, grain, wool, butter, and hay are extensively produced. Carriages, wagons, and brick are leading articles of manufacture. The county is traversed by the Iowa Midland, the Davenport and St. Paul, the Sabula Ackley and Dakota, and other railroads. Cap. Anamosa. Pop. 19,731.

**Jones**, county of the S. E. of Mississippi, drained by the head streams of the Pascagoula River. Area, 650 square miles. It is partly light pine-land, and has dense forests. It produces some rice, corn, and sweet potatoes. Cap. Ellisville. Pop. 3313.

**Jones**, county of the E. of North Carolina, traversed by the river Trent. Area, about 425 square miles. It has much pine forest and swamp-land, and is generally level and sandy. Cotton and tobacco are staple products. Cap. Trenton. Pop. 5002.

**Jones**, an unorganized county of N. Central Texas. Area, about 1200 square miles. It is drained by the head-streams of Brazos River, and is generally a fertile prairie-land adapted to stock-raising. Its principal place is Anson. The county receives its name from Anson Jones, the president of the republic when Texas was admitted to the Union.

**Jones**, tp. of Winston co., Ala. Pop. 299.

**Jones**, tp. of Union co., Ia. Pop. 840.

**Jones**, tp. of Elk co., Pa. Pop. 1091.

**Jones** (Anson), b. in Massachusetts Jan. 20, 1798; commenced the practice of medicine in 1820. Being of a migratory disposition, he subsequently resided for a while in Philadelphia and New Orleans; he then visited South America, and finally (in 1833) settled at Brazoria, Tex. When the troubles between Texas and Mexico broke out in 1835, he

was a zealous advocate of the independence of the colony. In the war that ensued he acted as a private soldier as well as a surgeon in the Texan army. After independence was achieved he was a member of the Texas Congress. In 1838 he was minister from that republic to the U. S. Subsequently he was senator in the Texas Congress, and then for three years secretary of state. In Sept., 1844, he was elected president of Texas, which office he held until Texas became one of the States of the Union. He was a man of great and varied abilities, and left his impress upon the history of the times. His death, by his own hand, Jan. 7, 1858, was deeply lamented. A. H. STEPHENS.

**Jones** (CHARLES COLCOCK), D. D., b. at Liberty Hall, Ga., Dec. 20, 1804; studied at Andover and Princeton theological seminaries; was ordained in 1830, and went as a missionary to the negroes in his native county in Georgia. From 1836 to 1838 and from 1847 to 1850 he was professor of church history in the seminary at Columbia, S. C., having in the interval returned to his labors among the negroes. In 1850 he removed to Philadelphia, and became secretary of the Presbyterian Board of Domestic Missions; returned in 1853 to Georgia, where he d. Mar. 16, 1863. He published several catechisms, one of which, on *Scripture Doctrine and Practice*, was translated into several languages as a manual for the instruction of heathen; several pamphlets on the *Religious Instruction of the Negro*, and a *History of the Church of God*, left unfinished at his death.

**Jones** (CHARLES COLCOCK, JR.), b. in Savannah, Ga., Oct. 28, 1831. His early education was under the instruction of private tutors at Montevideo and Maybank (plantation residences of his father in Liberty co., Ga.); his freshman and sophomore years were spent at South Carolina College, Columbia, where his father, Rev. Charles Colcock Jones, Sr., D. D. (a man of great eloquence), was then one of the professors in the Presbyterian Theological Seminary of that city. The junior and senior years of his collegiate course were passed at Nassau Hall, Princeton, N. J., where he graduated with high distinction in 1852. After this he studied law in Philadelphia one year, and then went to Dane Law School, Harvard University, Cambridge, Mass., where he remained two years more, and took the regular degree in the law department of that institution in 1855. Returning to his native State, he was admitted to the bar at Savannah, Ga., in 1856, and with his natural ability and thorough training rose rapidly to the first rank in his profession. In 1860 he was elected mayor of the city—a position seldom if ever before conferred on one so young by a corporation possessing the amount of wealth, population, and extent of commercial and navigating interests that the city of Savannah then did. Soon after the passage by Georgia of her ordinance of secession in 1861, and the beginning of the late war, he entered the Confederate States military service and became lieutenant-colonel of artillery. This position he held until the end of the war. He was under Gen. Joseph E. Johnston at his surrender in Apr., 1865. After the war Mr. Jones moved to the city of New York, where he resumed the practice of law, and has continued to prosecute it with great success. He has not permitted the calls of his profession, however, to absorb all his time or energy. By a methodical economy in the arrangement of business peculiar to himself, he has, even under the greatest pressure of office duties, found leisure to contribute largely to the literature as well as science of the country by his pen. Several works of unusual merit have been published by him. Among these may be named—his *Historical Sketch of the Chatham Artillery during the Confederate Struggle for Independence* (1867), *Historical Sketch of Tomo-chi-chi-mico of the Yamaceranes* (1868), *Ancient Tumuli on the Savannah River* (1868), *Ancient Tumuli in Georgia* (1869), *Antiquities of the Southern Indians, particularly of the Georgia Tribes* (1873). The latter is a work of great interest, and exhibits a vast amount of mental labor and historical research. His published works, already ten in number, place him in style and matter high among American authors. A. H. STEPHENS.

**Jones** (GEORGE W.), b. in King and Queen co., Va., Mar. 15, 1806; was a member of the legislature of Tennessee (in the house or senate) from 1835 to 1842, and was a member of Congress from 1843 to 1861. Though a Union man of the Jackson school, after the secession of Tennessee he went with his State, and was a member of the Confederate Congress. Since the war he has acted no prominent part in politics. Mr. Jones is a remarkable instance of a self-made man under American free institutions. A poor boy with scanty education, he was brought up to the saddler's trade, but by dint of application and study he acquired extensive knowledge, and during his entire Congressional career was one of the most marked men of the House. A. H. STEPHENS.

**Jones** (Sir HARRY DAVID), G. C. B., b. 1792; commis-



sioned second lieutenant royal engineers 1808; served in the expedition to Walcheren 1809; in the Peninsula campaigns 1810-14; on special duty in America 1815; engineer in charge of fortifications on Montmartre after the entrance of the British troops into Paris 1815, and commissioner to the Prussian army of occupation 1816; brigadier-general July, 1854, and conducted the siege operations against Bomarsund; promoted to be major-general Dec., 1854; appointed to and continued in command of the royal engineers in Eastern campaign 1855 to fall of Sebastopol; lieutenant-general July 6, 1860, and colonel commandant of royal engineers Aug. 2, 1860. In 1856 he succeeded to the governorship of the Royal Military College at Sandhurst, where he remained until his death, which occurred at that place Aug. 2, 1866. G. C. SIMMONS.

**Jones** (HENRY BENJ.), M. D., F. R. S., an English physician, b. in 1814, was educated at Harrow and Trinity College, Cambridge, studied medicine in London, and in 1816 became physician of St. George's Hospital, London. Has published *General Calculus, and Gout, Animal Chemistry, Animal Electricity, Life of Paracelsus* (1869), *The Royal Institution* (1871), and many scientific papers; was a member of many learned societies. D. Apr. 20, 1873.

**Jones** (INIGO), b. in London in 1572; d. there July 21, 1652. Of humble parentage and poor, he owed to the earl of Pembroke, who was attracted by his taste for drawing, the advantage of travel and study in Europe. He spent several years in Germany, France, and Italy, and received his chief impulse from the works of Palladio in Venice. In 1604 he passed a year in Copenhagen, under the patronage of King Christian IV.; in 1605 returned to England, recommended by the king to his brother-in-law, James I.; in Ben Jonson's prime as poet laureate was court architect and decorator; showed a talent for mechanical invention and the production of scenic effects; became, in short, a person of importance, a favorite with the court, but not equally popular with artists and men of letters. He maintained his position under Charles I.; was made superintendent of the royal buildings, designed works of importance, and held a high rank among the architects of his generation. The river front of Somerset House, Shaftesbury House, Ashburnham House, the W. front of old St. Paul's, and Covent Garden, were admired examples of his skill. His designs for the palace of Whitehall, the banqueting-house of which only was built, are regarded as his masterpieces. Jones owed his celebrity less to his genius than to the style of building that he introduced into England from Italy. When that style became obsolete his fame passed away. He was an author as well as a builder and designer, an excellent mathematician, a good classical scholar. He wrote an essay on *Stonehenge*, ingenious, but of no value; notes on the architecture of Palladio, essays on miscellaneous subjects, and verses. Volumes of his architectural designs were published by William Kent and Isaac Ware. His biography has been prepared by Peter Cunningham (London, 1848). The fortunes of Inigo Jones were implicated in those of the royal family. The execution of Charles I. crushed him, and he d. poor and wretched.

O. B. FROTHINGHAM.

**Jones** (JACOB), b. near Smyrna, Del., in 1770; entered the U. S. navy as midshipman in 1799; was captured in frigate Philadelphia in 1803 near Tripoli, where he was held a prisoner twenty months; commanded the U. S. sloop of war Wasp in 1812, in its celebrated capture of the British sloop Frolic, and was himself captured the same day with both those vessels by the British ship Poictiers of 74 guns. Released on parole at Bermuda. Jones received distinguished honors for his bravery, was voted a gold medal by Congress, was promoted to post-captain in the squadron under Com. Decatur. After the war Com. Jones commanded squadrons in the Mediterranean and Pacific. D. at Philadelphia Aug. 3, 1850.

**Jones** (JAMES), M. D., b. in Georgetown, D. C., 1806; d. in 1873 in North Carolina, of paralysis. He received M. D. from the University of Pennsylvania, and became resident physician in the Philadelphia almshouse. Was editor of the *N. O. Med. and Surg. Journal* in 1857; professor of obstetrics and diseases of women and children; and then professor of practical medicine and dean of the faculty in the University of Louisiana 1857-66. PAUL F. EVE.

**Jones** (JAMES CHAMBERLAIN), b. in Davidson co., Tenn., Apr. 20, 1809; was elected governor of the State over James K. Polk in 1841 and 1842, and was one of the U. S. Senators from Tennessee from 1851 to 1857. D. at Memphis Oct. 29, 1859. A. H. STEPHENS.

**Jones** (J. GLANCY), b. in the valley of the Conestoga, Pa., Oct. 7, 1811; was educated for the ministry, but became a successful lawyer and for a time was deputy attorney-general of Pennsylvania. He was three times sent to Congress between 1850 and 1858; was the founder of the court

of claims, and for a time chairman of the committee of ways and means. In 1858 he became U. S. minister to Austria. D. at Reading, Pa., Mar. 24, 1878.

**Jones** (JOEL), LL.D., b. at Coventry, Conn., Oct. 25, 1795; graduated at Yale in 1817; was a lawyer of Easton, Pa. In 1835 he became judge, and afterwards presiding judge, of the Philadelphia district court. He was (1847-49) the first president of Girard College, and in 1849 was mayor of Philadelphia. He published reports of the revision of the civil code of Pennsylvania, *Pennsylvania Land Law*, and *Jesus and the Coming Glory*, a work in favor of the doctrine of the speedy second advent of the Lord. He was perfectly familiar with several living and dead languages, was an earnest student of theology, and wrote much for the religious press. D. in Philadelphia Feb. 3, 1860.

**Jones** (JOHN), M. D., b. at Jamaica, L. I., in 1729; studied medicine at Rheims and Leyden; was surgeon to Sir William Johnson's expedition against Crown Point in 1755, and attended the wounded French commander, Baron Dieskau; was professor of surgery at the medical school of the College of New York 1767; published *Plain Remarks upon Wounds and Fractures* in 1776; retired from New York City during the British occupation; was elected to the State senate; served for a short time in the medical department of the army in 1780, where he was chosen physician to the Pennsylvania Hospital, and in 1787 vice-president of the College of Physicians. He was the friend and family physician of Franklin and Washington, and stood at the head of his profession in America. D. at Philadelphia June 23, 1791. A volume of his medical writings was published, with a memoir, by his pupil, Dr. Mease, in 1795.

**Jones** (JOHN B.), b. at Baltimore, Md., in 1810; wrote a number of descriptive books and character sketches, which have been very popular. *Wild Western Scenery* (1849) had a sale of 50,000 copies. Mr. Jones established in 1857 at Philadelphia a weekly paper, the *Southern Monitor*, devoted to the advocacy of Southern interests.

**Jones** (JOHN M.), b. in Virginia in 1821; graduated at West Point 1841, and entered the infantry as brevet second lieutenant, second lieutenant 1845, first lieutenant 1847, and captain 1853; served on frontier duty until 1861, and resigned May 27, 1861, to join the cause of the Confederacy; was appointed colonel of Virginia volunteers, and advanced to the grade of brigadier-general; served with Longstreet's corps in Virginia; wounded at Malvern Hill, and severely at Gettysburg; and served in operations about Knoxville, Tenn., in the Virginia campaign of 1864 was killed at Spottsylvania, May 10, 1864. G. C. SIMMONS.

**Jones** (JOHN PAUL), whose true patronymic was JOHN PAUL, b. at Arbriggland on the Firth of Solway July 6, 1747. His father followed the peaceful pursuit of a gardener. The youth became early imbued with the spirit of adventure and desire for a seafaring life, which the scenes of his childhood were calculated to inspire. Accordingly, we find him at the age of twelve apprenticed to a shipmaster engaged in the American trade. His first voyage took him to Virginia, where his brother William had settled and prospered, and under whose care our hero diligently improved his leisure moments, particularly in the study of his newly-adopted profession. The failure of his master liberating him from his indentures, Paul was almost at once engaged as third mate of a slave, in which traffic he continued until his own sense of the disgrace attaching to such a career induced him to abandon it. Taking passage from Jamaica for Kirkcubright in 1768, the death of both master and mate occurred on the passage, and Paul was forced to assume command of the vessel, bringing her safely to her destination, and subsequently becoming her master, making several voyages to the West Indies. In 1773 he came to Virginia to arrange the affairs of his brother, who had died childless and intestate. Here he added the name of Jones to his own, and apparently determined to abandon his profession and devote himself to agriculture. The outbreak of hostilities in 1775, however, recalled him to the sea, and his offer of services to Congress being accepted, he was on Dec. 22, 1775, appointed senior lieutenant in the navy, and assigned to the flagship Alfred. On the arrival of the commanding officer on board, Jones with his own hands hoisted the American flag, the occasion being the first on which it was ever displayed. His first engagement was with the Glasgow, soon after which action he succeeded to the command of the sloop Providence (12), in which, during a cruise of little more than six weeks, he captured sixteen prizes, besides doing much damage to the fishery and shipping at Canso and Isle Madam. Appointed to command the Alfred on the completion of this successful cruise, he led an expedition, which sailed Nov. 2, 1776, to break up the Cape Breton fishery and capture the coal fleet, in which he was partially successful, arriving in Boston Dec. 15 with four prizes. He was in Jan., 1777, ordered back to



the Providence. Though in the list of original appointments in the colonial navy he stood sixth from the head, and subsequently received his commission as captain, dated Aug. 8, 1776, a resolution of Congress was passed Oct. 10, 1776, declaring the order in which captains in the navy should take rank, in which list Jones's name was the eighteenth. This superseding was a constant source of annoyance to Jones, the injustice of which he continued to represent, but without effect. In June, 1777, Congress appointed Jones to the command of the *Ranger* (18), a new ship, in which he sailed from Portsmouth Nov. 1, arriving at Nantes Dec. 2, 1777. In Apr., 1778, he sailed from Brest in the *Ranger*, and after burning a brig off Cape Clear made a daring descent upon the town and shipping of Whitehaven, in which he displayed great personal daring; he then conceived the idea of capturing the earl of Selkirk, hoping to make him the instrument of obliging England to agree to a system of exchanges. The absence of the earl from his estate near Kirkcubright caused the scheme to fail. A quantity of silver plate which was seized on this occasion was subsequently recovered and returned to the earl at Jones's expense. During this cruise he fell in with the *Drake*, a vessel superior in crew and armament, which he captured and took into the harbor at Brest. The *Ranger* subsequently returned to America, Jones being retained in France by our commissioners at the request of the French minister of the marine, who made several very gratifying propositions to him, all of which, however, failed of execution, greatly to the disappointment and annoyance of Jones, who was thus without a command until Feb., 1779, when by his urgent applications the French minister appointed him to the command of the *Duras*, an old merchantman converted into a war vessel, and which Jones obtained permission to name *Bon Homme Richard* in honor of Dr. Franklin, whom he greatly respected and by whom he was held in high esteem. The *Richard* when completed mounted 42 guns, and on the 14th of Aug., 1779, Jones departed from Lorient in command of a squadron of seven vessels, including two privateers. In a month's time they had captured or destroyed twenty-six vessels, this intelligence spreading consternation along the English coast. On Sept. 23 the squadron, consisting of the *Richard*, the *Alliance*, the *Pallas*, and the *Vengeance*, when off Flamborough Head sighted a fleet of forty-one sail, which proved to be the Baltic fleet under convoy of the *Serapis* (50) and the *Countess of Scarborough* (20). Chase was at once given by the squadron, the *Alliance*, disregarding signals to form in line of battle, at once taking the lead, but after approaching near to the *Serapis*, stood off again from land. About 7½ p.m. the *Richard* came up with the *Serapis*, and a terrible engagement, lasting upwards of three hours, ensued, during all of which time the vessels were in close proximity, and during the latter part of the fight in actual contact. At the commencement of the action two of the *Richard*'s guns burst, disabling their crews and causing the abandonment of the battery. The *Countess of Scarborough* surrendered to the *Pallas* after a short action, and the *Alliance* now approached the scene of conflict between the *Richard* and *Serapis*, but, instead of supporting the *Richard*, her commander, Capt. Landais, an envious Frenchman, actually opened a raking fire on the *Richard*, which was continued too long to admit of doubt of the Frenchman's intention. Notwithstanding this discouraging circumstance, and the fact that the *Richard* was in a sinking condition and surrender counselled by many, Jones maintained the conflict until shortly after 10 o'clock, when the *Serapis* struck. The *Richard* being on fire in two places and in a hopeless condition, she was abandoned after removing the wounded, and about 10 a.m. of the 25th she went down, bows first. The *Serapis* was taken into the Texel, and Jones was received in Paris and throughout France with the greatest honors, the king bestowing upon him an elegant sword and the cross of the order of Military Merit, which latter Congress permitted him to accept, and with which he was decorated by the French minister at Philadelphia, where Jones had arrived on Feb. 18, 1781. Congress also gave him a vote of thanks, and by resolution the command of the new frigate *America* (74); but as this fine ship was subsequently presented to France to replace the *Magnifique*, Jones never saw active service at sea again. He was subsequently (1783) sent to Paris as agent to recover the moneys due in Europe for prizes taken under his command. In 1787, Jones came to America, and while here Congress voted him a gold medal. He soon after returned to Europe, and in 1788 accepted the appointment of rear-admiral in the service of Russia, and rendered important service against the Turks. He became the object of personal enmity among favorites at court, and was allowed to retire on a pension, which, however, was not paid. He removed to Paris, where he died July 18, 1792.

G. C. SIMMONS.

**Jones** (JOHN TAYLOR), D. D., b. at New Ipswich, N. H.,

July 16, 1802; graduated at Amherst in 1825, and studied theology at Andover and Newton, Mass.; became a Baptist in 1828; went in 1830 as a missionary to Burma; was transferred in 1833 to Siam, where he was a successful missionary. He published a *Siamese New Testament* (1843) and several tracts. D. at Bangkok Sept. 13, 1851.

**Jones** (JOHN W.), b. in Montgomery co., Md., in 1806; studied medicine, took his degree at Jefferson College, Philadelphia, and moved to Georgia, where, after serving in the State legislature, he was elected to Congress 1847-49; subsequently he became one of the professors in the medical college of Atlanta. D. in 1872. A. H. STEPHENS.

**Jones** (JOHN W.), b. in Chesterfield, Va.; graduated at William and Mary College in 1803; represented Virginia in Congress 1835-45, and was Speaker during his last term. D. Jan. 29, 1848. A. H. STEPHENS.

**Jones** (JOHN WINTER), F. S. A., b. at Lambeth, England, early in the present century; was educated at St. Paul's School; studied law, and entered the civil service in 1837. He became assistant keeper of the printed books at the British Museum in 1850, keeper in 1856, and principal librarian on the retirement of Mr. A. Panizzi in 1866. Mr. Jones has edited for the Hakluyt Society several republications of rare works of early travels, has written a guide to the printed books in the Grenville and King's Library, has contributed to the *New Biographical Dictionary* of the Society for the Diffusion of Useful Knowledge, and to the quarterly reviews. D. Sept., 1881.

**Jones** (JOSEPH), M. D., b. in Liberty co., Ga., Sept. 6, 1833; graduated at Princeton College, N. J., and at the medical department of the University of Pennsylvania. His great-grandfather was killed in storming the British works at Savannah when an aide to Gen. McIntosh, Oct. 9, 1779; his grandfather served through the war of 1812; and his father was the distinguished clergyman and professor, Charles Colcock Jones. Joseph Jones was professor of chemistry in the Medical College, Savannah, Ga., 1858-59; professor natural sciences University of Georgia, Athens, 1858-59; professor in the Medical College, Augusta, 1859-60; chemist to cotton-planters' convention, Georgia, 1860; surgeon army Confederate States 1862-65; professor chemistry and clinical medicine Nashville University, Tenn., 1868-69; and at present professor chemistry and clinical medicine University of Louisiana, and visiting physician to its charity hospital. He is the author of several valuable contributions to medical science and its kindred subjects. PAUL F. EVE.

**Jones** (NOBLE WINBERLY), M. D., b. near London, Eng., 1724; emigrated to Georgia; a member of the colonial legislature in 1761; was a leading revolutionist in 1774, and was a member of the second Congress of the colonies 1775; afterwards became connected with the army, and was made prisoner at the capture of Charleston in 1780. After being exchanged he was again returned to Congress. He practised medicine during the intervals of public life; was president of the State convention of Georgia by which the constitution was amended in 1795. D. in Savannah, Ga., Jan. 9, 1805. A. H. STEPHENS.

**Jones** (OWEN), b. in Wales, 1809; best known by his studies of the Alhambra in Granada, to which he devoted much time and labor. He decorated the interior of the Exhibition building in Hyde Park (1851) and of the Crystal Palace at Sydenham, where the Egyptian, Greek, Roman, and Alhambra courts were of his design. In 1852 he was made director of decorations for the Crystal Palace Company. St. James's Hall, Piccadilly, was erected by him. He was the author of *Designs for Mosaic and Tessellated Pavements* (1842), *Plans, Elevations, and Sections of the Alhambra* (1848), *An Attempt to define the Principles which should Regulate the Employment of Colors in Decorative Arts* (1841), *The Grammar of Ornament* (1856). He wrote much on the art of illumination, and designed the illuminations of the Book of Common Prayer. To illustrate his doctrine that ancient sculpture was commonly painted, and the exterior of marble buildings embellished with color, Mr. Jones touched with color statues in the Greek Court at Sydenham, including some of the casts from the Elgin marbles there. His work is familiar through the ornamental title-pages of illustrated books. D. Apr. 19, 1874. O. B. FROTHINGHAM.

**Jones** (Gen. ROGER), b. in Westmoreland co., Va., 1789; appointed second lieutenant in the marine corps in 1809; transferred to the artillery in 1812, with rank of captain; and assistant adjutant-general, with rank of major, 1813; served with distinction during the war with Great Britain, winning brevet of major for Chippewa and of lieutenant-colonel for gallantry at sortie from Fort Erie; appointed adjutant-general, rank of colonel, Aug., 1818, and retained in the artillery in 1821. In 1825 was appointed adjutant-



general of the army, which position he held until he d. at Washington, D. C., July 15, 1852. In 1832 he was brevetted brigadier-general, and in 1849 major-general.

G. C. SIMMONS.

**Jones** (SAMUEL, LL.D.), b. in 1769, was a son of Chief-Justice Samuel Jones; graduated at Yale in 1790; studied law in his father's office, along with De Witt Clinton; was a member of the New York assembly 1812-14; recorder of New York City 1823; chancellor of the State 1826; chief-justice of the superior court in New York City 1828, and judge of the supreme court of the State 1847-49. D. at Cold Spring, L. I., Aug. 8, 1853.

**Jones** (GEO. SAMUEL), b. in Virginia in 1820; graduated at West Point July, 1841, and appointed brevet second lieutenant of artillery, receiving his full commission the following September; promoted to be first lieutenant 1847, and captain 1849; 1841-45 was on frontier duty and in garrison; 1845-51 at West Point as professor and instructor; again on garrison and frontier duty 1851-58, when he was assigned to duty in Washington as assistant to the judge-advocate; resigned Apr. 27, 1861, and entered the Confederate service as colonel, rising to the grade of major-general 1862, and in 1864 commanded the department of South Carolina, Georgia, and Florida. G. C. SIMMONS.

**Jones** (SEABORN), b. in Augusta, Ga., 1788, and was sent to Princeton College for education, but returned before graduation in consequence of the failure of his father in mercantile business; studied law, and was admitted to the bar by special act of the legislature before he was twenty-one years of age; was solicitor-general of his judicial circuit in 1823; was a member of Congress 1833-35 and 1845-47. D. in Columbus, Ga., in 1874. He was a lawyer of great distinction in the State for half a century.

A. H. STEPHENS.

**Jones** (THOMAS AP CATESBY), b. in Virginia in 1789, was a brother of Gen. Roger Jones; entered the U. S. navy in 1805; was from 1808 to 1812 in the Gulf of Mexico, engaged in suppressing piracy, smuggling, and the slave-trade; was captured with his flotilla by a British naval expedition against New Orleans in 1814; commanded the Pacific squadron in 1842, when he took possession of Monterey in California, upon erroneous information of war existing between the U. S. and Mexico, for which he was temporarily suspended from the service. D. at Georgetown, D. C., May 30, 1858.

**Jones** (THOMAS RYMER), F. R. S., b. about 1810; educated at London and Paris, and entered on his profession as a surgeon in 1833, but by reason of deafness did not long practise; became in 1831 professor of comparative anatomy in King's College, London, and in 1840 Fullerian professor of physiology in the Royal Institution, and acquired fame as an eloquent lecturer. Author of *A General Outline of the Animal Kingdom* (1838), of papers in the *Cyclopaedia of Anatomy and Physiology*, and various monographs. D. Dec., 1880.

**Jones** (THOMAS WHARTON), F. R. S., F. R. C. S., b. at St. Andrew's, Scotland, in 1808; was educated at Edinburgh; became in 1838 a surgeon of London; was professor of ophthalmic medicine and surgery in University College, London; and wrote *Ophthalmic Medicine and Surgery*, the Astley-Cooper prize essay on *Inflammation* (1850), the Actonian prize essay of 1851, *Physiology of Body, Sense, and Mind*, *Failure of Sight from Railway Accidents* (1869), etc.

**Jones** (Sir WILLIAM), M. A., F. R. S., b. in London Sept. 28, 1746; was educated at Harrow and Oxford; was tutor to Lord Althorp 1765-70; published a French translation of the (Persian) *Life of Nadir Shah* (1770), a *Persian Grammar* (1771); was made F. R. S. 1772; in 1774 was called to the bar and published *Commentaries on Asiatic Poetry*; became commissioner of bankrupts 1776; translated in 1780 the *Modallakat*, from the Arabic, and published some legal writings; became in 1783 a knight and judge of the supreme court of judicature of Bengal; founded the Asiatic Society of Bengal at Calcutta; wrote largely for the *Asiatic Researches*; published the *Enchanted Ring*, a poem, translations of the *Sakuntala* (1789), a translation of the *Institutes of Manu* (1794), a translation of *Isaues*; extracts from the Vedas, and tales, poems, legal works, etc. from the Indian languages. A devout Christian, a steady friend of constitutional liberty, a profound jurist and linguist, an elegant poet, Sir William's name is one of the brightest ornaments of English literary history. D. at Calcutta Apr. 27, 1794. (See his *Life*, by Lord Teignmouth, 1804.)

**Jones** (WILLIAM), F. R. S., generally called of NAYLAND, b. at Lowick, Eng., July 30, 1726; was educated at the Charter-house and at Oxford, where he became a convert to the Hutchinsonian philosophy (see HUTCHINSON,

JOHN); was ordained in 1749; became successively curate of Finedon, vicar of Betersden, rector of Pluckley, of Paston, and of Hollingbourn, and perpetual curate of Nayland in Suffolk. In 1780 he was elected a fellow of the Royal Society. For many years he labored upon a general system of philosophy, based upon the works of Hutcheson, and he exercised considerable influence by his writings, being endowed with great learning, piety, and versatility, as well as an excellent style. D. Feb. 6, 1800. He wrote, among other works, *The Catholic Doctrine of the Trinity* (1753), *Physiological Disquisitions* (1781), *Art of Music* (1784), *Figurative Language of Scripture* (1787), *Life of Bishop Horne* (1795), and founded the *British Critic* (1793).

**Jones** (WILLIAM ALFRED), b. in New York June 26, 1817; graduated in 1836 at Columbia College, of which he was (1851-65) librarian. He is the author of many contributions to periodical literature, and has published *The Analyst* (1840), *Literary Studies* (1847), *Essays* (1849), *Characters and Criticisms* (2 vols., 1857), and other works.

**Jones's Bluff**, post-v. of Sumter co., Ala., on the Alabama and Chattanooga R. R., 10 miles from Livingston. Pop. of tp. 2134.

**Jones'boro'**, tp. of Lawrence co., Ala. Pop. 1087.

**Jonesboro'**, post-v. and tp., cap. of Craighead co., Ark., 49 miles N. W. of Memphis, Tenn. Pop. of v. 155; of tp. 2094.

**Jonesboro'**, post-v., cap. of Clayton co., Ga., on the Macon and Western R. R., 20 miles S. of Atlanta; has manufactures of flour, furniture, etc., an academy, a weekly newspaper, 2 churches, some 35 business-houses, 2 hotels, and considerable cotton trade. Pop. 531.

C. P. VAUGHN & CO., PUBL. "NEWS."

**Jonesboro'**, city, cap. of Union co., Ill., on the Illinois Central and the Cairo and St. Louis R. Rs., 36 miles N. of Cairo, in an elevated, well-timbered and watered region, abounding in good building-stone, and celebrated for its excellent and abundant fruit. It has a bank, 1 weekly newspaper, 3 churches, 2 hotels, stores, mills, and manufactories. Two miles to the N. E. there is a State insane asylum. Pop. 1108; of tp. 1577.

T. F. BOUTON, ED. AND PROP. "GAZETTE."

**Jonesboro'**, post-v. of Grant co., Ind., on the Pittsburg Chicago and St. Louis R. R., 5 miles S. E. of Marion, has 4 churches, 2 hotels, a newspaper, etc. Chief business, agriculture, general trade, milling, and lumber-dealing. Pop. 581.

N. W. WEDDINGTON, ED. "HERALD."

**Jones'borough**, post-tp. of Washington co., Me., 7 miles W. of Muchias, at the head of Englishman's Bay. Pop. 522.

**Jonesborough**, post-v., cap. of Washington co., Tenn., the oldest town in the State, and the first State capital, has 5 churches, a fine court-house, 2 hotels, 3 newspapers, a female college, and a male institute, and is pleasantly situated on the East Tennessee Virginia and Georgia R. R. 100 miles E. by N. of Knoxville.

S. A. BUELL, FOR PUBL. "E. TENN. ECHO."

**Jones'burg**, post-v. of Montgomery co., Mo., on the North Missouri R. R.

**Jones'port**, tp. of Washington co., Me., 18 miles S. W. of Muchias, on the W. side of Englishman's Bay. It has shipbuilding and lobster fisheries. Pop. 1305.

**Jones'town**, post-b. of Swatara tp., Lebanon co., Pa., 5 miles N. of Lebanon.

**Jones'ville**, a v. of McIntosh co., Ga. Pop. 99.

**Jonesville**, post-v. of Wayne tp., Bartholomew co., Ind., on the Jeffersonville Madison and Indianapolis R. R. Pop. 206.

**Jonesville**, post-v. of Hillsdale co., Mich., on the Michigan Southern R. R., at the junction of the Lansing division with the main line, and on the Fort Wayne Jackson and Saginaw R. R. It has a weekly newspaper, large woollen and cotton mills in successful operation, and important manufactures of carriages. Its mercantile interests are flourishing. It is 4½ miles N. W. of Hillsdale, the county-seat.

JAMES I. DENNIS, PUBL. "INDEPENDENT."

**Jonesville**, post-v. of Clifton Park tp., Saratoga co., N. Y. It is the seat of an academy. It is 3 miles from South Ballston Station on the Saratoga and Schenectady R. R.

**Jonesville**, post-tp. of Union co., S. C. Pop. 1809.

**Jonesville**, post-v., cap. of Lee co., Va., 28 miles N. of Rogersville, Tenn., has a flour-mill, steam saw-mill, 2 churches, a weekly newspaper, a male academy, 2 hotels, besides stores and shops. Chief industry, farming and mercantile pursuits. Pop. 274; of tp. 3369.

J. B. WEST, ED. "LEE CO. SENTINEL."

**Jönköping**, town of Sweden, beautifully situated at

the southern extremity of Lake Wetter, and surrounded by pine clad hills. It has large manufactures of arms and muskets. Pop. 11,751.

**Jon'quil** [Fr. *jonquille*, a dim. of Lat. *juncus*, a "rush"], a name given to *Narcissus Jonquilla* and odoriferous *Amaryllidaceæ*, garden plants blooming in spring. They are natives of the S. of Europe. The flowers of the fragrant sorts are employed in perfumery.

**Jon'son** (BENJAMIN), generally known as BEN JONSON, b. at Westminster, probably June 11, 1574, a short time after the death of his father. The details of his life before 1596 are uncertain, but they seem to have been very varied, like his faculties, and somewhat violent, like his passions. His mother married a master bricklayer, and for some time he worked with his stepfather as a mason. Later on he enlisted in the army, and made a campaign in the Low Countries. On his return he entered St. John's College, Cambridge, and studied classical languages and literature. In his twentieth year he went upon the stage, and tried to become an actor. At last his talent found its proper field. In 1596 appeared his *Comedy of Humors*, and in 1598 it was recast, and brought out with great success in the Globe Theatre under the title *Every Man in his Humor*. Then followed in 1599 *Every Man Out of his Humor*; in 1600, *Cynthia's Revels*; in 1602, the *Postaster*, which involved him in a very sharp controversy with Decker; in 1603, *Sejannus*, a tragedy; in 1604, *Eastward Ho*, written in connection with Chapman and Marston, for which he was imprisoned and threatened with having his nose and ears cut off; in 1605, *Volpone*; in 1609, *Epicoene, or the Silent Woman*; in 1610, *The Alchemist*; in 1611, *Catiline*, a tragedy; in 1616, *The Devil is an Ass*; in 1629, *New Inn, or the Light Heart*; but the last-mentioned comedy belongs to that part of his works which Dryden called his dotages. After his appearance in literature the life of Ben Jonson is tolerably well known, both in the inns and at court—his tournaments with Shakespeare and the other wits of his age in the Mermaid Tavern in Bread street, where Sir Walter Raleigh had founded the Mermaid Club; his throne-speeches on literary taste delivered at the fireside of the Devil's Tavern in Fleet street, where later on he himself founded the Apollo Club; and his "entertainments" or "masques," a kind of dramatic arrangement interspersed with songs and ballets which he wrote for the court festivals. In 1619, James I. made him poet-laureate, with a pension of 100 marks, and Charles I. increased the pension to £100, and added a tierce of canary. The last years of his life were nevertheless very clouded. He was poor—not because he had less than he needed, but because he used more than he had. He became bitter in spite of the great success he had achieved. He felt wretched. He d. Aug. 6, 1637, and was buried in Westminster Abbey, where his tombstone bears this rather queer inscription, "O rare Ben Jonson." The *Sad Shepherd*, a poem which he left unfinished, as well as much in his "masques," seems to indicate that in its foundation his genius was not so very different from that of Shakespeare. But its development was another, and thereby it assumed almost an opposite character. While Shakespeare was a man with sporadic and incidental knowledge, but with wonderfully large and striking views, Ben Jonson appears to have possessed a compact mass of systematic knowledge, which led him to rather narrow views. Shakespeare's taste was the natural result of his genius; Ben Jonson's was the product of his learning. Hence the difference between them. It is singularly wrong to say that *Every Man in his Humor* was the first regular comedy in the English literature—exactly as wrong as if anybody would say that *Sejannus* was the first regular tragedy. But it is true that in the English literature Ben Jonson was the first who adopted the ideals of the classical literature with full consciousness of what he was doing, and carried them through with adequate talent. This his standpoint procured for him a great authority in the literary life of his age, but it made his genius declamatory in tragedy and satirical in comedy, thereby vastly diminishing its importance for coming ages. Soon after his death his works ceased to be a living influence; they became literary monuments, historical phenomena, and nothing more.

—CLEMENS PETERSEN.

**Jonsson** (FINN), b. at Hitarðal, Iceland, Jan. 16, 1791; studied at the University of Copenhagen, and was appointed in 1794 bishop of Skalholt, where he d. July 23, 1789. His *Historia Ecclesiastica Islandiæ* (Copenhagen, 1772-79) is a principal source of the history of the island.

**Joodpoor', Joudpour, or Marwar**, a tributary state of India, the largest of Rajpootana, situated in the N. W. Provinces, between lat. 24° and 28° N. and lon. 70° and 75° E. Area, 35,672 square miles. It is divided into two unequal parts by the river Loonee, which flows into the Great Western Run of Cutch. The larger portion of Jood-

poor, N. W. of the Loonee, is chiefly waste, being an extension of the desert of Scinde; the smaller portion, S. E. of that river, is fertile, well irrigated by torrents from the Mairwar Mountains, and produces excellent grain and cotton. Wild beasts and serpents abound; iron, salt, and marble are plentiful. The natives, mostly of the JAINA sect (which see), are skilful in the woollen manufacture and active in trade. Joodpoor is under the government of a native prince called *maharajah*, who pays a considerable annual tribute to the British government, which is virtually the ruler through the agent residing at the court. The population is about 1,800,000; the capital, also called Joodpoor, has a population variously stated at from 80,000 to 150,000. Pallee, 40 miles S. E. of Joodpoor, is the commercial metropolis, the seat of an active trade in opium. There are in Joodpoor several thousand villages of from 500 to 1000 houses each.

**Jop'lin**, city of Jasper co., Mo., near the S. W. corner of the county, has 2 banks, 2 weekly newspapers, graded schools, 26 smelting furnaces, and produces about 15,000,000 pounds of pig lead and 10,000,000 pounds of pig zinc annually. It is a thriving town; estimated pop., 8500 in 1874. G. D. JACKSON, PRB., "BULLETIN."

**Joppa.** See JAFFA.

**Jor'daens** (JACOB), b. at Antwerp May 19, 1594, was a pupil of Adam van Oort. His style, however, he formed principally after the Italians Paul Veronese and Caravaggio, though he never visited Italy, and after Rubens, with whom he is often compared. He liked to fill a large canvas with mythological and bacchanalian scenes, but his pictures are always less powerful in conception, less vigorous in design, and less brilliant in coloring than those of Rubens, and sometimes they are rather trivial. He worked with astonishing rapidity, and achieved a great fame; he is abundantly represented in all European galleries. D. at Antwerp Oct. 16, 1678.

**Jordan** [Heb. *Yarden*; Gr. *Ἰορδάνης*; called by the Arabian geographers *El-Urdun*, and more commonly *El-shē-riah*—i. e. "the watering place"], the principal river of Palestine and the most celebrated in biblical geography, takes its rise from the snows of Mount Hermon at the N. extremity of the Holy Land, and flows nearly due S. through the centre of that country to the Dead Sea. It has three principal sources: I. the *Leddan*, called by Josephus the Little Jordan, rising from a great fountain, the largest in Syria, at the base of the hill *Tell-el-Kady*, on which are the ruins of the ancient city Dan; II. the *Baniāsy*, rising at Baniās (the ancient Caesarea Philippi, 4 miles E. of Tell-el-Kady, from a vast cave now concealed by the ruins of a temple built by Herod; III. the *Hasbany*, rising at Hasbeiya, 12 miles N. of Tell-el-Kady, from a pool at the foot of a basalt cliff. The latter is the smallest of the streams, but is the longest and rises from the highest perennial source, 1700 feet above the level of the sea, while the fountain at Baniās is 1147, and that at Tell-el-Kady but 647 feet above that level. The two higher torrents burst through narrow rocky ravines, and unite with the Leddan 4 or 5 miles below its source, forming the Jordan proper, which, 6 miles below, falls into Lake Huleh, called in the Bible the "waters of Merom." From Lake Huleh the Jordan descends with rapidity and violence in a tortuous channel, over a rocky bed with many cataracts, and falling nearly 800 feet within a compass of 11 miles of latitude, enters the Sea of Galilee, otherwise called Gennesaret and Tiberias, now *Bahr-el-Tubariyeh*. The former lake is 120 feet above the level of the sea, the latter 650 feet below. In its remaining course from the Sea of Galilee to the Dead Sea the Jordan falls nearly 700 feet more—a strange and almost incredible fact had it not been established by careful measurement, the explanation of which is to be found in the extremely tortuous course of the river, which within 60 miles of latitude traverses at least 200 miles and has 27 considerable rapids. The whole lower stream, or Jordan proper, then, is many hundred feet below the sea-level, which fact alone would make this region unique as a geographical and geological phenomenon. The valley, now called *El Ghaz*, is about 6 miles wide at the northern end, expanding to 12 miles at the plain, is generally level and shut in between steep parallel chains of mountains from 3000 to 5000 feet high. Small portions in the N. are alone cultivated, the rest is desert, "in spring covered with rank grass and thistles, but in summer parched and bare." The southern section, known as the Plain of Jericho, is covered with a white nitrous sand, like that of the trough which not a blade of grass nor green herb grows. In the midst of this plain the Jordan has cut through the chalky strata a winding ravine, narrower than 200 yards to half a mile in breadth, and from 10 to 100 feet in depth. Five miles below the Sea of Galilee it receives its largest tributary, the *Saradit* or *Marjeh*. Hieronymus of the Greek



geographers), a stream from the E. scarcely inferior to the Jordan, 130 feet wide at its mouth; and about halfway between the lakes the Jabbok (Wady Zerka) enters from the mountains of Gilead on the E., being the only other considerable tributary. There are only two bridges over the Jordan now in existence: one, 2 miles S. of Lake Huleh, of the time of the Crusades, called *Jabr Benat Yekub*, "the bridge of Jacob's daughters," has been from time immemorial the leading pass from Western Palestine to Damascus; the other, *Jabr-el-Mejania*, a quaint Saracenic structure, is 2 miles below the mouth of the Hieromax, and formerly connected the great city of Scythopolis (Bethshean, now *Beisan*) with the Decapolis. The principal fords above the Zerka are one just below the Lake of Galilee, which must have been traversed by Christ, and that of Sueoth, 15 miles below the lower bridge. The latter was undoubtedly the ford by which Abraham and Jacob crossed; it was also probably the *Bethabara* of John's baptism and of the slaughter of the Midianites and the Ephraimites (Judg. vii. and xiii.). Ten miles below the Zerka is a noted ford on the road from Nablous (Shechem) to Es-Salt, and there are two others near the "pilgrims' bathing-place" in the Plain of Jericho. One of the latter must have been the scene of the miraculous crossing of the Israelites under Joshua and of the similar miracles recorded of Elijah and Elisha (2 Kings ii. 8, 14), and the same spot is traditionally regarded as the scene of Christ's baptism. At its mouth the Jordan is 540 feet wide and 1316 feet below the level of the sea. The valley of the lower Jordan abounds in slime-pits, and thermal springs are frequent, with many other indications of former volcanic or igneous action. Dark basalt is the principal rock in the upper region—trap, limestone, sandstone, and conglomerate in the lower. Cane, oleanders, willows, tamarisks, hollyhocks, and thistles form the most noticeable trees and plants; lions, tigers, and wild-boars formerly made their haunts in the thickets along the river's edge. The course of the Jordan was in 1847 partially explored by Lieut. Molyneux of the British navy (*Journal Roy. Geog. Soc.*, vol. xviii.), more thoroughly by Lieut. Lynch of the U. S. navy in 1848 (see his *Official Report*), and later by MacGregor (1868-69) in his Rob Roy canoe. (The best sources of information are Robinson's *Biblical Researches*, the geographical works of Von Raumer, Ritter, and Petermann, Stanley's *Sinai and Palestine*, and the recent publications of the British Palestine Exploration Society. See also able articles in Kitto's, Smith's, and McClintock and Strong's *Biblical Cyclopædias*, and article *PALESTINE* in this work.)

PORTER C. BLISS.

**Jordan**, tp. of Whitesides co., Ill. Pop. 1196.

**Jordan**, tp. of Jasper co., Ind. Pop. 327.

**Jordan**, tp. of Warren co., Ind. Pop. 448.

**Jordan**, tp. of Fillmore co., Minn. Pop. 683.

**Jordan**, post-v. of Scott co., Minn., on the St. Paul and Sioux City R. R., 8 miles S. W. of Shakopee. It has 1 weekly newspaper.

**Jordan**, a v. of Croghan tp., Lewis co., N. Y., on Oswegatchie River; has manufactures of leather.

**Jordan**, incorporated v. of Onondaga co., N. Y., on the Erie Canal and New York Central R. R., N. branch, 17 miles W. of Syracuse, in the N. W. corner of the town of Elbridge; has a weekly newspaper, a banking-house, academy, 4 churches, 13 stores, flouring-mill, 2 manufactories which turn out yearly 30,000 wheelbarrows and 15,000 hand-sleds, a straw-board mill, furnace, machine-shop, 2 cooper-shops, pump-factory, 2 wagon manufactories, fine water-power, etc. Pop. 1263.

H. P. WINSOR, Ed. "TRANSCRIPT."

**Jordan**, tp. of Clearfield co., Pa. Pop. 561.

**Jordan**, tp. of Lycoming co., Pa. Pop. 473.

**Jordan**, tp. of Northumberland co., Pa. Pop. 924.

**Jordan**, post-tp. of Green co., Wis. Pop. 1083.

**Jordan** (CAMILLE), b. at Lyons Jan. 11, 1771, and played a very conspicuous part in French politics during the Revolution and the Restoration. He was a decided enemy of the republican government, and one of the most active promoters of the insurrection of Lyons. After the fall of that city (Oct. 9, 1793) he fled to Switzerland, whence he went to London. Having returned to Lyons in 1796, he was elected a member of the Council of Five Hundred, but had to flee a second time after the revolution of Sept. 4, 1797. He went to Germany, and lived in Weimar. In 1800 he was recalled, and showed himself strongly opposed to the measures of the First Consul. But Napoleon chose not to notice him, and during the Empire he lived in retirement, engaged in literary pursuits. After the restoration of the Bourbons he at first sided with the government, but when in 1820, after the assassination of the duke of Berry, an attempt was made by the ministry to suspend

the liberty of the person, to suppress the freedom of the press, and to change the elective system, Jordan became the parliamentary leader of the opposition. He died, however, soon after May 19, 1821. His writings consist mostly of pamphlets written with great courage and eloquence, and illustrative of the situation of the moment. (See Saint-Beuve, *Camille Jordan et Madame Staël*, 1868.)

**Jordan** (CHARLES ÉTIENNE), b. at Berlin Aug. 27, 1790, of a French family; studied at Magdeburg and Geneva; was appointed minister to the French Reformed church of Pözlitz in 1725, but resigned his office in 1732, after the death of his wife; made a literary journey in Holland and France; accompanied the Prussian crown prince in his exile at Rheinsberg; and continued from that time to his death (May 14, 1745) to be the friend and companion of Frederick II. From this circumstance his *Histoire d'un voyage littéraire* and his *Correspondance avec Frédéric II.* derive some interest.

**Jordan** (DORA), b. near Waterford, Ireland, about 1762, was an actress in London towards the close of the eighteenth century, when she became the mistress of the duke of Clarence, afterwards King William IV. By him she had ten children, but the connection ceased some time before her death, which occurred at St. Cloud, France, July 3, 1816. Her *Memoirs* were published by J. Boaden in 1831. It has been asserted that Mrs. Jordan did not die in France at the above date, but resided for several years under an assumed name in England.

**Jordan** (RUDOLPH), b. at Berlin in 1810, and began his artistic studies in that city, but received his style in the school of Düsseldorf. He has painted scenes from the coasts of Normandy, the Dutch islands, Heligoland, Rügen, etc., and one of his pictures, *Marriage Proposal in Heligoland* (1834), has become widely known.

**Jordan** (THOMAS), b. in the Luray Valley, Va., Sept. 30, 1819; graduated at West Point, and entered the army as brevet second lieutenant of infantry July 1, 1840; second lieutenant Dec., 1840; in the war with the Seminoles (1842) captured their leading chief, Tiger Tail; in the war with Mexico engaged at Palo Alto and Resaca de la Palma; appointed captain and quartermaster Mar. 3, 1847, serving as such on the Pacific coast 1852-60. Resigned May, 1861, to follow the fortunes of his native State, entering her service as lieutenant-colonel, and at once assigned as adjutant-general of Confederate forces assembling at Manassas Junction. As chief of staff accompanied Gen. Beauregard to Tennessee, and was appointed brigadier-general from date of the battle of Shiloh; temporarily on staff of Gen. Bragg, but resumed his position with Beauregard during the defence of Charleston, 1862-64. Immediately after the war published in *Harper's Magazine* a critical review of Confederate operations and administration; subsequently (1866) was editor of the *Memphis Appeal*. Invited to organize the military resources of the Cuban revolution, was made chief of general staff of that army, and second in command (1869), succeeding to chief command Dec., 1869, and fought a largely superior force Jan. 1, 1870, inflicting heavy loss. Seeing no probability of being able to organize an effective force, and the supply of arms and ammunition running low, he resigned Feb., 1870, and returned to the U. S., where he is mostly engaged in literary pursuits. Author of *Campaigns of Lieut.-Gen. Forrest* (1867).

**Jordan River**, in Utah, flows from Utah Lake, some 45 miles, in a northward course into the Great Salt Lake. It is small and not navigable, but is capable of irrigating a large extent of country. Its waters contain numerous species of small fish.

**Jordan's**, tp. of Coosa co., Ala. Pop. 568.

**Jornan'des**, or **Jordanes**, the historiographer of the Goths, was himself a Goth by birth, and lived in the middle of the sixth century. Having been converted to Christianity, he became a monk, and tradition makes him bishop of Crotona. He wrote two historical works which have come down to us—*De rebus antiquis temporibus successione*, an outline of the history of the world to the time of Justinian; and *De Getarum sive Gothorum origine et rebus gestis*, a history of the Goths from the origin of the people to the fall of the Ostrogothic empire in Italy. The former is of very little interest, but the latter is invaluable. It is the principal, nearly the only, source of the history of the Goths and of the great migration of the nations. The history of the Goths had been written before by Cassiodorus, Abavius, and Dion Cassius, but these works are lost, and we know them only from extracts made by Jornandes. The best critical edition of his works is that by Closs (Stuttgart, 1861).

**Jortin** (JOHN), D. D., b. in London Oct. 23, 1698; studied at the Charter-house and at Jesus College, Cambridge, of which he became a fellow after graduating in 1719. While at college he made extracts from Eustathius for the

use of Pope in his translation of Homer, and became noted for his facility in Latin verse, of which he published a volume (*Lusus Poeticus*, 1722). Taking orders in the Church of England he was presented to the living of Swavesey near Cambridge (1726), but soon after removed to London, and became a much-admired pulpit orator, being successively rector of Eastwell (Kent), of St. Dunstan's in-the-East, domestic chaplain to the bishop of London (1762), prebend of St. Paul's, rector of Kensington, and archdeacon of London (1764). He was author of numerous learned philological, critical, and theological works which have maintained a high reputation, among which were *Truth of the Christian Religion* (1746), *Life of Erasmus* (1758-60), *Sermons* (4 vols., 1771), *Six Dissertations upon Different Subjects* (1772), *Remarks upon Authors Ancient and Modern* (1773-82), *Remarks on Ecclesiastical History* (5 vols., 1784-85), and *Tracts, Philological, Critical, and Miscellaneous* (1790). D. at Kensington Sept. 5, 1779.

**Jorullo**, a volcano of Mexico, in the state of Michoacan, in lat. 19° 10' N. and lon. 101° 1' W. From a plain having an elevation of 2800 feet it was suddenly lifted to a height of 4265 feet on Sept. 28, 1759. Several of its cones soon subsided, however, and it is now nearly extinct, discharging only a little vapor, and is nearly covered with forests.

**Joseph** [Heb. *Yoseph*, "increaser"], one of the twelve patriarchs, the elder son of Jacob and Rachel, b. at Haran, in Syria (Padan-Aram), about B. C. 1813; was the favorite son of his father, and envied by his brethren on that account. Their enmity was further excited by two dreams which Joseph related when about seventeen years of age, in which his future greatness was foreshadowed, and this led them to sell him as a slave to some Midianite traders, by whom he was carried into Egypt and sold to Potiphar, an officer of the king. He acquired the confidence of his master, who set him as overseer over all his property, but having repelled dishonorable proposals made to him by his mistress, she accused him falsely to her husband, and caused him to be thrown into prison. Here he interpreted the dreams of two of his fellow-prisoners, the chief baker and chief butler of Pharaoh, and when his predictions had been justified by the result, he was summoned by King Pharaoh, at the instance of the butler, to interpret two dreams which portended seven years of prosperity followed by seven of famine. The king was so much struck by the wisdom of the advice given by the young Hebrew that he adopted all his suggestions for making preparations for the time of famine, and appointed him ruler over the whole land. The measures taken by Joseph as vizier or viceroy resulted greatly to the advantage of the king and of his people, securing an abundant provision for the time of famine. This calamity extended also to the adjoining countries, and led to the brethren of Joseph being sent into Egypt to buy corn. Joseph recognized his unnatural brethren, and after a series of stratagems, by which he reminded them of and punished them for their crime, the whole family was brought into Egypt and established in the land of Goshen. Joseph married a daughter of the high priest of On (Heliopolis), and had two sons, Manasseh and Ephraim, who became the progenitors of the tribes bearing those names, the most powerful of the future kingdom of Israel. Joseph preserved his authority until his death, which occurred B. C. 1802, at the age of 110. His body was embalmed, and at the time of the Exodus was carried to Palestine and buried at Shechem, where his tomb is still shown.

**Joseph**, the husband of Mary and reputed or legal father of Jesus, was a resident of Nazareth in Galilee, though a descendant of David, and connected by his immediate ancestry, perhaps by birth, with Bethlehem in Judah. His genealogy is given both by Matthew and by Luke, but in the former Gospel he is called the son of Jacob, and in the latter the son of Heli. Various hypotheses have been proposed to reconcile this discrepancy, the most general being that one of the genealogies is really that of Mary. Joseph was a carpenter, and is supposed to have educated Jesus to his own trade. Little can be ascertained of his character or personal history beyond the well-known circumstances of the announcement made to him by an angel in a dream of the miraculous conception of the Christ, his journey to Bethlehem, flight into Egypt, and return to Nazareth. The last glimpse of Joseph is found in the incident (Luke ii. 42-52) of Jesus when twelve years of age being found with the doctors in the temple. He is represented by early tradition to have been an old man at the birth of Jesus, and apparently had died before the public ministry of Christ began.

**Joseph**, king of Naples and of Spain. See BONAPARTE (JOSEPH).

**Joseph** (FATHER), b. in Paris, France, Nov. 4, 1757, his original name being FRANÇOIS LÉONARD DE THÉODÉAZ. He belonged to a distinguished family, travelled much in his

youth, and served in the army under an assumed name, after which he took holy orders and attained a high position as a Capuchin friar. Attracting the attention of Cardinal Richelieu, that statesman made Father Joseph his secretary and confidential adviser. In this capacity he wielded immense influence and power for many years. He despatched missionaries to Canada and the East, advocated in a Latin poem a crusade against the Turks, and left several volumes of memoirs, which are still in manuscript in the National Library of Paris. A cardinal's hat was solicited and obtained for him by Richelieu, but before it was actually conferred he d. at Rueil Dec. 18, 1838.

**Joseph I.**, German emperor, b. at Vienna July 26, 1678; was crowned king of Hungary 1687; king of the Romans 1690; succeeded to his father, Leopold I., 1705. The great events of his reign were the putting of the electors of Cologne and Bavaria under the ban (1706) and the seizure of their states; the conquest of Naples under Daun, the successful revival (1707-08) of the imperial claims to the great fiefs of Italy, and the victories of Marlborough and Eugene in the war of the Spanish succession. D. Apr. 17, 1711.

**Joseph II.** of Germany, b. Mar. 13, 1741, was the son of Francis I. and Maria Theresa; was fond of learning, and became a professed philanthropist; succeeded his father in 1765; took part in the first partition of Poland 1772; succeeded his mother in Hungary and Bohemia 1780; attempted the wholesale reformation of all the empire and his kingdom by edicts abolishing serfdom, declaring for religious liberty, the reform of jurisprudence, the abolition of monasteries, etc.; but as the means employed were violent and unusual, and the changes but ill adapted to the state and feelings of the people, nearly all classes, led by nobles and priests, joined in the opposition, and the emperor (who, though theoretically a friend of reform, was not a just man) was compelled to yield (1790) and withdraw his novel measures. D. Feb. 20, 1790.

**Josephine**, county of the S. W. of Oregon, bounded on the S. by California. Area, about 1100 square miles. Much of its surface is mountainous. The Rogue River Valley is very fertile. Gold, iron, and copper are found. Cap. Kerby. Pop. 1204.

**Josephine**, empress, first wife of Napoleon I., originally named MARIE JOSEPH ROSE DE TASCHER DE LA PALLIERE, b. at Trois Islets, in Martinique, West Indies, June 24, 1763; was married in 1779 in France to the Vicomte de Beauharnais, in consequence of an early betrothal by her father. The union was not a very congenial one. She became the mother of Eugène Beauharnais and of Hortense, the mother of Napoleon III. The vicomte was executed by the Jacobins in 1794, and Josephine's life was saved with some difficulty by Madame Tallien, who rescued her from prison in 1794. In 1796 she married Gen. Napoleon Bonaparte, then a rising officer, afterwards appointed to the chief command in Italy. The match was prompted by mutual love, and was long a union of great happiness to both. In 1804 she was crowned empress, and both before and after that event Josephine's wisdom and talents, and the affection with which she was popularly regarded, did much to strengthen Napoleon's position in France. But the fact that the union was childless was likely to be fatal to Napoleon's ambition to become the founder of an imperial line; and in 1809 she was divorced, and retired to Malmaison, where she d. May 29, 1814.

**Josephus** (FLAVIUS), b. at Jerusalem in 37 A. D. of a noble and wealthy family; after passing through the schools of the three different Jewish sects, and spending three years in the desert with the hermit Banus, he adopted the views of the Pharisees as most congenial to his shrewd, ambitious, and worldly character, and he soon attained a prominent position in Jewish society. In 63 A. D. he was sent to Rome on a diplomatic errand, and was introduced to the empress Poppæa, who favored the Jews, by a Jewish actor belonging to the troupe of Nero. He accomplished his mission with success, and returned with great honor to Jerusalem. During the Jewish revolution he commanded in Galilee, and escaped the massacre after the capture of Jotapata. He fell, nevertheless, into the hands of the Romans, but saved himself by predicting the future elevation of Vespasian to the imperial throne. He was present in the Roman army at the destruction of Jerusalem, and accompanied Titus to Rome, where he resided for the rest of his life. As long as the Flavian family, in honor of which he adopted the name of Flavius, occupied the throne, he lived in great splendor. Of his life after the death of Domitian (96 A. D.) very little is known, and the date of his own death is uncertain, though it is probable that he was still living in 103 A. D. Of his works the following have come down to us: *Historia Iudeorum*, a history of the Jewish war from 130 B. C. to the destruction of Jerusalem



saalem, originally written in Syro-Chaldean, which version is lost, but translated into Greek by himself: *Ἰουδαϊκὴ Ἀρχαιολογία*, a history of the Jews from the Creation to 66 A. D.; *Bios*, an autobiography; and a work against Apion. The best editions are those by Dindorf (Paris, 1845) and Bekker (Leipzig, 1855), and of the *Jewish War* separately by Cardwell (Oxford, 1837). Complete translations into English have been given by Lodge (1602), L'Estrange (1702), Whiston (1737); and of the *Jewish War* separately by Robert Traill (1847).

**Josh Bell**, now (1880) **Bell**, south-easternmost county of Kentucky, having Virginia on the E. and Tennessee on the S. Area, about 480 square miles. It is a rugged mountain region. The valleys produce corn and tobacco. The county is traversed by the Cumberland River, and contains coal and iron. Cap. Pineville. Pop. 3731.

**Josh'ua** [Heb. *Yehoshua*, "Jehovah his helper"], originally called *Hoshea*, a Hebrew general, the successor of Moses in the leadership of the chosen people and the conqueror and ruler of Palestine. He was the son of Nun, of the tribe of Ephraim, b. in Egypt not far from B. C. 1698, as he was about forty years old at the time of the Exodus. He first appears in the biblical record as commander of the Israelites in their victorious engagements with the Amalekites at Rephidim (B. C. 1658). In the account of Moses' ascent of Sinai for the tables of the law, Joshua appears as his "servant" or "minister," accompanying him in a part of the ascent, and first meeting him on the descent. He was one of the twelve "spies" sent to explore the land of Canaan, and one of the two (the other being Caleb) who reported favorably upon the country, for which reason they alone of all the adult Israelites were spared to enter the Promised Land. Moses was divinely directed shortly before his death to confer upon Joshua the chief authority over the people, and a solemn charge from Jehovah was addressed to him from the lips of the dying founder of the Hebrew commonwealth. In his eighty-fifth year Joshua led the chosen people dry-shod through Jordan (Josh. iii. 17); fortified a camp at Gilgal, where he set up twelve stones from the midst of Jordan as a memorial of miraculous assistance; kept a solemn Passover, on which occasion the daily fall of manna ceased; and received a visit (Josh. v. 13) from a mysterious personage called the "captain of the host of Jehovah," who pronounced the ground whereon he stood holy. Who was this "captain" has been greatly disputed, the most orthodox commentators often identifying him with the second person of the Trinity. Joshua led the Israelites in the taking of Jericho and of Ai, miraculously assisted in both cases, as he was some time later in the celebrated battle with the five kings of the Amorites, when, in the language of the author of the poetical book of Jasher, he commanded, "Sun, stand thou still upon Gibeon, and thou, Moon, in the valley of Ajalon," and was obeyed, giving him time to finish the destruction of his enemies. No miracle recorded in the Bible has occasioned greater diversity of opinion or has been received with greater incredulity. Many modern orthodox writers conclude that it is unnecessary to suppose an actual stopping of the sun's course, and find a sufficient explanation in the fact that the account is quoted from a poetical work not now preserved, and therefore presumably neither inspired nor infallible in matters of fact, even supposing the intention to have been to chronicle an actual occurrence. Joshua inscribed the Law upon Mount Ebal; in six years overran Canaan in its whole length from S. to N., destroying thirty-one kings, but leaving many isolated strongholds in the hands of the Canaanites; divided the land among the tribes; appointed six cities of refuge and forty-eight Levitical cities; set up the tabernacle at Shiloh, and dismissed the trans-Jordanic tribes to their homes. He fixed his own residence at Timnath-Serah in Mount Ephraim, and after judging the people twenty-two years convoked an assembly of the elders at Shechem, delivered two solemn addresses, and caused them to renew their covenant with Jehovah, after which he died at the age of 110 years (B. C. 1593), and was buried in Timnath-Serah (*Tibneh*), where M. de Saulcy and M. de Guérin have, as they believe, recently discovered his tomb. The career of Joshua has been noticed by many biblical commentators as one of the few recorded in some detail without any blemish being imputed. Many are loath to justify his wholesale slaughter of the Canaanites, but if they believe such action to have been commanded by Jehovah, they cannot logically condemn him for the execution of divine vengeance. Others, disbelieving the reality of such command, may, and perhaps do, upon their own principles, doubt the reality of the acts of extermination imputed to him. The name Joshua is in Hebrew the same as *Jemu* in Greek; in one passage in the New Testament (Heb. iv. 8) he is alluded to by that name, and evidently regarded as a type of Christ.

PORTER C. BLISS.

**Joshua**, tp. of Fulton co., Ill. Pop. 1175.

**Joshua, Book of**, the sixth canonical book of the Old Testament, immediately following Deuteronomy, so called because it is devoted to the history of the conquest and division of Canaan under the auspices of Joshua, and closes with his death. It may be divided into two equal parts, called respectively the historical and the geographical—the first (chaps. i.-xii.) containing the record of the conquest; the second (chaps. xiii.-xv.) the division of the land among the tribes. The second part has been compared to the Doomsday Book of England, from the minuteness of the boundaries laid down, thus affording so exact an account of the principal cities, towns, and villages of Canaan, fifteen centuries B. C., that the researches of the Palestine Exploration Society, now (1875) engaged in a topographical survey of Palestine, are largely and successfully directed to the verification of the data of the book of Joshua. The authorship and date of the book cannot be considered as settled, nor is it probable that they can ever be accurately ascertained. Early commentators, patristic, Catholic, and Protestant, usually assigned the book to Joshua himself, except the last chapter, which records his death, but apparently for no better reason than because no other author could be designated by name and date. By modern orthodox critics it is generally assigned to an unknown writer of a period immediately subsequent to the death of Joshua. The school of De Wette and Ewald is much divided upon the questions affecting the unity and integrity of the book, and a great variety of opinions is still maintained: most of them, however, allege passages which they regard as contradictory, or at least as betraying diversity of authorship. The chief English representative of this view is Dr. Samuel Davidson in his *Introduction to the Old Testament*, who assigns the chief authorship to a writer of the age of Saul. The commentaries on Joshua are numerous; it will be sufficient to name as of special value for geographical data those of Keil (1847, Edinburgh translation 1857), Knobel (1861), and Dr. H. Crosby (New York, 1874) in Lange's series, edited by Dr. Schaff. There is a so-called Samaritan book of Joshua, written in Arabic during the Middle Ages, consisting of a compilation from the canonical book, interwoven with strange legends having Joshua for their hero, forming part of a chronicle of Samaritan history down to the Jewish war of Adrian. It was edited with a Latin translation from the only known manuscript (which once belonged to Joseph Scaliger) by G. J. Juybnell, *Liber Josua: Chronicon Samaritanum* (Leyden, 1848). The modern Samaritans are entirely ignorant of this compilation, though it was evidently written in the interest of their religious ceremonies and traditions as opposed to those of the Jews.

**Josi'ah** [Heb. *Yoshigah*, "healed by Jehovah"], the sixteenth king of Judah after its separation from the kingdom of Israel, the son and successor of Amon. He began to reign at the age of eight years, about B. C. 640, and, reversing the conduct of his father, "did that which was right in the sight of the Lord." The reign of Josiah was at a critical period in the history of Judaea, and he is expressly said to have attained a higher standard of religion than any of his predecessors or successors. In this he was aided by several prophets, who exercised great influence upon the measures of his government during his minority. At twenty years of age Josiah began to take vigorous measures against idolatry, then very prevalent in the land, breaking down altars, temples, and images. Especially the ancient idolatrous temple at Beth-El, in the northern kingdom, was thus purified, burning upon the altar the bones of the recreant priests of former generations found there in the sepulchres, in accordance with a prophecy delivered 345 years before (1 Kings xiii. 2). How Josiah came to exercise jurisdiction in the northern kingdom at this time is not known; it has been thought that the Assyrian king, his feudal lord, may have conferred the government of Samaria upon him. Six years later, Josiah undertook the repair and renovation of the temple, which had been so long neglected that the holy books had fallen into oblivion. The high priest Hilkiah (according to some, the father of the prophet Jeremiah) found in the sanctuary the "Book of the Law"—i. e. either the whole Pentateuch or the book of Deuteronomy—and the people were convoked to hear it read in the temple, after which the ancient covenant vows were renewed, and a Passover celebrated with such pomp and precision as had not been seen for centuries. During the reign of Josiah a horde of Scythians conquered the Assyrian empire, and a column of their forces penetrated through Palestine on their way to Egypt. In the historical books of the Old Testament no mention is made of this circumstance, but the prophecy of Zephaniah alludes to it, and Ewald thinks the fifty-ninth Psalm to have been written by Josiah during a siege of Je-



rusalem by the Scythians. In the thirty-first year of Josiah, Pharaoh-necho, king of Egypt, landed an army in Northern Palestine to make war against the Assyrian empire on the Euphrates. Josiah rashly attacked him at Megiddo, was defeated with great slaughter, and was himself mortally wounded. D. at Jerusalem about B. C. 609.

**Jo'sika** (MIKLÓS) was b. at Torda, Transylvania, Sept. 28, 1796; studied law; served 1811-18 in the Austrian army; lived then on his estates, engaged in agricultural, political, and literary pursuits; took part very actively in the Hungarian rising in 1848; fled in 1850 to Brussels, and lived afterwards in Dresden, where he d. Feb. 27, 1865. Inspired by Walter Scott, he wrote a great number of novels treating Hungarian life and history, most of which have been successfully translated into German. Four volumes of memoirs appeared at Pesth shortly before his death.

**Josquin' Desprez'** (JOSQUIN PRATENSIS), b. about 1450; served from 1471 to 1484 in the choir of Sixtus IV. at Rome and then in the choir of Louis XII. at Paris; received a benefice, and d. in 1531 in his native town, Condé. He wrote a great number of masses, motets, and songs, which were highly appreciated, not only at the court of Louis XII., but in the circles of Luther, and he is generally considered as the greatest composer before Palestrina.

**Jos'selyn** (JOHN), a native of Kent, England, visited New England in 1638, and again 1663, remaining there eight years. Returning to England in 1671, he published three works on America: *New England's Rarities Discovered* (1672), *An Account of Two Voyages to New England* (1673), and a *Chronological Table of the most Remarkable Passages from the First Discovery of the Continent of America to 1674*, appended to the above. The first of these works gives a picture of Boston in 1663; it was reprinted in this country in 1865, with notes by Edward Tuckerman.

**Jost** (ISAAC MARCUS), b. at Burnburg, in the duchy of Anhalt, Feb. 22, 1793, of Jewish parentage; studied at Göttingen and Berlin; became teacher at a Jewish school in the latter town in 1816, and removed to Frankfurt in 1825. D. Nov. 23, 1869. He translated the Mishna into German (6 vols., 1832), and wrote *Geschichte der Israeliten* (9 vols., 1820), besides several other works relating to the history of the Jews.

**Jo'tuns, or Jätten**, form one of the most peculiar but also one of the most interesting elements of the Scandinavian mythology; they were the evil principle. Some of the traits under which they were imagined seem to have a historical origin, and refer to the oldest inhabitants of the Scandinavian countries, the Finns and Lapps, who were driven back by the Teutonic invaders to the northernmost parts of Norway and Sweden. In other respects the Jotuns appear to be mere creations of the imagination, symbolizing in a vague, general way, and under a most fantastic imagery, the dumb powers of nature. They were giants, and immensely strong, yet they could be conquered even by men, for they were only half intelligent. Their intelligence arose from their native malignity, and assumed generally the form of witchcraft. From Jotunheim or Niffheim, the home of darkness and dulness, they waged perpetual war against the Æsir, the bright gods of Valhalla; and although they always were defeated, great calamities to the human race ensued from this warfare. Their part is most conspicuous, however, at the opening and at the close of the world's drama. Odin slew Ymer, the first Jotun, and built the world from his body—the mountains and rocks of his bones, the earth of his flesh, the ocean of his blood, the sky of his skull, and the clouds of his brain. At the end of time Ymer's offspring will take revenge, slay all the Æsir, burn Valhalla, and destroy the earth; after which event the All-father will restore the universe and establish a higher and nobler rule. CLEMENS PETERSEN.

**Joubert'** (BARTHÉLEMY CATHERINE), b. at Pont-de-Vaux, department of Ain, in 1769; signalized himself by his republican convictions, and was considered as the only man able to counteract Bonaparte's ambition, and to become the chief of a definitely established republic of France. But he was killed at the age of thirty, at the battle of Novi, where his army was defeated by Souwarow. Joubert had enlisted in 1791 as a volunteer, and was promoted on the battlefield, in 1795, to the rank of general of brigade. When he had the command in chief in Northern Italy he hastened to proclaim the revolution in Piedmont. He contributed largely to the success of Bonaparte in the battles of Montenotte, Mondovì, and Rivoli. FÉLIX ARCAIS.

**Joudpur'**, town of British India, the capital of a district of the same name, in the province of Agra, on both sides of the Ganges, which here is crossed by a stone bridge resting on fifteen arches, built in the fifteenth century, and remarkable for its strength. Pop. 27,160.

**Jou'ett** (JAMES E.), U. S. N., b. in 1826 in Kentucky; entered the navy as a midshipman Sept. 10, 1841; became a passed midshipman in 1847, a lieutenant in 1855, a lieutenant commander in 1862, a commander in 1866, a captain in 1874. On the night of Nov. 7, 1861, Lieut. Jouett, in command of the first and second launches of the U. S. frigate Santee, carried, by boarding, the armed schooner Royal Yacht in the harbor of Galveston, Tex., after a very obstinate fight, in which he was twice severely wounded. At the battle of Mobile Bay he commanded the steamer Metacomet, and distinguished himself by his coolness and intrepidity. Rear-admiral Farragut, in his official report of the battle, says: "Our little consort, the Metacomet, was also under my immediate eye during the whole action up to the moment I ordered her to cast off in pursuit of the Selma. The coolness and promptness of Lieut.-Com. Jouett throughout merit high praise; his whole conduct was worthy of his reputation." FOXHALL A. PARKER.

**Jouffroy'** (THEOPHILE SIMON), b. at Les Pontets, department of Doubs, France, in 1796; educated at the College of Dijon; initiated into the study of philosophy by Victor Cousin, and held different positions as teacher of philosophy at different educational and scientific institutions of Paris, where he d. Feb. 4, 1842. He translated Dugald Stewart's *Outlines of Moral Philosophy* and all the writings of Dr. Reid into French, and thereby became the medium of a lively intercommunication between the Scotch and the French philosophy. Of his own numerous works, all of which are without any striking originality, but clear and instructive, the *Cours de droit naturel* and some essays have been translated into English.

**Jouffroy d'Arbans, de** (CLAUDE FRANÇOIS DOROTHÉE), MARQUIS, b. in Franche-Comté, France, about 1751; was in his early manhood (1772) a captain of infantry. During an exile of two years in Provence he studied the navigation of sailing vessels, and prepared notes for a work on that subject. The sight of Chaillot's fire-engine (1775) suggested to him the application of steam to navigation. He developed his idea by consultation with Perier and other men of science, and with the assistance of a village coppersmith made a small steam-propeller, which he placed on the river Doubs in June, 1776, but the experiment had only partial success. Continuing his mechanical studies in spite of ridicule, Marquis Jouffroy constructed another vessel, which had better success, in 1780, and in 1783 he had so far perfected the invention as to place upon the river Saône at Lyons a small steamboat which on July 15, 1783, stemmed the current of the river in the presence of the members of the Lyons Academy. Still, the vessel was too defective to be available for purposes of actual navigation. The inventor solicited a patent, which was refused by the French government (Jan. 31, 1784), in consequence of an adverse report made by the Academy of Sciences after an examination of the vessel. At the outbreak of the French revolution Jouffroy emigrated to England, served in the army of Condé, and took part in political intrigues in favor of the Bourbons. Returning to France under the Consulate, he became acquainted with Fulton, who after some controversy acknowledged the merits of the experiments made in 1783, claiming for himself only an improvement in the engine. In 1816, Jouffroy obtained a patent, formed a company under the auspices of the count of Artois, published his book, *Les bateaux à vapeur*, and addressed a memoir to the Academy. On Aug. 20 of that year he launched on the Seine a steamer, the Charles Philippe, but it could not compete with rival enterprises of the same kind. After this the marquis passed the remainder of his life in complete oblivion, dying of cholera at the Hôtel des Invalides, Paris, in 1832.—His son ACHILLE, b. about 1790, was a voluminous political and historical writer of the Ultramontane school. He wrote an account of his father's inventions (1839), and devoted himself to experiments on steamboat and railway propulsion, without practical success.

**Jongs, Joggs, or Juggs**, an instrument of punishment formerly employed in Scotland, the Netherlands, etc., was simply an iron collar placed around the culprit's neck and fastened by a padlock. A short chain ran from the collar to a staple in a tree, wall, or building near the parish church. The punishment was substantially that of the pillory. The term is allied to the word *yoke* and the Lat. *jugum*.

**Joule** (JAMES PRESCOTT), D. C. L., LL. D., b. at Salford, England, Dec. 24, 1818, the son of a brewer, and was associated with his father in business until 1854. His scientific education was entirely conducted by himself at home, with the exception of a course of private lessons in physics he received three or four times a week for three or four years from Dr. John Dalton, the celebrated author of the atomic theory. He became enthusiastically fond of original research, and at



the age of nineteen had manufactured an electro magnetic engine, a description of which he published in the *Annals of Electricity* for Jan., 1828. Further research into the phenomena of heat evolved by electricity showed that his engine could not advantageously replace the steam-engine as a motor, and led to the discovery of the laws of the evolution of heat by electric currents, the relations between heat and chemical affinity, and the mechanical nature of the origin of heat. In 1841 he gave in a lecture at Manchester the results of the important experiments made by himself and Jacobi of St. Petersburg into the magnetic forces as a motive-power. These experiments were continued by Joule and by Mr. Scoresby, and led in 1843 to ascertaining the exact proportion between the mechanical powers of steam and electro-magnetism, and the equivalency of heat with mechanical force, ultimately fixed by him, after further experiments with various fluids, at 772 foot-pounds per unit of heat. The scientific applications of this principle were numerous, and Joule soon accumulated data for his important communication to the Royal Society *On the Change of Temperature produced by the Rectification and Conduction of Air*, which brought him into prominence as an investigator, and led to his association in further experiments with other eminent scientists, especially Prof. (now Sir William) Thomson of Glasgow and Dr. Lyon Playfair. With the former he commenced in 1852 a series of researches upon the thermal effects of fluids in motion, which were continued for many years, the results of which were communicated to the Royal Society in four memoirs (1853-62) printed in the *Philosophical Transactions*. With Dr. Playfair he made a careful investigation of the volumes of space occupied by the same bodies in a solid and in a liquid state, the results leading to important modifications of the theories of molecular physics. The discoveries of Dr. Joule have been intimately related to the remarkable theories of the correlation of forces developed by Dr. Meyer and Helmholtz of Germany, Seguin of France, Faraday and Grove of England. In recognition of his important services to science, Dr. Joule received the royal medal of the Royal Society in 1852, and in 1860 the Copley medal, besides all the honors which could be conferred by degrees from Oxford, Dublin, and Edinburgh universities, membership of the Institute of France and all the chief scientific corporations throughout the world, and the presidency of the British Association for the Advancement of Science in 1873. His miscellaneous experiments have been very numerous, and he has invented many scientific processes and instruments, especially in relation to a more accurate measurement of forces.

**Jour'dan** (JEAN BAPTISTE), b. at Limoges Apr. 29, 1762; after the death of his father was placed in his uncle's silk store in Lyons. In 1778 he left this employment, entered a regiment of infantry, and fought in America under D'Estaing. Having returned in 1784, he settled in his native city, married, and opened a milliner's store, but at the outbreak of the Revolution he became captain of the national guard of Limoges, and thus began his very active and even brilliant military career. As chief of a battalion he distinguished himself under Dumouriez; was made a brigadier-general in 1793, a general of division in the same year, and commander-in-chief of the army of the North. Oct. 16, 1793, he defeated the Austrians at Wattignies, and June 26, 1794, at Fleurus, driving them back to the other side of the Rhine. In the campaigns of 1795 and 1796 he was less successful. On Sept. 6, 1795, he crossed the Rhine at Düsseldorf, but on Oct. 11 he was defeated at Höchst by Clerfayt. In June, 1796, he crossed the Rhine a second time, and penetrated with a victorious and well-equipped army into the Upper Palatinate; but having been defeated by Archduke Charles at Würzburg, Sept. 3, 1796, he resigned his command. Elected a member of the Council of Five Hundred, he was twice chosen its president, and planned and established the system of military conscription. Napoleon never gave him an active independent command, but appointed him governor of Piedmont in 1800, and made him a marshal in 1804. He accompanied Joseph to Naples and Spain, and was a friend of his. Louis XVIII. made him a count in 1815, chief of the seventh military division, and peer of France in 1819. During the July revolution he was charged with the ministry of foreign affairs, but only for a very short time. D. Nov. 23, 1833, as governor of the Hôtel des Invalides. He published *Opérations de l'Armée du Danube* (1799) and *Mémoires pour servir à l'Histoire de la Campagne de 1796* (1819).

**Jourdan** (MATHIEU JOUVE), called COUPE-TÊTE ("head-cutter"), b. at St. Just, near Puy, France, in 1749, and was guillotined May 27, 1794, by the order of the Committee of Public Safety and the Revolutionary Tribunal as throwing discredit on the Revolution by his excesses. He was

keeping a wine shop in Paris when the Bastille was taken, and he prided himself as having killed the governor of the prison. On Oct. 6, 1789, he murdered the two body-guards accompanying the royal family in their memorable ride from Versailles to Paris. Jourdan is historically known as the organizer and leader of the massacre perpetrated in 1793, called the "Massacre of La Glacière," at Avignon.

FÉLIX ARAGONE.

**Jour'nalism** is one of the prime necessities of modern civilized life. There are now 14,000 periodicals printed in the world. More than 6000 are published in the U. S., and they annually circulate over 1,500,000,000 copies. It is a close approximation to the truth to say that each copy issued averages five readers. If these publications annually circulate 1,500,000,000 copies, the periodicals of the Union are read 7,500,000,000 times. Such is the fact in the U. S., as shown by the census returns; and it is perhaps fair to assume an equal circulation for the periodicals of the rest of the world. It is manifest, therefore, that journalism is a necessity of the age. It is the letter, the pamphlet, the book of the million. Newspapers are read when nothing else is read; newspapers are sent by the thousands through the mails instead of letters, and they are with many, very many individuals, the only medium of intercommunication. Ideas by means of journalism become cosmopolitan. It enables all nations to interchange with each other in a free, easy, cheap, and intelligent manner. None are too poor to obtain a newspaper; none are too poor to know each morning the daily occurrences of the world. Newspapers of to-day, by means of the telegraph, are the reflex of the events of yesterday. What transpires in Paris or New York, London or Washington, St. Petersburg or San Francisco, Berlin or Boston, Vienna or Philadelphia, Liverpool or New Orleans, Canton or Chicago, is known within twenty-four hours to millions of people of all nations and tongues through the press. Napoleon is overthrown at Sedan, and the startling fact is the talk at every breakfast-table the next morning. Some important discovery in science or art is made to-day in Boston or Berlin, and it is practically applied to the business of life to-morrow through the same channel of communication. On all the great subjects that agitate the public mind governments are advised of the public sentiment, and cabinets are guided by public opinion expressed in the public journals. Through this source the *vox populi* has become the voice of warning and influence in the councils of nations, and in the practical details of life everywhere the newspaper is the necessity. All kinds of business, all inventions and improvements in machinery, all changes in trade and finance, all facts and movements affecting the weal or woe of mankind, are daily spread throughout the universe by means of journalism. Whatever is to be bought or sold is advertised; movements of railway-trains and steamships, conveying hither and thither the inhabitants and annual produce of the world, are chronicled. Servants, artisans, the employed and the employers, have their needs made public for a trifling sum in the pages of the daily papers. If a mechanic or a monarch is dead, the fact is announced through the same ubiquitous means. Is it too much to say, therefore, that society is regulated by this great power, and that journalism is one of the prime necessities of the world? Stop all the presses throughout Christendom for one week, or even for one day, and what would be the result?

How did this institution originate? When and where? What is it now?

There were news-sheets long anterior to the discovery of printing in Europe. They were in circulation in China and Rome and Venice, and it is asserted by archaeologists that those in China were printed on rude wooden type several centuries before the days of Gutenberg, Coster, and Schöffer; but in Europe the earliest news-sheets were manuscript papers prepared with some regularity, and known in Rome as the *Acta Diurna* and in Venice as the *Gazzetta*. These sheets are interesting to us as indicative of the fact that newspapers were indispensable ages before types were invented in Europe. But we will leave the age of manuscripts and begin with the age of printed newspapers. According to tradition, the first printed news-sheet appeared in Nuremberg in 1457, and was called the *Gazette*. We have no knowledge of the existence in any collection of a copy of that publication. If published, not a copy has been preserved. In 1534 a newspaper was printed in that famous city of which there is a record. There was a copy in the Libri collection, and a description of it appeared in the catalogue of that collection. This sheet was entitled the *New Zeitung aus Hispanien und Italien*. When we consider the wonderful enterprise of the inhabitants of that town, it is not improbable that the latter publication was a continuation of the former. Wooden type were invented in 1438-40, and Peter Schöffer first cast metal type in 1452. It is therefore within the range of

probability that, in bringing those type into use, it was easier to print meagre news sheets than books, and that the *Gazette* was printed in the very infancy of typography. But be that as it may, it is pretty well ascertained that Ulric Zell printed a newspaper in Cologne as early as 1499, called the *Chronicle*; and we also have the fact that in 1598 the *Mercure des Gallo-Belgiques* was printed there. In 1615 *Die Frankfurter Oberposten-Zeitung*, believed to have been the first daily paper in the world, was established by Egenolf Emmel, and Frankfurt claims him as the father of journalism. These are the beginnings, and to Germany the world is indebted not only for the invention of printing, but for the first use of types for the dissemination of news among the people. Now, Germany is full of newspapers of all sorts and shades, and many are of a superior order and ability; and some of those in existence to-day have been continuously published 100 and 200 years, and one even for a longer period.

England followed Germany in journalism. Nathaniel Butters was a writer of news-circulars in London in the early part of the seventeenth century. He is mentioned as early as 1611, occasionally printing a news-slip, and in 1621 he published one or two numbers of *The Concord or Weekly News from Foreign Parts*; and during this interesting period he was in the employment of several of the nobility and gentry as a gatherer of news, which he regularly despatched in written communications to his patrons in the country. It was not till 1622 that he permanently resorted to the printing-press. With Nicholas Bourne and three or four others, probably printers, he issued the first regularly printed newspaper—the *Weekly News*—in the English language. It made its appearance in London on the 23d of May. This was nearly 200 years after the discovery of printing, and about 150 years after William Caxton had established the first printing-office in Westminster. Meanwhile, the manuscript news-circulars and the gossips at the coffee-houses supplied the public with their daily talk. Strange as it may appear to the present age, the playwrights in the infancy of journalism were the influential writers of the time, the men who largely guided the popular mind, the censors of manners and morals. Fletcher and Ben Jonson and Shirley made fun of the newspaper-men on the stage in *The Fair Maid of the Inn*, the *Staple of News*, and other plays; and it was even deemed a piece of journalistic enterprise to obtain the first playbill and other intelligence of theatrical movements. All this, however, has since been changed, and in England the present examiner of plays is a journalist named Pigott. The first daily paper in England, the *Daily Courant*, was issued in 1702; and the first penny or one-cent paper, the *Orange Postman*, was started in 1709. Now, there are 1500 newspapers and periodicals published in Great Britain, with such papers as the *Times*, the *Telegraph*, the *Illustrated News*, and *Punch* as representative papers. The newspaper press of England has long been considered the fourth estate in that kingdom; but as the leading minds of the nation for the last 200 years—Milton, Johnson, De Foe, Swift, Coleridge, Macaulay, Palmerston, Brougham, Disraeli—have written for the journals, and as the daily and weekly papers now represent in various ways the intellect of the country, it takes higher rank than Hunt in his modesty chose to assign to the profession.

France followed England, and established her first newspaper in 1631. The phraseologist Renaudot issued the *Gazette de France* on the 30th of May of that year. Official bulletins of the military operations of Charles VIII. in Italy in 1491-95 were printed, and were the conception of *Le Moniteur Universel*, the official organ of France in after years; but these were mere bulletins of the army, not often issued, and there was a sheet called the *Mercure Francaise*, printed in Paris in 1643; yet Renaudot and his *Gazette de France* have always been considered the pioneers of the newspaper press of that country. The *Gazette*, with an occasional interruption, has been published from 1631 to the present day, and is one of the two oldest papers in the world. Renaudot was a remarkable man and a remarkable journalist. He was a physician and a gossip, and in his intercourse with people became one of the best-informed men of his day. Like Butters in England, he wrote news-circulars prior to the establishment of the *Gazette*, and, like Butters, he sold his papers in the streets by news-boys and news-women, who were known as "hawkers" and "Mercury women." Such men as Richelieu, Mazarin, and Louis XIII. wrote for the *Gazette*, as Guizot, Thiers, Lamartine, and Napoleon have since written for the modern French press. The pioneer daily paper in France, the *Journal de Paris au Petit au Soir*, did not make its appearance till 1777. The *Journal de la Ville de Paris* was published a century earlier, but only appeared once a week, with the daily occurrences recorded in the style of a diary of events, and hence its name. Now, France can boast of 1600 periodicals,

full of ability, but very deficient in enterprise. The French journals depend largely upon their able editorial articles, brilliant reviews, and sensational *feuilletons* for their support. Their advertisements are inserted mostly like handbills, and their columns for business notices are generally farmed out.

Newspapers continued to increase in Europe after these early publications had opened the way. The *Postoch Lucches Tidning* was founded in 1644 as the official organ of Sweden. The *Haarlem Courant* appeared in 1656. The *St. Petersburg Gazette* was established in 1703, and printed under the authority of Peter the Great, who took an active interest in its management. The pioneer paper of Spain, the *Gaceta de Madrid*, made its appearance in 1704. There were a *Gazette* and also a *Courant* in Amsterdam in 1705. The first paper in India was issued in 1781, and the first in Turkey was printed in Smyrna in 1827 by M. Blecque, just a century after the introduction of printing in the Ottoman empire. It was called the *Spectator of the East*. Now, there are over 8000 newspapers and periodicals printed in Europe, Asia, and Africa. Those in Australia are as large, as ably conducted, and nearly as well filled with advertisements as those in London. There are several papers printed in English in the seaports of China, and our journalists have frequently been indebted to the *China Mail* and the *China Register* for news from the interior of the Celestial Empire, and entertained with the republication of the vermilion edicts from the *Peking Gazette*, which is claimed to be the oldest government organ in the world. Annexed are the statistics of the periodical literature of Europe, Asia, and Africa, which, if not strictly accurate, are very near the actual numbers:

*Newspapers and Periodicals in Europe, Asia, and Africa in 1874.*

Great Britain.....	1456	Denmark.....	96
France.....	1668	Norway and Sweden.....	184
Prussia.....	809	Netherlands.....	243
Austria and Hungary.....	1016	Switzerland.....	194
Other German States.....	467	Egypt.....	7
Russia.....	337	Africa.....	14
Italy.....	723	Asia.....	30
Spain.....	206	Turkey.....	53
Belgium.....	194	Elsewhere.....	150
Portugal.....	26		
Total.....	8253		

All interests and classes, professions and trades, literature and art, politics and religion, are represented in these publications—illustrated, comic, financial, commercial, marine, sporting, dramatic, scientific—a variety the sight of which would fairly stagger Butters and Renaudot were they to reappear on earth and enter into the office of the *London Times* or that of the *Printers' Register*.

There are several newspapers printed in Europe which have lived a great many years, and the files of which, notwithstanding the restrictions of censors, are filled with intensely interesting details of the great events of the last two centuries, of the rise and fall of empires, of national changes and revolutions that were startling to mankind when they occurred. Here are their names:

Names.	When established.
Frankfort Gazette.....	1615
Gazette de France.....	1631
Leipsic Gazette.....	1660
London Gazette.....	1665
Stamford Eng. Mercury.....	1695
Edinburgh Courant.....	1705
Rastock Gazette.....	1710
Newcastle Eng. Courant.....	1711
Leeds Eng. Mercury.....	1718
Berlin Gazette.....	1722
Leicester Eng. Journal.....	1752
Dublin Freeman's Journal.....	1755

All the governments of Europe were early represented by newspaper organs. They are an easy means of communicating orders in council, special edicts, proclamations, and laws to the people. The *London Gazette* was the first of these, and was established in 1666, and is still published. It was originally the *Oxford Gazette*. *Le Moniteur Universel*, *Journal Officiel de l'Empire Francaise*, was started in 1789; but Louis Napoleon abandoned the paper in 1869, because it was owned by private individuals, and established another with the simple title of *Journal Officiel de l'Empire Francaise*. Italy is represented by the *Gazzetta Ufficiale*; Spain, by the *Gaceta de Madrid*, and Russia by the *Pravitel'stvenni Vystok*. The *Imperial Russ* of St. Petersburg was the organ of the Russian government for many years. It was established in 1815 to raise a fund for the relief of wounded soldiers. It was superseded in 1868 by the new organ. Russia is also represented in Brussels by *Le Nord*, the utterances of which are semi-official, and are intended to explain to Europe any political problem in which the government of the czar may be interested. Austria is officially heard through the *Gazette of Vienna*.



Of all the newspapers now printed in Europe, the *London Times* is the most perfect. It is ninety years old, and has been owned and managed during that time by three generations of one family—the Walters. Its intellectual ability and business enterprise have been remarkable since 1803, when it became the property of John Walter, the father of the present proprietor. He conducted the paper for forty years, and it has a great power in the land; and in order to be entirely independent of government influence the second Walter ran his own special expresses with the news of the battles of Napoleon I., often anticipating the government couriers and official despatches. The *Times* was the first paper printed by steam-power, which was introduced into its press-room in 1814.

The number of daily papers published in Great Britain in 1874 was 131, of which 24 were printed in London. Of the total number, 23 are represented as independent in politics: 39 as liberal; 22 as neutral; 26 as conservative; and 1, the *Morning Post*, the organ of fashion, as High Church. The *Times* is set down as liberal. The prices of these journals range from one farthing, or half a cent, to five pence, or ten cents, per copy. The *London Sun* is sold for a farthing, the lowest-priced paper in the English language, and the *London Times* for three pence for each copy. The price of the *London Telegraph* is one penny, or two cents. Its circulation is said to be 160,000 copies daily, while that of the *Times* is about 40,000. It is perhaps only necessary to mention three or four of the most prominent on the continent of Europe. The *Gazette de Moscou*, edited by M. de Kathof, is one. M. Thiers, in speaking of the press in the Corps Législatif in 1868, said that to have an exact idea of what passes in Russia, of the movements and tendencies of that great power, it was necessary to combine the utterances of the government with the language of the *Gazette de Moscou*. The *Augsburg Gazette* has always been an authority in Germany. It is printed every day in the year, like the *New York Herald*. The *Journal des Débats* is probably the ablest paper in France, and has always given the debates of the Corps Législatif in full, as the *London Times* does those of Parliament. Of course there are others, like *Le Nord* and the *Mémorial Diplomatique*, but space will not tolerate a complete list of them.

The most remarkable field for newspaper enterprise and newspaper literature has been the U. S.; and in giving a sketch of the journals of this country it will be necessary to embrace those that appeared before the colonies became independent of the mother-country, as well as those that appeared subsequently, in order to show the progress of journalism on this continent. In a country where, after 1783, industry and intellect became the most active in the world, the increase and growth of newspapers have been wonderfully great, surpassing every other single nation, and where the aggregate number of journals and their circulation have almost reached in 1874 the number and circulation of those printed in all other parts of the world. There are eras in the history of the periodical press of North America which do not exist in the history of the newspaper press in other parts of the world. This is due to our peculiar political status as a people first, as a colonial, and second, as an independent government. Our journals, largely entering into the political controversies of the people, passed through the changes that the country experienced from utter subservience to the English monarchy to complete independence, and then through the changes growing out of the marvellous progress of the nation. These eras were five in number—namely, first, the colonial press; second, the Revolutionary press; third, the political party press; fourth, the cheap press; fifth, the independent press.

The COLONIAL PRESS first appeared in Boston, Mass., in 1690. On Sept. 25 of that year Benjamin Harris published a sheet with the title of *Publick Occurrences both Foreign and Domestic*. It was the intention of the publisher to issue this paper once a month, and the annexed prospectus gives, in the quaintest manner, what the pioneer journalist of America believed to be the duties of an editor:

PUBLICK OCCURRENCES,  
BOTH FOREIGN AND DOMESTICK.

BOSTON, THURSDAY, SEPT. 25, 1690.

It is designed that the Country shall be furnished once a month, or if any Glut of Occurrences happen oftener with an Account of such considerable things as have arrived unto our Notice.

In order here unto, the Publisher will take what pains he can to obtain a Faithful Relation of all such things; and will particularly make him self beholden to such Persons in Boston whom he knows to have been for their own use the diligent Observers of such matters.

That which is herein proposed, is, First, That Memorable Occurrences of Divine Providence may not be neglected or forgotten, as they too often are. Secondly, That people everywhere may better understand the Circumstances of Publique Affairs, both abroad and at home; which may not only direct their Thoughts

at all times, but at some times also to assist their Business and Negotiations.

Thirdly, That some thing may be done towards the Curing, or at least the Charming of that Spirit of Lying, which prevails among us, wherefore nothing shall be entered, but what we have reason to believe is true, repairing to the best fountains for our Information. And when there appears any material mistake in anything that is collected, it shall be corrected in the next.

Moreover, the Publisher of these Occurrences is willing to engage, that whereas, there are many False Reports, maliciously made, and spread among us, if any well minded person will be at the pains to trace any such False Report, so far as to find out and Convict the First Raiser of it, he will in this Paper (unless first Advice be given to the contrary) expose the Name of such person as A malicious Raiser of a False Report. It is supposed that none will dislike this Proposal, but such as intend to be guilty of so villainous a Crime.

On this basis of truth and justice and conscience was issued the first newspaper on this side of the Atlantic. Its size was three pages of a folded sheet, leaving one page blank, with two columns to a page, and each page was about eleven by seven inches. But the effort of Benjamin Harris failed, in consequence of the opposition of the provincial authorities, who forbade "anything in print without license first obtained from those appointed by the government to grant the same;" and as the first number of *Publick Occurrences* contained "reflections of a very high nature," a second number did not appear. Some have doubted the existence of this publication, but the fact that a copy, and the only one extant, is on file in the state paper office in London is sufficient proof that such a paper was issued. Harris's news-sheet was a veritable newspaper, but there was a reprint of the *London Gazette* in New York in 1696 which gave the news of an important battle in Europe leading to the Peace of Ryswick. This was issued by William Bradford by order of Gov. Fletcher, as an easy mode of reproducing an official account of an affair of much moment to the colonies for the information of the people. It was not intended as a regular newspaper. These two publications were the only attempts of the kind till 1704. Meanwhile, the colonists relied upon a few London papers, received by the few vessels arriving from England, for news from Europe, and on the gossips at the coffee-houses for local intelligence; but meanwhile, also, John Campbell, the postmaster of Boston, became a news-gatherer, and furnished the New England governors and a few friends with periodical news-letters or circulars. Nine of these letters, written to Gov. Fitz John Winthrop of Connecticut, and bearing dates from April to October, 1703, now belong to the Massachusetts Historical Society. These circulars led to the issue of a newspaper by their writer. On Apr. 24, 1704, John Campbell commenced the publication of the *News-Letter*, and it has since been incorrectly stated that this was the first newspaper printed in America. Campbell's prospectus was a brief one. Harris promised to issue his paper once a month. The interim of fourteen years lessened the time to weekly publication. This is Campbell's prospectus:

ADVERTISEMENT.

This News-Letter is to be continued weekly; and all persons who have any Houses, Lands, Tenements, Farms, Ships, Vessels, Goods, Wares or Merchandises, &c. to be sold or let; or Servants Run-away, or Goods Stole or Lost; may have the same inserted at a Reasonable Rate, from Twelve Pence to Five Shillings and not exceed: Who may agree with John Campbell Post Master of Boston.

All persons in Town or County may have said News-Letter every Week, Yearly, upon reasonable terms, agreeing with John Campbell, Post-master for the same.

Harris, it will be seen, did not ask for an advertisement. His attention was wholly directed to intelligence and the truth of public reports. Campbell, on the contrary, was wholly devoted to business, and calculated largely on advertisements. He does not allude to news in any way. But very few business notices appeared in the *News-Letter*. It was a novel enterprise, and the merchants and mechanics of Boston did not fully comprehend the advantages of this new mode of making their business known to the public. The *News-Letter*, in its early days, was sometimes printed on a single sheet, foolscap size, but oftener on a half sheet, with two columns on each side. It lived for seventy-two years, and went out of existence when the British troops evacuated Boston in 1776. The *News-Letter* enjoyed a monopoly of journalism in America for fifteen years, and yet had a circulation of only 300 copies. In 1719, William Brooker was appointed postmaster of Boston in the place of Campbell, and in consequence of some difficulty about the *News-Letter* and the mails the new postmaster thought it expedient to establish another newspaper. On Dec. 21 of that year he issued the *Boston Gazette*. The appearance of this sheet, added to the loss of office, fired the indignation of Campbell, and thereupon commenced the "war of editors" on this continent, which has never ceased. In speaking of the *Gazette*, the editor of the *News-Letter* said, "I pity the readers of the new paper; its sheets smell



stronger of beer than of midnight oil. It is not reading fit for the people!" It appears that Brooker was not inclined to carry on the war to the bitter end, for in reply he wished Campbell "all desirable success in his agreeable *News Letter*, assuring him" that he had "neither capacity nor inclination to answer any more of his like advertisements."

On Dec. 22, 1719, the day after the *Gazette* appeared, the initial paper in Philadelphia, the *American Weekly Mercury*, was issued by Andrew Bradford, a son of the first printer in Pennsylvania—a paper that Benjamin Franklin subsequently characterized as "a paltry thing, wretchedly managed, no way entertaining, and yet was profitable." But the paper that attracted the most attention in the colonies at that early period was the *New England Courant*, established by James Franklin Aug. 7, 1721. Benjamin Franklin commenced his career as a printer's apprentice on this paper. It is stated in the autobiography of the latter that the *Courant* was the second newspaper started in America. It was the fifth. But the *Courant* created a sensation which the others did not do, and its publisher was soon in difficulty. It first had a wordy war with the *News Letter*. Then James Franklin had a great deal of trouble with the clergy, especially with Cotton and Increase Mather, and finally the journalists and the government officials had their differences. The communications in the *Gazette* produced so much talk and scandal in the quiet town of Boston that its publisher was forbidden to issue his paper except under very arbitrary restrictions, and for attempting to evade these he was thrown into prison. On Feb. 11, 1722, Benjamin Franklin, then only sixteen years of age, was placed in charge of the paper as its editor and publisher, and he remained for several months in this position. There continued to be the same independent spirit in the management of the paper, and its troubles finally induced James Franklin to abandon its publication. He went to Newport, R. I., where he established the *Gazette* in 1732, and where he died three years later.

The next paper that appeared in America was the *New York Gazette*, the first in that province. It was published by William Bradford, and the first number was issued on Oct. 23, 1725. In 1727 the *New England Weekly Journal* was published by Samuel Kneeland, and he made brilliant promises to his readers. On Apr. 8, 1728, he said: "There are Measures concerting for rendering this Paper yet more universally esteemed, and useful, in which 'tis hop'd the Publick will be gratif'd, and by which those Gentlemen who desire to be improv'd in History, Philosophy, Poetry, &c. will be greatly advantag'd." The *Maryland Gazette* also appeared in 1727, the first in that colony. It was published till 1736, and revived in 1749. In 1728, Benjamin Franklin made his reappearance as a journalist. Samuel Keimer had started a paper in that year in Philadelphia, which he named the *Universal Instructor in all the Arts and Sciences, and Pennsylvania Gazette*. Franklin had contemplated such an enterprise, and had confided his intention to a fellow printer, who treacherously informed Keimer of the plan, and the *Instructor* was the result. Franklin, in order to prevent the success of Keimer's journal, immediately commenced writing "several amusing pieces for Bradford's paper [the *Mercury*], under the title of *Busy Body*." In less than a year Keimer sold his paper with its ninety subscribers to Franklin, who condensed its name to *Pennsylvania Gazette*, and made it a success. In mentioning this circumstance Franklin said: "Our first papers made quite a different appearance from any before in the province; a better type, and better printed; but some remarks of my writing, on the dispute then going on between Governor Burnet and the Massachusetts Assembly, struck the principal people, occasioned the paper and the manner of it to be much talked of, and in a few weeks brought them all to become subscribers." On Jan. 8, 1731, the *South Carolina Gazette* was issued, the first in that province. It was printed in Charleston, and lived a year, but was revived in 1734.

But the most important newspaper, politically, in early colonial times was started in New York in 1733. On Nov. 5 of that year John Peter Zenger issued the first number of the *New York Weekly Journal*. It was a rival of Bradford's *Gazette* professionally and politically, and Zenger was a fearless journalist. The *Journal* made war on the administration of Gov. Cosby, and in 1734 its editor was arrested for libel on the government and thrown into prison, and in the hope of crushing the paper the authorities kept him nine months in confinement. This created a great deal of popular sympathy for the newspaper, and neither Zenger nor his friends were to be put down. In spite of the imprisonment of its editor, the *Journal* continued to appear regularly, and finally the case was brought before the court for trial. It was the first action for new paper libel on the American continent. The court met on Aug. 3, 1735, and Andrew Hamilton of Philadelphia appeared for Zenger.

The publication of the alleged libel was admitted, and Mr. Hamilton offered to prove the truth of the statements made. This the court refused to permit. All evidence being thus shut out, it became necessary for Mr. Hamilton to address the jury, which he did with great power. Zenger was acquitted, and the verdict was greeted with the utmost enthusiasm by an immense audience. Mr. Hamilton was conducted in triumph to a splendid entertainment, a salute was fired on his departure for home, and the freedom of the city was presented to him by the common council for "the remarkable service done by him to the city and colony by his learned and generous defence of the rights of mankind and the liberty of the press." In the opinion of Gouverneur Morris the result of this case was "the dawn of that liberty which afterwards revolutionized America."

Other papers made their appearance in Boston and Philadelphia; the *Virginia Gazette*, the first in that province, made its debut in Williamsburg in 1736; and two newspapers printed in German, the pioneers in any foreign language in America, appeared—one in Germantown, Pa., in 1739, and the other in Philadelphia in 1743.

These were the beginnings in America. Newspapers were published in 1745 in Boston, Philadelphia, New York, Annapolis, Williamsburg, and Charleston. Most of these colonial papers confined themselves strictly to the merest mention of the news of the day. If any opinions were uttered, they were subservient to the authorities. The Franklins and Zenger were the exceptions, and they originated and practised that independent spirit which was infused in a new class of papers that appeared subsequent to 1745. This new class was the *Revolutionary Press*. It was still of the colonial stamp, because the country was yet composed of colonies, with governments appointed to rule over them by England, but the people and the press had become revolutionary, more self-reliant, and more independent of the colonial authorities. The pioneer of this class of journals was the *Independent Advertiser*, issued in Boston on Jan. 4, 1748, under the inspiration of that ardent patriot, Samuel Adams. One of its contributors was Jonathan Mayhew, who preached a sermon on the occasion of an election strongly advocating the republican form of government. David Fowle, the printer of the paper, having issued a pamphlet which severely denounced the legislature for certain acts, he was arrested and imprisoned. On his release he quitted Boston and went to Portsmouth, N. H., where he started the *New Hampshire Gazette* in 1756, and the young patriots of the *Advertiser* had to bide their time. One or two new papers appeared in Boston and New York, and pamphlets were issued by the opponents of the government in the next year; but the real organ of the Revolutionary party made its appearance on Apr. 7, 1755. It was published by Edes & Gill, and named the *Boston Gazette and Country Gentleman*. All the vigorous writers for the *Independent Advertiser*, with others—Samuel Adams, Jonathan Mayhew, John Adams, James Otis, Joseph Warren, Thomas Cushing, Samuel Dexter, Benjamin Austin, Jr., and Samuel Cooper—contributed to the columns of the *Gazette*. It was a fearless denunciator of the wrongs of the government. The spirit of the paper was indicated in its devices on its title page. On its first number were two cuts—one representing an Indian with bow and arrow, the other represented Britannia liberating a bird confined by a cord to the arms of France. Five years later (1760) there was a new device: this represented Minerva, in place of Britannia, seated at a pedestal on which was a cage, holding a spear surmounted with the cap of liberty in her left hand. With her right hand she opens the cage and liberates a bird, which is depicted flying towards the tree of liberty. This was fifteen years before the fight at Concord.

It is not to be expected that in an article as circumscribed as this must be all the newspapers springing into life from time to time can be mentioned. Only those that made their mark on the age or were representative in their character can be noticed. All others will be included in the general statistics of journalism. It is necessary to mention the *Newport (R. I.) Mercury*, not only because it is still published, but because it enjoys the reputation of having been started on its career by Benjamin Franklin. He had nothing to do with its origin. It was established on June 12, 1728, by James Franklin, a nephew; and all Benjamin had to do with the paper was to present to his nephew, after the *Mercury* had been some time in existence, a font of new type, "as ample amends" to his brother James "for the service he had deprived him of by leaving him so early"—in other words, for having run away before his apprenticeship had expired. The press on which the elder James Franklin and his brother Benjamin so often worked in Boston remained in the *Mercury* office for 100 years. It was then presented to the Massachusetts Charitable Mechanics' Association. On Feb. 16, 1799, the old *Gazette* of William Bradford was revived, and afterwards mounted by the



Freneau. On Oct. 29, 1764, the *Connecticut Courant* was issued in Hartford, and is still published there. Its pages have been of great value to the historians of the U. S. Indeed, all the old papers have been a mine of wealth to these writers and compilers.

The great event which alarmed the colonists, aroused the patriotic indignation of the journalists, and which threw the political clubs into commotion, and did more to precipitate the Revolution than any other single act of the home government, occurred in the following year. It was the Stamp Act of 1765, which required that all instruments in writing be executed on stamped paper to be purchased of government agents only, and all offences against the act were to be tried in any royal marine or admiralty court in any part of the colonies, no matter how distant from the place of offence; thus interfering with the right of trial by jury. The colonists were at once aroused to a sense of the danger impending over them. In May the subject came up in the house of burgesses in Virginia, of which Washington was a member. Patrick Henry introduced his celebrated resolutions that the assembly of that province had the exclusive right and power to lay taxes and impositions upon the people of that commonwealth, and whoever maintained the contrary of this doctrine was an enemy of the colony. It was on this occasion that he exclaimed, "Cæsar had his Brutus, Charles his Cromwell, and George III. [cries of "treason!" "treason!"] may profit by their example. Sir" (bowing to the Speaker), "if this be treason, make the most of it!" The resolutions, with some slight modifications, were adopted. They were immediately published in the *Maryland Gazette*, with an article strongly endorsing them written by Charles Carroll. They were also printed in the *Pennsylvania Gazette* and the *Newport (R. I.) Mercury*, and the number of the latter containing them was immediately suppressed as a traitorous publication. The *South Carolina Gazette*, the *American General Gazette*, and the *Gazette and Country Journal*, all published in Charleston, printed them. They were endorsed by the Sons of Liberty in New York and Massachusetts, and were published in the *Boston Gazette* with comments by John Adams, which were subsequently printed in pamphlet form in London. They were deemed traitorous and seditious there, and an unsuccessful effort made in Parliament to have the pamphlet suppressed. The Stamp Act was repealed in 1766, but the effect produced on the minds of the colonists by these few newspapers was prodigious. This act, which created so much enmity to the mother-country, was originally recommended to the authorities as an excellent measure by a journalist, Ellis Huske, postmaster of Boston, who in 1734 started the *Boston Weekly Post Boy*. Several of the publishers suspended the publication of their papers in consequence of this act. On Oct. 31, the day before it was to take effect, the pages of the *Pennsylvania Journal and Weekly Advertiser*, published by a grandson of William Bradford, were enclosed in black lines, with the picture of a skull and cross-bones over the title, with the words, "Expiring: In Hopes of a Resurrection to Life again." On the border of the first page were printed, "Adieu, adieu, to the Liberty of the Press." On the last column of the third page were the words, "Farewell, Liberty." On the fourth page was a cut of a coffin, with this epitaph:

"The last Remains of  
The Pennsylvania Journal  
Which part of this Life, the 31st of October, 1765,  
Of a SPAM in her Vitals,  
Aged 23 years."

Such was the spirit of journalism in America ten years before the commencement of the Revolution. Of course the government had its organs. Several of the papers "printed by authority" endeavored to counteract the influence of the patriotic sheets, but where these made any sign others were established in the interest of the people. Such was the case in Virginia. In 1766 a second *Gazette* appeared in Williamsburg, printed by William Rind. In mentioning this paper, Thomas Jefferson said, "Till the beginning of our Revolutionary disputes we had but one press, and that, having the whole business of the government, and no competitor for public favor, nothing disagreeable to the governor could find its way into it. We procured Rind to come from Maryland to publish a free paper." The first printed statement of the adoption of the Declaration of Independence on the 4th of July, 1776, was made in the *Gazette* on the 19th of that month, and the document in full appeared in the same paper on the 26th. While this was being done in Virginia, the patriots in other provinces were doing what they could in the same direction. On May 29, 1767, the *New York Journal, or General Advertiser*, was brought out under the inspiration of George Clinton and Philip Schuyler. It was a revival of Zenger's paper, and was edited by Alexander McDougall. Alexander Hamilton, when only sixteen years of age, was

a smart contributor to its columns. It was McDougall who issued a pamphlet in New York in the interest of the Sons of Liberty in 1770, charging the assembly with a betrayal of its trust in its favorable action on the Mutiny Act of 1768-69, for which he was thrown into prison. The assembly voted the pamphlet libellous, and the proceedings were printed on the 45th page of the records of that body. "Forty-five" thereupon became the countersign of the Sons of Liberty. McDougall received many visitors while in jail, and in connection therewith the *Journal* of Feb. 15, 1770, gave the following paragraph: "Yesterday, the forty-fifth day of the year, forty-five gentlemen, real enemies to internal taxation by, or in obedience to, external authority, and cordial friends to Captain McDougall and the glorious cause of American liberty, went in decent procession to the New Gaol; and dined with him on forty-five pounds of beef stakes, cut from a bullock of forty-five months old, and with a number of other friends, who joined them in the afternoon, drank a variety of toasts, expressive not only of the most undissembled loyalty, but of the warmest attachment to Liberty, its renowned advocates in Great Britain and America, and the freedom of the press. Before the evening the company, who conducted themselves with great decency, separated in the most cordial manner, but not without the firmest resolution to continue united in the glorious cause."

Opposite in political sentiment to these patriot journals was the *Royal Gazette*, which was established in New York in 1762 by James Rivington. The leading contributors to the *Gazette* were Attorney-general Seabury, Myles Cooper, president of Columbia College, the Rev. John Vardill, and the Rev. Samuel Chandler. Major André also wrote for the paper, and his well-known satire, the *Cane Chase*, appeared in the *Gazette* on the very day of his capture:

"And now I've closed my epic strain,  
I tremble as I show it,  
Lest this same warlike rover Wayne  
Should ever catch the poet."

It was subsequently called *Rivington's Royal Gazette*, with the royal arms over the office-door. It was an ably conducted newspaper. Its office was twice mobbed for its zeal for the Crown—once by the Sons of Liberty, and once by a party of Connecticut militia. After enjoying royal favor for many years, Rivington in 1782, who then saw the "end of things," shaped his course to meet coming events. Several years previously Freneau predicted this in some verses which he published in a Philadelphia paper:

"Says Satan to Jimmy, 'I hold you a bet,  
That you mean to abandon our Royal Gazette!'"

On July 10, 1782, the following appeared in the *Gazette*: "The publisher of this paper, sensible that his zeal for the success of His Majesty's arms, his sanguine wishes for the good of his country, and his friendship for individuals, have at times led him to credit and circulate paragraphs, without investigating the facts so closely as his duty to the public demanded, trusting to their feelings, and depending on their generosity, he begs them to look over past errors, and depend on future correctness. From henceforth he will neither expect nor solicit their favours longer than his endeavours shall stamp the same degree of authenticity and credit on the *Royal Gazette* of New York, as all Europe allow to the *Royal Gazette* of London." The title *Royal* was dropped, and the paper was afterwards known as *Rivington's New York Gazette and Universal Advertiser*, and the royal arms were removed from over the door of the office. The circulation of the *Gazette* reached, in its best days, the large number of 3000. Another organ of the Crown was started in Boston in 1767. It was the *Chronicle*, and the handsomest journal, typographically, published in the colonies. It exhibited great pretensions to literature. John Mein, one of its publishers, was a bookseller, and would sometimes fill a page of the *Chronicle* with advertisements of his books for sale. Mein, assisted by a pre-Revolutionary wit of Boston named Joseph Green, and a few others, was very severe on the Whigs of those days. On Nov. 5, 1769, in a public procession, among the effigies displayed was one of Mein, to which was attached the following acrostic:

"Insulting wretch, we'll him expose—  
O'er the whole world his deeds disclose;  
He'll now apes wide to take him in;  
Now he is ripe—O lump of Sin!  
  
Mein is the man—Mein his name;  
Enough he's spread his hellish fame;  
Internal fires hurl his soul;  
N—no million times, from pole to pole!"

So inimical to Mein had the popular sentiment become that he was compelled to stop the publication of the *Chronicle* and leave the country.

The *Massachusetts Spy*, "calculated on an entire new

plan," was the next influentially patriotic paper started in the colonies. Its first number came out in July, 1770, under the auspices of Isaiah Thomas, the author of the *History of Printing in the United States*. With the *Gazette*, the *Spy* was a power with the people, and did its full share in bringing on the rupture with the mother-country. The office of the paper was styled "the seditious family." Early in 1771 it urged a recourse to arms, and on Oct. 8, 1772, it closed an article in this fearless manner: "Should the liberty of the press be once destroyed, farewell the remainder of our invaluable rights and privileges! We may next expect padlocks on our lips, fetters on our legs, and only our hands left at liberty to slave for our worse than Egyptian task-masters, or—Fight our way to constitutional Freedom." In denouncing Gov. Hutchinson as "an usurper," and showing Lieut.-Gov. Oliver as a "recorded perjured traitor," an effort was made by Attorney-Gen. Sewall to have Thomas indicted for libel, but the grand jury refused to find a bill. More British troops having reached Boston, that city became too warm for Thomas. On the night preceding the eventful day at Concord the material of the *Spy* was conveyed across the Charles River and carried to Worcester, where the paper was ever afterwards printed, and where it is now known as the *Worcester Spy*. On May 3, 1775, it first appeared there with the motto in large type: "Americans! Liberty or Death! Join or Die!" Thomas was famous for these newspaper laconisms. He had a fresh one for every new phase and every new movement in the Revolutionary conflict. The government, to stem this Revolutionary tide after the suspension of the *Chronicle*, resorted to the old *News-Letter*, which was then known as the *Massachusetts Gazette and Weekly News-Letter*. All the Tory writers of note—Oliver, Brattle, Leonard, and Sewall—concentrated their power on this paper. There was a sharp contest between Sewall and Leonard as "Massachusettsensis" in the *Massachusetts Gazette*, and John Adams as "Novanglus" in the *Boston Gazette*.

After the fight at the Old North Bridge in Concord, Mass., Apr. 19, 1775, there was open war for eight years. In the first year of the Revolution eight newspapers were started—four in Philadelphia, where Thomas Paine and Philip Freneau lived and wrote. The first newspaper in New Jersey, the *Gazette*, was issued on Dec. 3, 1777; the first in Mississippi Territory appeared in 1779, a pioneer among the pioneers; and in 1781 the first, the *Gazette or Green Mountain Post Boy*, was published in Vermont. Forty-nine newspapers were established in the colonies from 1745 to 1783, the Revolutionary period of our history, but of all these publications not one was really a journal, not one appeared daily. While New York was occupied by the British troops four papers were published there, and an arrangement was made in their days of publication by which the public had a newspaper each day. This was the nearest approach to this luxury in that period. The first daily paper in America was not issued till 1781. It was the *American Daily Advertiser*, and was published in Philadelphia by Claypoole, who was the first to introduce reporting on the continent.

The initial newspapers in the colonies made their appearance in the following chronological order:

Name	Where published	When published
1. Publick Occurrences	Boston	1690
2. News-Letter	Boston	1704
3. American Mercury	Philadelphia	1719
4. New York Gazette	New York	1725
5. Maryland Gazette	Annapolis	1727
6. South Carolina Gazette	Charleston	1731
7. Rhode Island Gazette	Newport	1732
8. Virginia Gazette	Williamsburg	1736
9. North Carolina Gazette	Newberne	1755
10. New Hampshire Gazette	Portsmouth	1756
11. Summary	New London	1758
12. Delaware Current	Wilmington	1761
13. Georgia Gazette	Savannah	1763
14. New Jersey Gazette	.....	1777
15. Vermont Gazette	Westminster	1781

Of the 63 newspapers which had been started in America from 1690 to 1783, only 13 were in existence on the conclusion of peace with Great Britain.

The third era of the newspaper in America, embracing the Political Party Press, began in 1785. On the acknowledgment of the independence of the U. S., 3,000,000 of people found it necessary to organize a government on a new basis. All sorts of opinions, notions, and theories prevailed as to the best mode of accomplishing this great end. All thoughts were naturally turned to the subject, and it was very soon apparent that there were two sides to every question, even in a nation which as a unity had just achieved its independence; and these sides became great political parties in the U. S. Alexander Hamilton was the recognized leader of one of these divisions, the Federal party, and Thomas Jefferson the chief of the other, the Re-

publican or Democratic party. Without any exception the 43 newspapers published in 1783 arrayed their columns on either side in the momentous political contests which followed the conclusion of peace. Of this number, the *Massachusetts Spy*, the *Gazette*, and *Independent Chronicle* of Boston, the *Virginia Gazette*, the *Maryland Gazette*, the *Journal*, and the *Packet* of New York, the *New Hampshire Gazette*, the *Salem Gazette*, the *Connecticut Current*, the *Newport R. I. Mercury*, the *Pennsylvania Gazette*, and the *Pennsylvania Journal* were the most prominent. The failure of the Articles of Confederation as a perfect system of government for the U. S. brought on the first great political conflict; and when the legislature of Virginia, in Jan., 1786, proposed a convention of delegates from each State for the purpose of revising the Federal system, the real contest began. Out of this convention, which finally met in Philadelphia in 1787, came the Federal Constitution; and in the adoption of this instrument by the several States the most intense excitement prevailed throughout the nation. In the great controversy the newspapers played an important part. The *Packet* in New York strongly advocated the adoption of the Constitution, in opposition to the *Journal*. In Boston the *Massachusetts Centinel*, which was started in 1784, and edited by Major Benjamin Russell, was the leading Federal organ, and from the adoption of the Constitution in the national convention till its acceptance by the State conventions the *Centinel* kept up a vigorous fire in its favor; and there were one or more personal collisions, growing out of the bitterness of the contest, between Major Russell and Benjamin Austin, a writer for the *Independent Chronicle*, which was the organ of the Democratic party. The *Centinel* was one of the most enterprising journals of its day. It did not confine itself wholly to politics, but intelligently gave the fullest marine and commercial reports, and its summary of foreign news was always excellent, especially during the wars of Napoleon. The proceedings of the constitutional convention in Massachusetts were reported by Major Russell, almost the first reporting attempted in America, and he thus described his labors and a scene in the convention: "I had never studied stenography, nor was there any person then in Boston that understood reporting. The presiding officer of the convention sat in the deacon's seat, under the pulpit. I took the pulpit for my reporting-desk, and a very good one it was. I succeeded well enough in this my first effort to give a tolerably fair report in my next paper; but the Puritanical notions had not entirely faded away, and I was voted out of the pulpit. A stand was fitted up for me in another place, and I proceeded with my reports, generally to the acceptance of the convention. The doubts that still existed as to whether enough of the States would come into the compact as to make the Constitution binding, made the proceedings of the convention intensely interesting. When the news arrived of the acceptance of it by the State of Virginia, there was an extraordinary outbreak of rejoicing. It seemed as if the meeting-house would burst with the acclamation." On the final adoption of the Constitution there were celebrations everywhere. There was one in New York in 1788, made up of all the trades. The press section was headed by two marshals—Hugh Gaine of the *Gazette* and Samuel Loudon of the *Register*. In the procession was a stage drawn by four horses. On this stage was a printing-office, cases and other typographical implements, with compositors and pressmen at work. Many hundred copies of a song and an ode were struck off and distributed along the route. There was a small flag on top of the press bearing the inscription of "Publius" in gold letters. John Loudon, as a herald, was mounted on the back of the press, dressed in a flowing robe, and a cap on which were written the words, "The Liberty of the Press." He carried a trumpet in his right hand, with which he proclaimed, "The epocha of Liberty and Justice." In the left hand he held a parchment scroll representing the new Constitution. With the adoption of the Constitution the Federal party considered itself fully and firmly established; and of course the Republican or Democratic party was also established, although, on the inauguration of Washington and Adams, the *Boston Centinel* formally announced the death of the latter; but on Mar. 4, 1801, on the inauguration of Jefferson and Burr, the *Centinel* published a characteristic monumental inscription, the first part of which was as follows:

YESTERDAY Expired,  
Deeply regretted by MILLIONS of grateful AMERICANS,  
And by all good men,  
THE FEDERAL ADMINISTRATION  
of the  
Government of the United States  
Annulled by  
A Washington, an Adams, a Hamilton, Knox,  
Pickens, Wolcott, McHenry, Marshall,  
Stoddert and Dexter  
A.D. 12 years



When the Constitution went into operation in 1789 there were printed in each week, in the U. S., 76,438 copies of newspapers, or 3,974,776 copies during the year, filled with the political excitement of that interesting period of our existence in somewhat of the spirit which animated Major Russell of the *Boston Centinel*. Newspapers continued to increase. Many foreign writers of ability and smartness were employed by both parties on the press, and many of the political chiefs wrote for the journals. There were few or no regular editorial articles—or leaders, as they are now styled—but the topics of the day were warmly discussed in communications over all sorts of signatures. Most of the foreign writers were political exiles, and they naturally fell into the ranks of the Democrats and wrote for the papers of that party, strongly against England and in favor of aiding republican France; and they were very severe on the administrations of Washington and Adams. One of these papers, the *National Gazette*, was established in Philadelphia in Oct., 1791, by Philip Freneau while a clerk under Jefferson in the state department. Freneau was a poet of the Revolution, and accomplished as much with his rhyme as with his prose. In regard to him Jefferson said in his *Autobiography* that at a cabinet council Washington remarked: "That rascal Freneau sent him three copies of his paper every day, as if he thought he (Washington) would become the distributor of them; that he could see in this nothing but an impudent design to insult him; he ended in a high tone." Jefferson placed a high estimate on the services of Freneau as a journalist. On another occasion Jefferson said, in speaking of Washington, "He adverted to a piece in Freneau's paper of yesterday: he said he despised their attacks on him personally, but that there had never been an act of the government, not meaning in the executive line only, but in every line, which that paper had not abused. He was evidently sore and warm, and I took his intention to be that I should interpose in some way with Freneau, perhaps withdraw his appointment as translating clerk in my office. But I shall not do it. His paper has saved our Constitution, which was galloping fast into monarchy, and has been checked by no one means so powerfully as by that paper. It is well and universally known that it has been that paper which has checked the career of the monarchists." The *Gazette* was published till 1793. In 1797, Freneau started the *Time Piece* in New York, which was afterwards edited by Matthew L. Davis, and subsequently by John Daly Burk, one of the United Irishmen. Two influential journals were established in 1793: the *New England Palladium* in Boston, and the *Minerva* (afterwards and still known as the *Commercial Advertiser*) in New York. Noah Webster, the lexicographer, previously a lawyer in Hartford, was induced to migrate to New York to take charge of the *Minerva*, and thereby strengthen the Federal party. William L. Stone was subsequently and for many years its editor. It is now, as the *Commercial Advertiser*, owned by Hugh Hastings, and is the oldest paper in New York. The *Palladium* was merged with the *Boston Advertiser*. But the newspapers that attracted the most attention in the latter part of the last and the early part of this century were the *Aurora* in Philadelphia and the *Evening Post and American Citizen* in New York. The *Aurora* was edited by Benjamin Franklin Bache, a grandson of Benjamin Franklin, till 1798. It contained on Mar. 3, 1797, a very savage article on the departure of Washington for Mount Vernon after the inauguration of John Adams. It was disowned by Bache, who was absent when it appeared, but it is said to have been written by a "public functionary" and a distinguished member of the Democratic party. On the death of Bache the *Aurora* passed under the editorial care of William Duane, who had become very much embittered against England in consequence of his treatment in India. The *Aurora* was a powerful organ of Jefferson's. The *Evening Post* was not so old a paper as the *Aurora*. It was started on Nov. 16, 1801, and was strongly Federal in its politics. Alexander Hamilton, John Jay, and their friends established it, and placed William Coleman in the editorial chair, where he remained for nearly thirty years, and was succeeded by William Leggett and William Cullen Bryant; the latter is still chief editor. It was Democratic in politics for over forty years, and is now independent Republican. The *American Citizen* was a continuation of the *New York Journal and Argus*. James Cheetham became its editor in 1801, and acted with that portion of the Democratic party of which the Clintons were leaders. Violent altercations between some of the leaders of the two sections of that party took place, and the duelling-ground at Hoboken became the scene of several affairs of honor. Matthew L. Davis, armed and equipped, went forth in Wall street one time to shoot Cheetham at sight. The bitterness of these three remarkable journals kept up the political excitement in New York to a high pitch and for a long time. Coleman

called Duane "a low-lived foreigner," and he alluded to "the insolent vulgarity of that base wretch," Cheetham. Once he discharged a double shot at his opponents:

"Lie on, Duane—lie on for pay,  
And, Cheetham, lie thou too;  
More against truth you cannot say,  
Than truth can say 'gainst you."

Another Democratic paper was issued in New York in 1802 by the friends of Aaron Burr, in opposition to the *Citizen*. It was the *Morning Chronicle*, and edited by Dr. Peter Irving. Washington Irving made his first appearance as a writer in the *Chronicle*, over the signature of "Jonathan Oldstyle." Matthew L. Davis was a contributor to its political columns. It was no match for the *Citizen*, and ceased to exist in 1805, the year after the killing of Hamilton by Burr. But before all these papers had commenced their career the violence of several of the organs of the Democratic party, edited largely by foreigners, towards the close of last century, led to the enactment of the Alien and Sedition laws of 1798. The Sedition law, restricting the liberty of the press and of speech, especially aroused the Democrats, and caused great indignation in most of the newspaper-offices, and the journals opposed to the administration of John Adams became more violent than ever. The second clause of this act stated that "if any person should write or publish, or cause to be written or published, any libel against the government of the U. S. or either house of Congress, or against the President, he should be punished by a fine not exceeding \$2000, and by imprisonment not exceeding two years." About 200 papers were published in the U. S. at that time, and of these only 20 or 25 were edited wholly or partly by aliens. Nearly all of these were opposed to the leading measures of the administration of Adams, and assailed the President for his opposition to France with the utmost virulence. The laws affected these foreign writers. Among them were James Thompson Callender, William Duane, John Daly Burk, and William Cobbett, and all but the latter were in the interest of the Democratic party and encouraged and sustained by Jefferson and Madison, especially by the former. Cobbett edited the *Porcupine* in Philadelphia. There were many prosecutions under the Sedition law—of natives as well as foreigners. Callender of the *Richmond Examiner*, who wrote the *Prospect before Us*, was tried, convicted, fined, and imprisoned in Richmond. Jefferson subsequently had the amount of the fine refunded to him. Judge Thomas Cooper, tried in Philadelphia, was imprisoned twenty-four hours and fined \$1000 for printing a political handbill. On the morning after his conviction, Fenno in the *United States Gazette*, the Federal organ, said: "The Republican party is always committing some act of excess, but what occurred in court on yesterday surpassed anything that has yet occurred. Upon the conviction of Cooper, Stephen Thompson Mason, a Senator from Virginia, shook hands with the culprit in the very face of justice." The *Aurora* the next morning contained the following reply, prepared by Gen. Mahlon Dickinson of New Jersey (it is to be borne in mind that Judge Chase who presided at the trial was a person of rotundity and of a florid complexion): "Mr. Fenno is evermore committing great mistakes, but of all the errors into which he has yet fallen, that in his paper of yesterday is the greatest. He states that Stephen Thompson Mason, a Senator from Virginia, shook hands with the culprit in the very face of justice, mistaking the bacon-face of old Chase for the face of justice." Col. Matthew Lyon, who represented Vermont in Congress from 1797 to 1801, was prosecuted for letters written from Washington to Alden Spooner and published in the *Windsor Journal*, "containing artful and indirect accusations" against the President, charging him with "rejecting men of age, experience, wisdom, and independency of sentiment," and saying that the President exhibited a fondness for "ridiculous pomp, idle parade, and selfish avarice." It was also charged that Col. Lyon had published parts of the Barlow letter "abusing, in the most virulent manner, the President and Senate of the U. S." in regard to France; and that all this was done with the intention "to stir up sedition and bring the President and government" into contempt. Col. Lyon was tried in Oct., 1798, convicted, sentenced to four months' imprisonment and to a fine of \$1000. During the pendency of the case he was re-elected to Congress, and went from prison to his seat in the House of Representatives. John Daly Burk, author of the play *Bunker Hill*, or the *Death of Warren*, and Dr. James Smith, editors of the *Time Piece* in New York, were also arrested under this law, but the case never came to trial. Burk left the country for a time, but returned and was killed in a duel in 1808. Charles Holt, editor of the *New London Bee*, was fined and imprisoned under the same law, but the fine of \$1000 with interest was afterwards refunded by act of Congress. Holt in 1808 established the *Columbian* in New York as the

organ of the Clintonians, and was always an ardent supporter of Jefferson and Madison.

These were some of the troubles of the journalists in the early days of the republic; and while these papers and editors were having their joys and sorrows in the cities on the Atlantic coast, the tide of emigration was setting westward and the North-west Territory boomed up before the eyes of the world. With the increase of population in that region, the necessity of newspapers became evident, and on Nov. 9, 1793, the *Centinel of the North-western Territory* was founded in Cincinnati by William Maxwell, the first newspaper and the first printing-office beyond the Ohio. Nathaniel Willis, an old Boston printer, started the *Saints Gazette* in Chillicothe in 1796, and in 1799 the *Western Spy and Hamilton Gazette* was issued. So the North-western Territory, as it was called, was not without its journals to keep its hardy people posted in the affairs of the rest of the world; and now that Territory and the entire West to the Pacific is covered with numerous States, occupied by millions of enterprising men and women, and supplied with thousands of first-class newspapers—such papers as the *Republican* and *Democrat* in St. Louis, where the first paper, the *Republican*, was established in 1808, when that city was a mere trading post; as the *Tribune*, *Times*, *Journal*, and *Post*, large flourishing sheets in Chicago, where the first journal was founded as late as Nov., 1833, and in a State where the first newspaper did not appear till 1814; as the *Alta California*, *Bulletin*, and *Morning Call* of San Francisco, enjoying circulations from 6000 to 20,000 daily, where the first journal was issued by our soldiers in camp in 1846-47; and as the *Bulletin* and *Herald* in Portland, and over 30 other papers in Oregon, make money and fame where no paper existed in 1846. So, too, in the South as far as Texas, where the *Gallean*, *Bulletin*, and *News* flourish in Galveston, and more than 100 other newspapers look after the growth of that great border State, destined to be cut up into half a dozen smaller States as the population increases.

Singular as it may seem, journalism made its appearance in the North-west even before it did in the interior of New York. The *Ontario Herald*, or *Western Advertiser* was the first newspaper printed in Western (now known as Central) New York. It appeared (18 by 21 inches in size, each of the four printed pages being 9 by 15½ inches) at Cooperstown Apr. 3, 1793, and was continued until 1821. Elisha Phinney was its founder, editor, and the pioneer journalist in that section of the country. In announcing his enterprise he felt the "highest satisfaction in being honored as the conductor of the first public paper printed in the respectable county of Otsego." William L. Stone, Thurlow Weed, and other distinguished journalists, worked at the case in his office, and J. Fenimore Cooper often "set type" there for amusement, and he thus described the printing-establishment of the *Herald* in its days of infancy, in his charming novel, *The Pioneers*. Speaking of the laying out of the village, and of an effort of the early settlers to start an academy, he said: "Meeting after meeting was held for this purpose year after year. The resolutions of these assemblies appeared in the most conspicuous columns of a little, blue-looking newspaper, that was already issued weekly from the garret of a dwelling-house in the village, and which the traveller might as often see stuck into the fissure of a stake that had been erected at the point where the footpath from the log cabin of some settler entered the highway, as a post office for an individual. Sometimes the stake supported a small box, and a whole neighborhood received a weekly supply for their literary wants at this point, where the man who 'rides post' regularly deposited a bundle of the precious commodity." This description of the printing-office and the mode of delivery of the *Otsego Herald* in 1793 was true of nearly all the journals of a century ago; and even now the small box on a stake is seen at some cross-roads in the interior of Massachusetts, Vermont, and elsewhere.

But to return to our chronological order. The Alien and Sedition laws led to the famous Virginia and Kentucky resolutions of 1798-99. These became the chief plank in the Democratic platform, and were the basis of many of the Democratic journals which were subsequently established; and those in existence sustained the Democratic doctrine thus enunciated by Jefferson and Madison. The *Richmond Enquirer*, edited for forty years by Thomas Ritchie, started on May 9, 1804, was among the first established on this platform, and became a leading and powerful organ of public opinion for half a century. Among other prominent journals that appeared at that time was the *Albany Register*, established in 1803 or 1804, an influential paper, especially under the care of Solomon Southwick, who was its chief editor in 1808. But, like all political journals, it had, in the overthrow of factions, to succumb to the *Albany Argus*, which was started in 1813,

and managed with great ability and skill by Edwin Crosswell till the defeat of Martin Van Buren in 1840, and even maintained much of its power till the election of Abraham Lincoln. It was the mouthpiece of the Albany Regency, as the *Enquirer* was of the Richmond Junta. Another paper of note was the *Hudson Balance*, a leading Federal paper in 1804, and edited by Harry Crosswell. It had to carry on the contest against the Democratic organs with the *Commercial Advertiser* and *Economy Post* of New York. The *Balance* was made famous in journalism by a libel on Thomas Jefferson, for which Crosswell was tried and convicted. On the trial the editor offered to prove the truth of the charges, but such evidence was ruled out as inadmissible. This case changed the law of libel in New York, for in consequence the legislature in 1805 passed an act authorizing the truth to be given in evidence when published with good motives and for justifiable ends; and this principle afterwards became the fundamental law of the land. New party papers continued to make their appearance, and were at that time mostly Democratic. They grew out of the troubles and jealousies of the party-leaders. After the death of Cheetham, the Tammany Hall Democrats, dissatisfied with the course of the *Columbian*, set up a paper to take the place of the *Citizen*. This journal was named the *National Advocate*. Henry Wheaton was its editor for a number of years. It then passed into the hands of Mordecai Manasseh Noah; James Gordon Bennett was also one of its editors; Henry Eckford, the famous shipbuilder, was one of its principal owners. The party press reached its greatest power and influence with the establishment of these papers and others, such as the *Portland (Me.) Argus* in 1803, the *New Hampshire Patriot* in Concord in 1808, the *Hartford (Conn.) Times* in 1817, the *Charleston (S. C.) Mercury* in 1822, the *Globe* in Washington, and the *Post* in Boston in 1831, the *Nashville (Tenn.) Union*, and the *Columbian (O.) Statesman*. These journals wielded the destinies of the Democratic party from the days of Jefferson to the inauguration of Lincoln. They gave the keynote on all important public questions to the lesser organs scattered over the country. The newspapers in opposition to a large portion of this time, although some of these were originally Democratic, were the *National Intelligencer*, issued in Washington in 1793-1800; the *Providence (R. I.) Journal*, established in 1820; the *Boston Courier*, started by Joseph Tinker Buckingham in 1824; the *Richmond (Va.) Whig*, in 1826; the *New York Courier and Enquirer*, in 1827; the *Albany Evening Journal*, originally established by Thurlow Weed as an Anti-Masonic organ in 1830; the *Louisville (Ky.) Journal*, first issued in 1831, and edited for thirty years by George D. Prentice; the *Boston Atlas*, started by John H. Eastburn and the Webster Whigs in 1832; and the *New York Express*, set up by the Clay Whigs in 1836. These journals, with their assistants in the cities and towns of the Union, represented the National Republican and Whig parties, and made their mark on the pages of political history. But these journals were not confined wholly to politics. With the progress of the country, and with the discussions of the great questions that came up before the people, they expanded their usefulness and showed some enterprise. Especially in New York, in order to obtain large circulations, efforts were made to acquire the earliest news in advance of each other. This led to improvement in the columns generally of the chief organs of public opinion. More attention was devoted to commercial and foreign intelligence, and they became large advertising mediums. Other papers were established during this long period which were not strictly party papers, but the number of these was very small indeed. One of the most valuable of these publications was *Niles' Weekly Register*, which was brought out in Baltimore in 1811, and continued till 1848; and a set of this paper contains the fullest and best history of the country during the thirty-seven years of its existence.

While the party press reigned in journalism, a class of papers existed which were deemed, till quite recently, a necessity of the time—an *Independent Press*. These were the organs in Washington. The first of this class was the *National Intelligencer* and *Washington Globe*. This paper had been removed from Philadelphia, where it was known as the *Independent Gazette*, on the removal of the seat of government from that city. It was in 1793-1800. The *Intelligencer*, then owned by Samuel Harrison Smith, became the organ of Jefferson. In 1810-12 it passed into the hands of Gales & Seaton, and these publishers introduced the full reports of the debates in Congress. On the advent of Jackson on Mar. 4, 1829, the *Intelligencer* ceased to be the organ of the government, and became that of the Whig party, and the *United States Telegraph*, edited by Duff Green, was accepted as the organ of Jacksonian administration. But a rupture between Pres. Jackson and



Vice-Pres. Calhoun caused the establishment (in 1831) of the *Globe*, with Francis P. Blair and Amos Kendall as editors, and this journal became the thunderer of the Democratic party. It continued to be the organ till the advent of Harrison in 1841, when the *Intelligencer* resumed its old position, but the early death of Harrison, throwing the Whig party into confusion, led John Tyler to select the *Washingtonian*, started in 1841, to be his organ. On the election of James K. Polk in 1844, the *Globe* did not return to power with its party, but a new paper, called the *Union*, was established, with Thomas Ritchie as editor, and that journal became the official organ. On the election of Gen. Taylor in 1848, a new paper was started for his organ, as the *Intelligencer* favored the Webster wing of the Whig party. The new paper, the *Republic*, was edited by Alexander Bullitt and John O. Sargeant. The *National Era* acted in the national capital for the Abolition party from 1847. When Franklin Pierce came into power in 1852-53, the *Union* resumed its position with the government, but with Gen. Robert Armstrong as editor and Caleb Cushing and A. O. P. Nicholson as contributors; and continued, with John Appleton (previously editor of the *Portland Argus*) as conductor, through the administration of James Buchanan. The *Union* was the last of the official organs at the national capital. Neither Pres. Lincoln nor Johnson indulged in the luxury of one, and Pres. Grant follows in their footsteps in having no special journal to speak for his administration. Several newspapers published in Washington have pretended to be such, but have not been officially recognized.

While party spirit prevailed in journalism, class-papers began to show themselves. The pioneers of these were the religious press, and the first appeared in 1814-16. The Rev. John Andrews established in Chillicothe, O., the first religious newspaper in America. It was entitled the *Recorder*, and the initial number was issued in 1814. Nathaniel Willis thought and talked of such an enterprise in Portland, Me., in 1808, but did not receive sufficient encouragement to carry out his plans till 1816. On Jan. 3 of that year he issued the first number of the *Boston Recorder*; and now the nation is full of religious newspapers, many of which are very ably conducted and reach larger audiences than sermons from pulpits can possibly reach. Three or four years afterwards another important class of newspapers was initiated. The *American Farmer* was the first of the agricultural press. It was published in Baltimore by John S. Skinner, and the first number appeared on Apr. 2, 1818. The *Ploughboy*, managed by Solomon Southwick, followed in 1821, and was published in Albany. The *New England Farmer* next appeared in Aug., 1822. These were the pioneers of the hundred useful and valuable publications now in circulation for the benefit of the farmer and stock-breeder. Other class newspapers appeared. Special interests are represented in journalism. The commercial classes were not overlooked. Indeed, as far back as 1795 the *Boston Prices Current* and *Marine Intelligencer* was published, but in a few years it became a political newspaper. The first successful commercial paper was the *New Orleans Prices Current*, established in 1822. Every city has now one or more commercial and shipping lists. Besides these, all trades, avocations, interests, occupations, professions, amusements, have their organs, in the U. S. as well as in Europe. The *Nautical Gazette*, the *Paper-Trade Circular*, the *Tobacco Leaf*, the *Cotton-Planter*, the *Telegrapher*, the *Railroad Journal*, the *Medical Times*, the *Scientific American*, are names frequently seen, and these publications are a credit to their conductors for the ability and research shown in their management, as well as for the beauty of their typographical appearance. Then, there are the illustrated papers, such as *Harper's Weekly*, *Frank Leslie's Illustrated Paper*, *Harper's Bazar*, the *Aldine*, and *Appleton's Journal*, that favorably compare with anything published in Europe. And comic journalism, what can be said of that? Not much for the U. S., for comic papers have been a failure on this side of the Atlantic. They are a great success in England, France, Germany, Italy, and Spain, and are full of wit and humor, but here not one attempt has been successful. Why? Because there is not a paper of any sort issued in the U. S.—political, religious, commercial, marine, scientific—but what has its joke. Most of the papers indulge in regular departments of wit and fun. There is a daily effervescence of *bonmots* from Canada to Mexico and from the Atlantic to the Pacific. The U. S. are a Vesuvius of wit and humor in a constant state of eruption, and the lava is in perpetual motion down the sides of its mountains. Hence the failure of the two or three dozen or more publications which have from time to time made a specialty of the comic side of human nature on this side of the Atlantic.

While the party papers of the old school, such as we have briefly described, covered with the dust of battle, of the Federal Constitution, the French war, the war of 1812, the

old tariff, the U. S. Bank, the Mexican war, and the slavery question, and the class of papers with their specialties were passing on, some to continued prosperity and others to the grave, a more vigorous set of newspapers was coming into existence—namely, the CHEAP PRESS. These papers were the great journalistic event in America. The old order of journals were subscription papers, and, considering size and amount of reading matter given, they were high-priced. The only part really cheap about them were the advertisements in their columns. It was only by becoming annual subscribers that copies could be obtained for less than six cents each: none were sold in the streets, none at news-stands or news-agencies, now so numerous, and very few were disposed of over their own counters. None of these journals had large circulations, none printed as late even as 1835-40 circulated over 5000 copies, and very few over half that number. With all the enterprise that James Watson Webb of the *Courier and Enquirer*, and Hale and Hallock of the *Journal of Commerce* of New York, and Richard Houghton of the *Boston Atlas*, displayed between the years 1830 and 1840 in news-schooners and pony expresses, not one of these journals could boast of a subscription-list of over 5000 names. But with the establishment of the cheap press all this has been gradually and wonderfully changed. Newsboys were introduced in our streets, news-agencies started in all the cities of the country, parcels of city journals were daily sent along the railroad and steamboat routes by express, and the modern newspapers soon had circulations ranging from 10,000 to 100,000, and now as high as 125,000, with an occasional spurt to 150,000 copies. The penny press was established in New York in 1833. The *Morning Post* was started on the first day of that year. Horatio David Shepard was the editor, and Horace Greeley and Francis V. Storey the printers. It was first sold for two cents, and then for one cent. In three weeks it was dead. On Sept. 3, 1833, the *New York Sun* was issued by Benjamin Day, and sold at one cent per copy. Its prospectus was as follows: "The object of this paper is to lay before the public, at a price within the means of every one, all the news of the day, and at the same time afford an advantageous medium for advertising. The sheet will be enlarged as soon as the increase of advertisements requires it, the price remaining the same. Yearly advertisers (without the paper), thirty dollars per annum. Casual advertising, at the usual prices charged by the city papers. Subscriptions will be received, if paid in advance, at the rate of three dollars per annum."

This was the origin of the cheap press in America, and the *Sun* is still published, and is still one of the cheap papers, although not a penny paper. The new class of journals, beginning thus in 1833, has gradually worked a complete revolution in the profession. Most of the cheap papers were established independently of political parties, but politicians were not disposed to lose such an opportunity for publicity, and while the *Transcript* in New York, the *Public Ledger* in Philadelphia, the *Sun* in Baltimore, and the *Herald* and *Mail* in Boston were established as mere local news-sheets, and owned and published by printers, the *New Era* and *Tribune* in New York were started in the interests of politics—the first as a Democratic organ, and the latter as a Whig organ—and the increase of cheap political sheets continued for several years. The conductors of these cheap papers in the early days of their publication confined themselves to local news only. Their means were limited, and they were governed by circumstances. They did not indulge in opinions. But in 1835 the cheap press with opinions was inaugurated. On May 6 of that year the *Herald* was established in New York by James Gordon Bennett with a more comprehensive plan in view. Its founder had been ten or twelve years previously actively engaged as a reporter, a correspondent, and an editorial writer on leading political journals, and he therefore entered on his new duties with considerable ability and experience as a journalist. With these qualities he combined that of great energy and enterprise, and he started on his new career entirely independent of party affiliations. The result is known, and with the issue of the first number of the *Herald* the INDEPENDENT PRESS had its origin. With the success of the *Sun*, *Herald*, and *Public Ledger* and their contemporaries of the cheap press, the old class of papers began to pass out of existence, and even the new political journals were subsequently established on the new plan as more effective with the masses and more successful in a business point of view. On Apr. 10, 1841, Horace Greeley started the *New York Tribune*, and by his ability, indomitable industry, and experience as a printer and political writer, as had been illustrated on the *Jeffersonian*, *Lag Cabin*, and *New Yorker*, he made that journal the chief Whig and Republican organ, and a power in the politics of the Union. On Sept. 18, 1851, the *New York Times* was founded by Henry J. Raymond, who had graduated in the offices of

the *Tribune* and *Courier and Enquirer*. It was organized as a political journal, and was a Republican organ, but its editor was under the control of no party, although he always acted with the Republicans. On June 1, 1860, the *New York World* was established by a number of religious gentlemen for the purpose of having a newspaper in the metropolis without the prurient police reports and the theatrical advertisements and notices that occupied so much space in the other city journals. After spending a large sum of money the enterprise was abandoned, and the *World* passed into the hands of more secular journalists. On July 1, 1861, the *World* and *Courier and Enquirer* were united. The *World* for the last ten or twelve years has been edited as an independent organ of the Democracy.

These journals are thus particularly mentioned because they fully represent the modern class of papers that now come under the head of the independent press. Others in other cities belong to the same category, such as the *Globe*, started in Boston in Mar., 1872. These papers are quarto or double-sheets; which style is rapidly taking the place of the old folio sheet. Many of the older papers, like the *Boston Transcript* and *St. Louis Republican*, have adopted the modern plan, and are now eight-paged instead of four-paged journals.

This is a brief sketch of journalism in the U. S. Its progress may be indicated by a few facts, as follows:

First printing-office in America .....	A. D. 1639
First newspaper .....	1690
First political newspaper .....	1733
First libel suit .....	1735
First German newspaper .....	1739
First daily newspaper .....	1784
First religious newspaper .....	1811
First agricultural newspaper .....	1818
First prices current .....	1822
First penny newspaper .....	1833
First independent newspaper .....	1835
First illustrated newspaper .....	1838
First comic newspaper .....	1859

But statistics will exhibit more comprehensively, perhaps, the growth of journalism on this side of the Atlantic, and the figures develop a marvellous result. The census returns, as given in *Journalism in the United States*, show the following as the

NUMBER OF PUBLICATIONS, WITH THEIR CIRCULATION AND ANNUAL ISSUE, IN THE U. S. IN 1870.

Periods of Issue.

	Number	Copies monthly issued	Circulation
Daily .....	574	886,479,570	2,601,547
Three times a week .....	107	24,193,380	155,105
Semi-weekly .....	115	25,708,488	247,197
Weekly .....	1,295	550,921,435	10,594,643
Semi-monthly .....	91	32,395,680	1,349,820
Monthly .....	622	67,810,115	5,650,843
Bi-monthly .....	13	189,990	31,650
Quarterly .....	39	446,680	211,670
Total .....	3,871	1,508,548,250	20,842,475

Classes of Publications.

	Number	Copies monthly issued	Circulation
Advertising .....	79	4,689,800	293,450
Agricultural and horticultural .....	93	21,541,904	770,752
Business and mercantile .....	81	6,518,660	257,080
General literature and miscellaneous .....	112	31,120,600	690,290
Illustrated .....	503	180,000,408	4,422,235
Nationality devoted to .....	20	4,111,000	45,150
Political .....	1,000	11,111,000	8,781,220
Religious .....	407	125,959,196	1,514,178
Sports .....	6	1,111,000	73,500
Territorial and professional .....	207	1,974,400	744,100
Total .....	3,871	1,508,548,250	20,842,475

What an astonishing exhibition! Now let us look at the comparative results since 1704:

Newspapers and Periodical Circulation in the U. S.

Year	Newspapers and periodicals	Copies annually issued	Population
1704	1	15,000	600,000
1725	4	175,000	1,000,000
1775	37	1,500,000	2,800,000
1810	379	2,371,000	7,239,814
1828	802	6,811,000	12,000,000
1845	1,258	20,811,000	14,000,000
1860	1,631	195,858,000	17,000,000
1870	2,226	1,508,548,250	23,191,876
1890	4,051	9,273,341,318	31,145,080
1870	5,871	1,508,548,250	38,555,753

Statistics of the Daily and Weekly Newspapers in the U. S.

States and Territories	1840		1850		1860		1870	
	Daily	Weekly	Daily	Weekly	Daily	Weekly	Daily	Weekly
Alabama .....	3	25	6	54	9	82	12	75
Arkansas .....		9		9		36	3	40
Arizona .....								
California .....		1		22	71	27	162	
Connecticut .....	2	31	7	34	14	33	17	53
Colorado .....							9	13
Delaware .....		6		10		9	1	13
District of Columbia .....	3	11	5	17	5	4	8	11
Dakota .....								2
Florida .....		10		10		17		23
Georgia .....		29	5	40	12	60	13	77
Illinois .....		40	8	88	23	239	26	378
Indiana .....		7	9	97	13	160	22	234
Iowa .....		1		27	9	107	18	204
Kansas .....								7
Kentucky .....					3	21	10	55
Louisiana .....	5	31	9	45	4	62	5	74
Maine .....	11	23	11	43	4	61	10	80
Maryland .....	3	33	4	44	7	43	6	59
Massachusetts .....	7	35	6	58	6	49	6	93
Michigan .....	10	81	22	141	17	109	19	162
Minnesota .....	6	26	3	49	8	100	12	152
Mississippi .....					4	44	7	76
Missouri .....	6	29	5	49	15	133	20	211
Mississippi .....	2	29		50	5	66	7	68
Montana .....								1
North Carolina .....		27		1	8	53	12	48
Nebraska .....							12	1
New Hampshire .....		27		3		18	7	39
Nevada .....							4	12
New Mexico .....				1		2		5
New Jersey .....	4	32	6	43	15	65	21	88
New York .....	34	211	51	329	68	336	77	575
Ohio .....	9	114	26	211	22	266	33	320
Oregon .....				2	2	12	7	26
Pennsylvania .....	12	175	24	264	28	285	49	406
Rhode Island .....	2	14	5	14	5	12	5	17
South Carolina .....	3	14	7	32	2	30	4	62
Tennessee .....	2	44	8	38	8	61	14	75
Texas .....				34	3	69	10	102
Utah .....							1	2
Vermont .....	2	28	2	31	2	28	6	44
Virginia .....	4	47	15	67	15	98	11	79
West Virginia .....							4	47
Wisconsin .....		6	6	39	11	128	14	146
Washington .....							4	14
Total .....	158	1,266	254	2,048	372	2,971	542	4,125

It is an interesting fact to note that of all the newspapers published in the world in 1874, there were printed, in round numbers

In the English language .....	7500
In all other languages .....	6500
English over foreign periodicals .....	900

If we make an estimate, based on the returns since 1870, we find the relative position of the U. S. to the rest of the world in periodical literature in 1874, to be as follows:

Periodicals published outside of the U. S. ....	8240
Periodicals published in the U. S. ....	6500
Against the U. S. ....	1740

It is safe to say that the number of copies annually printed in the U. S. is fully equal to those annually issued in all the other nations of the world. The highest circulation of any daily paper in London is 160,000, which is that of the *Telegraph*. The highest ever reached in New York has been 156,000, which number has been printed by the *Herald*. The average daily circulation of the *New York Sun* is 120,000; that of the *Philadelphia Ledger*, 84,000; of the *Boston Journal* and *Boston Herald*, in the neighborhood of 60,000. Some of the leading papers in Chicago and Cincinnati range from 40,000 to 50,000. The price of the journals affects the circulation as a matter of course. The *Telegraph* in London sells for two cents, the *Times* for six cents; the *Herald* in New York sells for four cents, and the *Sun* for two cents. The *News* in New York is now the "penny paper" of the American metropolis, which is as low as a paper can be conveniently sold on this side of the Atlantic, while in London the *Sun* is sold for half a cent, or a farthing, which is as low as a paper can be sold in the English metropolis. If the old-fashioned half cents were now in circulation in the U. S., no doubt a paper would be issued for that price, although of course it could not compete with the higher-priced papers in news and other reading matter.

The newspaper press of the U. S. has reached as great perfection as that of any other nation; and in enterprise it far surpasses the journalism of England or of the Old World. There is very little enterprise in newspapers on the continent of Europe. There is almost a superabundance of it in America, and especially in New York. There is no danger too great, no expedition too remote, too costly, or



too extensive, no undertaking too vast, for the American journalist. If it be to the heart of Africa, or to Khiva, or to the North Pole, or in the thickest of the battle in the rebellion, in Cuba, in Spain, in Asia, or in Germany, correspondents are sure to be present preparing history for all time to come; and now these journalistic deeds of daring are rewarded by the Iron Cross from the emperor of Germany, the gold medal from the Royal Geographical Society of England, the order of St. Stanislaus from the czar of Russia, and larger checks on the bankers of the newspaper proprietors.

FREDERIC HUDSON.

**Joust**, or **Just** [Fr. *joute*, *jaust*, *juste*, from the Lat. *juctus*, "to join" in a fight], in the knightly exercises of the Middle Ages a contest with arms, especially between two single combatants. The joust was either on foot or horse; the pole-axe and sword, but more commonly the lance, was the weapon used. The joust, as a rule, was a friendly contest, and was regulated by very minute and punctilious rules. When more than two engaged in such a contest, it was properly a *tourney*.

**Joutel** (HENRI), the author of *Journal historique du dernier voyage que fit M. de la Salle par dans le golfe de Méridien*, which appeared at Paris in 1713. He accompanied La Salle on his expedition in 1684 to the mouth of the Mississippi; was left in command of the fort of St. Louis in 1685, but joined La Salle again in 1687, and was present in the camp when La Salle was assassinated. He returned through Canada to France in 1688, and lived in his native city, Rouen. Very little is known about him before and after his participation in the exploring expedition of La Salle.

**Jouy** (VICTOR JOSEPH ÉTIENNE), b. in 1764 at Jouy, near Versailles; entered the army very early, fought in South America, East Indies, and the campaigns of the Revolution, but gave up his military career in 1797, and devoted himself exclusively to literature. He wrote novels, vaudevilles, and opera-texts, of which *La Vestale*, composed by Spontini (1807), was the first, and *Guillaume Tell*, composed by Rossini (1828), the last. He also wrote tragedies—*Tippecanoe* (1812) and *Sylla* (1822); and in 1815 he was chosen a member of the Academy. But his sketches attracted most attention: *L'Hercule de la Chaussée d'Antin* (4 vols., 1812-14), *L'Hermite en Province* (14 vols., 1818-27), *Les Hermites en Prison* (2 vols., 1823), and *Les Hermites en Liberté* (1824). They were written in a liberal spirit, and brought him for a short time to prison, a fact which increased his popularity. Louis Philippe made him librarian at the Louvre. D. Sept. 4, 1846.

**Jovellanos, de** (GASPAR MELCHOR), b. at Gijon, Spain, Jan. 5, 1744, of noble parentage; studied at the universities of Oviedo and Alcalá, and became distinguished for his researches in natural, moral, and political science. After acting for some years as a magistrate at Seville, Jovellanos was successively appointed to several high posts at court, until his friendship for Cabarrus incurred for him the enmity of Godoy, resulting in his banishment from Madrid under pretext of a commission to explore the mineral resources of the province of Asturias. He had previously written for the stage a comedy, *El Delincuente Honrado*, and a tragedy, *Pelayo*, both of which were successful and made him prominent as an author, and had published an important work on the agricultural condition and the property laws of Spain. In 1797 he was for a short time minister of justice, but, again incurring the displeasure of Godoy, was imprisoned in Majorca for eight years (1801-08), only recovering his liberty in consequence of the French invasion of Spain. He became one of the leading members of the central junta which organized resistance against the French, and of the regency, exercised immense influence by his writings for the same purpose, and d. at Vega Nov. 11, 1811.

**Jovianus** (FLAVIUS CLAUDIUS), a Roman emperor, son of Varronianus, a distinguished general. Jovianus was captain of the life-guards of the emperor Julian in the Persian campaign, in which the latter was killed (June 26, A. D. 363), and was proclaimed as his successor the following day by the choice of the generals. He declared himself a Christian, and extricated himself from a position of great peril in the midst of a hostile country by surrendering to the Persian king Sapor all the provinces beyond the Tigris. During his slow retreat towards Constantinople, Jovianus promulgated edicts re-establishing Christianity as the dominant religion, but protecting the pagans. He restored Athanasius to the see of Alexandria, abandoned Nisibis to the Persians, and admitted his infant son Varronianus as a colleague in the imperial rank. During his journey he was found dead in his bed at Dadastana, a small village in Galatia, Feb. 17, 364. Whether he was the victim of poison or of accidental suffocation by the fumes of charcoal is disputed. His successor was Valentinianus I.

**Jowett** (BENJAMIN), D. D., b. at Camberwell, England, in 1817; was educated at Oxford, where he became a fellow in 1838, while still an undergraduate; tutor in 1842, and regius professor of Greek in 1855. He was ordained in 1842; became in 1849, and again in 1853, examiner of classical schools, and in 1854 a member of the commission on examinations for the Indian civil service, along with Macaulay and Lord Ashburton. Their elaborate report, published in 1855, was written by him. In the same year Prof. Jowett published a commentary on Paul's Epistles to the Thessalonians, Galatians, and Romans, and in 1860 he contributed to the *Essays and Reviews* an article *On the Interpretation of Scripture*, for which he was tried and acquitted before the chancellor's court of the University of Oxford on a charge of heresy. His most important work is *The Dialogues of Plato translated into English, with Analyses and Introductions* (4 vols., 1871). Prof. Jowett became master of Balliol College in 1870.

**Jowf**, or **Djowf**, province of Jebel Shomer, Arabia, is situated between lat. 29° and 30° N. and lon. 39° and 41° E., and forms a deep depression in the surrounding desert. It is irrigated by running streams, very fertile, and has a temperate climate. The date-palm is largely cultivated, also several kinds of cereals and leguminous plants, and all sorts of fine fruit, especially peaches, figs, grapes, and melons. The whole oasis is about 70 miles long and 10 to 12 miles broad, and is inhabited by about 40,000 souls, belonging to the finest Arabian type, and exhibiting all the best characteristics of the race. The principal towns are Jowf and Sekakah.

**Joy**, post-v. of Solus tp., Wayne co., N. Y. Pop. 122.

**Joy** (CHARLES A.), Ph. D., b. Oct. 8, 1823, at Ludlowville, Tompkins co., N. Y.; graduated at Union College 1844; received the degree of LL.B. at Harvard University Law School 1847; appointed in 1847 on the first government survey of the copper-region of Lake Superior; attended the University of Berlin 1849; received the degree of Ph. D. at Göttingen 1852; attended lectures at the Sorbonne, Paris, 1853; appointed same year professor of chemistry in Union College, and in 1857 to the same chair in Columbia College, New York City, where he still remains. His principal contributions to chemistry have been analyses of minerals and meteoric iron, researches into the compounds of glucinum, and papers on the combination of alcohol radicals with selenium. He has contributed largely to scientific journals and newspapers, having been for two years an editor of the *Scientific American* and *Journal of Applied Chemistry*, and the editor of all chemical articles in *Appleton's New American Cyclopedia*. Has been president of the Lyceum of Natural History of New York City, president of the American Photographic Society, and chairman of the Polytechnic Association of the American Institute.

**Joy** (JAMES F.), b. in Durham, N. H., in 1810; graduated at Dartmouth College in 1833; moved to Detroit, Mich., in 1836; was an industrious and very successful lawyer; organized the Chicago Burlington and Quincy R. R. about 1850; became president of the Michigan Central and its connections in 1866. He organized the company which constructed the St. Mary's Falls ship-canal, and has been a very energetic railroad builder and manager in the Western States. W. S. GEORGE.

**Joyfield**, post-tp. of Benzie co., Mich. Pop. 130.

**Joynes'town**, tp. of Wilson co., N. C. Pop. 1271.

**Ju'ab**, county of Central Utah. Area, about 650 square miles. It is in part mountainous. It is partly in the Salt Lake Valley and partly in the Sevier Basin. Lignite coal of excellent quality is found. Cap. Salt Creek. Pop. 2034.

**Juan Fernan'dez**, or **Mas-a-Tierra**, an island in the Pacific Ocean, in lat. 33° 37' S. and lon. 78° 55' W., 400 miles off the coast of Chili, to which it belongs. It is 18 miles long, 6 miles broad, mountainous, with steep shores, but fertile, producing sandal-wood and other sorts of timber, figs, grapes, and many different kinds of fruit. It is inhabited by a few settlers from the U. S. and Tahiti. The story of Alexander Selkirk, a Scotch sailor who was at his own desire put ashore on this island, and lived there four years in solitude, is supposed to have suggested the idea of De Foe's tale of *Robinson Crusoe*. The island upon which De Foe places his hero is off the coast of Venezuela, near the mouth of the Orinoco.

**Juan' y Santacil'ia** (JORGE), b. at Nobelda, Spain, Jan. 5, 1713; studied at Malta and at the marine college of Cadiz, distinguishing himself in mathematics and astronomy; in 1733 commanded a small exploring vessel sent to the coast of America, and in 1734 was associated with Don Antonio Ulloa in the command of a scientific corps sent to South America to measure a degree of the

meridian at the equator in order to determine the true size and figure of the earth. The French academicians La Condamine and Bouguer participated in the expedition, which was completely successful. Juan and Ulla remained in Peru several years, and accumulated a vast store of observations in geography and physics, which they published in 1718 in 5 folio vols. The work has since been a standard one upon that portion of America. Juan wrote other works on nautical science; was an efficient officer of the Spanish navy, in which he attained the rank of vice-admiral; was elected a member of the chief scientific corporations of Europe, and d. at Madrid June 21, 1773.

**Juarez** (BENITO PABLO), b. of pure Indian parentage at Ixtlahuaca, Oaxaca, Mex., Mar. 21, 1806. Left an orphan at the age of three years, he received no early instruction, and spoke only the Zapotecan language until his twelfth year, when, taking refuge in Oaxaca from ill-treatment by his guardian, he had found favor with a Franciscan lay brother, who taught him to read and write, and afterward placed him for several years at an ecclesiastical seminary, where he studied Latin, with a view to the priesthood. But there had been founded meanwhile at Oaxaca an Institute of Arts and Sciences, which Juarez was attracted to enter in 1827. Taking the degree of bachelor of laws, he also became the professor of physics of the school, and in 1834 was licensed to practise law. Having espoused liberalism, he had previously (1831) been elected a member of the city council of Oaxaca, and a deputy (1832) to the state legislature. Charged with revolutionary affiliations, he was imprisoned for some months in 1836, but in 1842 was appointed a judge of the civil court of Oaxaca. When his party triumphed, Juarez in 1845 became secretary to the governor, but soon exchanged the place for that of fiscal (attorney-general) of the superior court, as the governor's views did not square with his own more advanced ideas. In Aug., 1846, Oaxaca resuming its sovereignty, the legislature delegated the executive powers to a triumvirate, of which Juarez was the most relied on. But his party having also gained possession of political power at Mexico, he was soon elected a deputy to the federal congress called to reorganize the government under the constitution of 1824, and to provide ways and means for the war with the U. S. He earnestly supported the measure of Gomez Farias to raise \$14,000,000 by sale or loan upon the Church property, which, though carried, was successfully set aside by the aid of Santa Anna. Oaxaca again in revolt, Juarez became governor for several years, making reputation throughout Mexico for administrative capacity. By another turn of the wheel of revolution Santa Anna rose again to power, and Juarez was arrested, imprisoned for a time, and banished. From New Orleans, however, he soon found his way by Panama to Gen. Alvarez, then in revolt at Acapulco; and when Alvarez was proclaimed President (Oct., 1855), Juarez was appointed minister of justice and ecclesiastical affairs. His sweeping measures of reform did not suit Gen. Comonfort, the ruling spirit of the cabinet, to whom the aged Alvarez soon yielded his office; therefore Juarez preferred to return to Oaxaca as governor once more. Again distinguished for executive ability, by his influence the democratic principle was greatly developed in the state, including the direct election of governor by the people, and in 1857 he was the first governor thus chosen. But at the same general election he was also elected president elect, justice of the federal supreme court, and in Nov., 1857, was appointed minister of government. His presence in that cabinet led congress to invest Comonfort with extraordinary powers, which were speedily abused by the President's complicity with the conspiracy of Zuloaga. Again Juarez was imprisoned, but as Comonfort's intrigues fell through, he had the grace to release Juarez before quitting the capital, and the latter retired at once to Oaxaca, whence he was soon summoned to Guanajuato to head the movement of the states against the military party, and under the constitution, as president judge, was proclaimed President Jan., 1858. For lack of resources he had to retire to Guadaluajara. There the garrison was divided: Lieut.-col. Landa, with a party of his battalion, pronouncing for reaction, seized and imprisoned Juarez and his cabinet in the palace, menacing them with death—a threat not executed, simply because of the energy with which another field officer rallied a small force of regulars, the national guards, and people, invested their prison, and forced their captors to surrender them. Meanwhile the liberal army under Gens. Parrodi and Degollado, defeated at Salamanca, had fallen back upon Guadaluajara, and Parrodi was made minister of war and general-in-chief. Juarez then retired with the government to Colima, leaving Parrodi to defend Guadalajara, where he soon capitulated. Replacing him by Degollado, Juarez now determined to take position at Vera Cruz, which he reached (May 4, 1858) by way of Manzanillo, Panama, and

Havana at an extremely critical juncture, when, with commerce virtually at an end, the whole interior was dominated by his adversaries. But Juarez never lost heart. Ably assisted by some resolute partisans in the field, he published (June, 1859) plans for reform which gave such strength to liberalism in the country that the conservatives invoked foreign aid (France, England, and Spain), upon the basis of a government which should secure reform with conservative rule; and to this scheme they secured the assent of Degollado, whose army, however, repudiated his course. Juarez, resolutely refusing to countenance European intervention, called a general election for President and deputies to congress. Then came the successful battle (Dec. 22, 1860), near Mexico, of Calpulalpan, and immediate entrance of the liberal army into that city, from which Miramon narrowly escaped at night. Juarez, following thither (Jan. 11, 1861), re-established his government, and at an election held in March was chosen President of the republic. Fifty-one deputies in Congress, however, demanded his resignation in favor of Gonzales Ortega, who had been chosen chief-justice (May). But, supported by the state legislatures, the governors, and a majority of the press, Juarez continued in the executive office. At his suggestion, congress having (July 17) suspended payment for two years of all (including exterior) public obligations, a pretext was given for the tripartite alliance, under which an Anglo-French-Spanish force was landed (Dec. 8, 1861) at Vera Cruz. Weakened by more than forty years of civil war and an impoverished exchequer, with aught less than his supreme faith and constancy of purpose, Juarez must have succumbed. But the fortunate early withdrawal of the English and Spanish forces encouraged the states to the most resolute resistance to the French, who were repulsed (May 5, 1862) in their first attempt upon Puebla. With the rich, the clergy, and the remains of the old army in sympathy with intervention, however, Puebla was taken in May, 1863, and in June the French entered Mexico. Retiring to San Luis Potosi, Juarez found himself deserted by many who had hitherto stood steadfast; he therefore proceeded to Saltillo, there to learn that Vidaurri, governor of Nuevo Leon and Coahuila, had already gone over to the French. Deposing him, with the aid of the people he soon forced him to seek refuge in Mexico. But a hostile force under Gen. Quiroga afterwards made him retire to Chihuahua, where the people gave a cordial welcome, and he organized an army under Gens. Ortega and Patoni, which, being poorly equipped and unskillfully commanded, was soon beaten. With other forces, raised in that quarter and Durango, however, Negrete, now minister of war and general-in-chief, recovering Saltillo, Monterey, and Parras (spring of 1865), an unsuccessful effort was made to recover Matamoros, which was soon followed by a counter-French invasion of Coahuila, Nuevo Leon, and even Chihuahua, before which Juarez was forced (Aug., 1865) to recede to the very border at Paso del Norte. It was now that Gen. Ortega, chief-justice of Mexico, claimed that Juarez's term of office having expired, the executive power constitutionally lapsed to him. Juarez, however, determined to hold over until there could be a general election, but for the next year had to remain near the northern frontier of Mexico, exercising little actual influence upon the struggle maintained in the interior by military chiefs with Maximilian and the French. In Jan., 1867, as the French were preparing to quit Mexico, he penetrated to Zacatecas, but after a narrow escape from capture by Miramon, had to retire. But Escobedo, apparently the soul of the military resistance to Maximilian, attacked Miramon in turn, and routed him in several actions (decisively at San Jacinto), and Juarez followed to San Luis Potosi, to hear there of the capture of Maximilian at Queretaro (May 17, 1867), soon after which he repaired to the capital. Maximilian, Miramon, and Mejia were shot, after a protracted trial by court-martial, June 19, 1867, notwithstanding all the efforts of their able counsel, the friendly intervention of the U. S. government, and the appeals of many personal friends of Juarez. A general election was held, and congress meeting Aug., 1867, declared his re-election to the Presidency. He set about the establishment of the government, but was encountered by violent opposition from ambitious or dissatisfied chieftains of his own party, who excited many insurrections, and during this whole term of office (1867-71) he was able to retain power merely because of the utter lack of harmony and concert among his military opponents. With characteristic inflexibility of purpose he pursued his object of consolidating the institutions resulting from the "war of reform," indifferent alike to flattery and to menace. One of the events of his administration was the triumphal procession made by ex-Secretary Seward through Mexico in 1869. At the general election of 1871, again a candidate, he had a plurality, not an absolute majority, of votes, but was elected by congress. The result was the revolution headed by Gen.



Díaz and Trevino, by whose successes the central power seemed more than once tottering to its fall. The tide was turned in favor of Juárez by the victory of Gen. Rocha at Zacatecas (Mar. 2), but the northern states were still unsubdued when he died of apoplexy, July 18, 1872. Personally, Juárez was taciturn, self-reliant, and hopeful, but unexcitable, confident in his own resources and of the ultimate triumph of his plans. Unquestionably, however, the downfall of Maximilian was due to the opposition made by military leaders remote from Juárez, and to the immense moral force of the position of the U. S. government at the time, rather than to the positive influence of the Indian statesman upon affairs.

THOMAS JORDAN.

**Juarros** (DOMINGO), b. in Guatemala about the middle of the eighteenth century, was an ecclesiastic, who is known only as the author of a learned historical work upon Central America, which is one of the chief sources of information upon the subject—*Compendio de la Historia de la Ciudad de Guatemala*, etc. (2 vols., 1809-18). He is said to have died about 1820.

**Ju'ba**, king of Numidia, succeeded his father Hiempsal after 62 B. C. The tribune Curio having proposed to make Numidia a Roman province, Pompey opposed the plan, and thus secured the good-will of Juba. In 49 B. C., Juba defeated and killed Curio on the Bagradas, took part in the African war against Caesar (47), and after the battle of Thapsus took his own life (Feb. 4, 46 B. C.).—His son, JUBA, greeted Caesar's triumph at Rome, 46 B. C.; was well educated, and became the friend of Augustus, who gave him in marriage a daughter of Antony and Cleopatra, and restored him to his kingdom 50 B. C. In 25 he exchanged Numidia for Mauritania, and the former became a Roman province. Mauritania under his tranquil sway, supported by the Roman arms, rose to great prosperity. He wrote grammatical works, histories of Africa, Arabia, and Rome, treatises on painting and the theatre, on certain plants, etc. Fragments of his works are extant, but only as citations in other writers, collected in Müller's *Fragm. Hist. Græc.* (iii. 455-484). His death is placed about A. D. 18.

**Ju'bilee** [Heb. *yobel*, a "glad sound"; Lat. *jubilō*, to "rejoice"], among the ancient Hebrews in Palestine, the fiftieth year, the year succeeding every seventh sabbatical year. During this year all lands lay fallow, all Hebrew slaves were set at liberty, and all lands reverted to the heirs of the original owners, to whom the lands had been parcelled out in Joshua's time. In the Roman Catholic Church, Boniface VIII. in 1300 established a jubilee to be held once a century; Clement VI. (1350) ordered it to be held once in fifty years; Urban VI. (in 1389), once in thirty-five years; Sixtus IV. (in 1475) fixed the interval at twenty-five years.

**Jubilee**, tp. of Peoria co., Ill. Pop. 837.

**Jubilees**, **Book of**, an important pseudepigraphical book, originally written in Hebrew, probably before (but not very long before) the birth of Christ. It was translated at an early date into Greek, was prized by the early Christian Church, but both Hebrew and Greek texts were lost (except fragments of each) before the thirteenth century. In 1844, Dr. Krapf discovered in Abyssinia an Ethiopic version from the Greek. Of this Dillmann published a German translation (1849-51) and the Ethiopic text (1859). This book is regarded as canonical by the Abyssinian Church. It pretends to be a revelation made to Moses. It is named from the fact that it treats of biblical history in *jubilees*, or periods of fifty years. The unknown author's design was to furnish a commentary upon Genesis and Exodus. He has borrowed freely from the Hagadah. The critical value of the work is very considerable. It may be regarded as a part of the Hagadah.

**Ju'da**, post-v. of Green co., Wis., on the Monroe branch of the Milwaukee and St. Paul R. R.

**Juda'ra**, or **Judea**, was first used in ancient geography as the name of the kingdom of Judah, in contradistinction to the kingdom of Israel, but after the return from the Captivity, and up to the times of the Romans, it denoted the whole of Palestine. The Romans used it partly in a general sense, signifying the land of the Jews; thus, Herod was styled king of Judæa, though he ruled over countries not belonging to Palestine; partly in a restricted sense, denoting the southernmost province of Palestine, bounded N. by Samaria, E. by the Jordan and the Dead Sea, S. by Idumea, and W. by the Mediterranean.

**Ju'dah** (Heb. *Yehudah*, "celebrated"), one of the twelve patriarchs, the fourth son of Jacob by Leah, b. at Haran (Padan-Aram) in Syria, about B. C. 1916; was esteemed the progenitor of the tribe of the same name, which became so predominant in Palestine as to give its name to the kingdom of Judæa, and ultimately to the whole race of the descendants of Abraham (Jews). Judah appears to

have exercised a kind of leadership among his brothers; it was he who persuaded them not to kill Joseph, but to sell him to the Midianites, and on the journey to Egypt to buy corn it was Judah who acted as spokesman for the whole company. As such, he offered himself to Joseph as a slave to ransom his half-brother Benjamin. He had married a Canaanite woman, and left three sons, Shelah, Pharez, and Zerah, from the second of whom David, and ultimately Christ, were descended. Of the life of Judah in Egypt nothing is known except that he was still living at the time of his father's death, and received that splendid blessing (Gen. xlix. 8-12) which foretold the glory of his lineage.

**Judah ben Samuel**, called HA LEVI, or "The Levite," and known among Arabic writers as ABUL HASSAN, b. in Castile about 1080, was one of the most distinguished mediæval Hebrew writers. He excelled as a physician, a theologian, and a poet, his Hebrew sacred songs having been several times translated into German within the present century. His principal work, however, was in Arabic, *Kuzari*, being discourses on religion between a king of the Khazars, a race of the Crimea, and a Jewish rabbi. It was translated into Hebrew, Latin (by Buxtorf), Spanish, and German. Rabbi Judah made a pilgrimage to Jerusalem, and, according to tradition, was assassinated by a Mohammedan in the Holy Land about 1140.

**Judah** (HENRY MOSES), b. at Snow Hill, Md., June 12, 1821; graduated at West Point in 1843, served in the Mexican war, and for nine years in Indian campaigns on the Pacific coast; was appointed colonel of volunteers in 1861, brigadier-general in 1862, and inspector-general of Gen. Halleck's army of the Tennessee; was actively engaged in pursuit of Morgan during his raid into Ohio and Indiana, and commanded a division under Gen. W. T. Sherman in the Atlanta campaign. D. at Plattsburg, N. Y., Jan. 14, 1866.

**Ju'das Iscar'iot** [Gr. *Ἰσκαριώτης*], one of the twelve apostles, and the betrayer of his Master, was a son of Simon, who is by some supposed to be Simon Zelotes, or the Canaanite, who was also an apostle. The surname Iscariot has given rise to many interpretations, but the most usual is "man of Kerioth," a village in Judæa. He was the treasurer of the apostles, participated with the others in the mission to preach the gospel and in receiving power to work miracles, was a witness of the whole career of Jesus up to the Last Supper, in which he took part, and betrayed Christ to the chief priests for thirty pieces of silver, with which he purchased a field, but shortly after hanged himself in remorse for his crime. Opinions have differed for centuries as to the precise nature and motives of the crime of Judas. It is evident that it could not have consisted simply in identifying the person of his Master, which was well known in Jerusalem; the better opinion seems to be that he revealed, or perhaps falsified, some portion of the teachings of Jesus intended only for the immediate circle of the disciples, but which enabled the chief priests, with the aid of hired witnesses, to fasten upon him the charge of blasphemy. As to his motives, the plain inference from the language of the Gospels and the Acts seems to be that he was actuated by avarice, jealousy, and perhaps disappointed ambition. Yet there have not been wanting theologians who have attempted some defence of, or at least apology for, his conduct. An early Christian sect, the Cainites, remarkable for the Antinomian inversions of Scripture which led them to worship Cain and the Serpent, while refusing to worship the Jehovah of the Old Testament, honored Judas as the only true apostle, alleging that he alone perceived the necessity of taking steps for the fulfilment of prophecy and the salvation of mankind by the death of the Messiah. Modern apologists, without going to this extreme, argue that Judas's object was to place his Master in such a conflict with the authorities as would lead him to exert his miraculous powers and establish the "kingdom of the Messiah," in which he of course looked for personal advancement, in accordance with the promise that the apostles should "sit on twelve thrones, judging the twelve tribes of Judah." It is even alleged that by virtue of name and descent (being the only apostle not a Galilean), as well as in reward of his political sagacity, he expected a kind of premiership as judge over the royal tribe of Judah. On this theory his remorse and suicide simply imply that the result of his action, so contrary to his expectations, first opened his eyes to the enormity of his offence. Archbishop Whately has presented a view similar to this in one of his *Essays on some of the Dangers to Christian Faith* (1839). But it must be admitted that this view is difficult to reconcile with the text of the biblical narrative. One of the numerous apocryphal writings of the second century was a "Gospel of Judas," which the Cainites adduced in support of their opinions.

**Judas Maccabæus.** See MACCABEES.

**Judas Tree.** of Europe and Asia, is the *Cercis Siliquastrum*, a small tree of the order Leguminosæ, having rose-colored flowers and handsome wood used in joinery. There was anciently a dispute as to whether Judas hanged himself on this or on the elder tree. The Judas tree or red bud of the U. S. *Cercis Canadensis*, resembles the above, but has pointed while the other has round leaves. Its abundant flowers, of a peach-blossom color, are very beautiful in spring. The wood is soft and brittle, but handsome.

**Judd** G. P., M. D., b. Apr. 23, 1803, at Paris, Oneida co., N. Y.; studied medicine, and went in 1828 to Honolulu as physician in the service of the American foreign mission. In 1842 he dissolved his connection with the mission, and became interpreter to the government of Kanehameha III. In 1843 he organized the first ministry which had ever been formed in the state, and he held himself the office as minister of finance, which he filled with great prudence and sagacity till his death, July 12, 1873.

**Judd** NORMAN B., b. at Rome, N. Y., Jan. 10, 1815; was admitted to the bar in 1836, and engaged in successful practice of law in Chicago; was a prominent politician of Illinois, in which State he held many important public offices. He was U. S. minister to Prussia 1861-65, member of Congress 1867-71, and became a railroad president. D. at Chicago, Ill., Nov. 11, 1878.

**Judd** ORASIEL, b. near Niagara Falls, N. Y., July 26, 1822; graduated at the Wesleyan University, Middletown, Conn., in 1847; was for some years successfully engaged as a teacher and lecturer; studied chemistry 1850-53 at Yale; became in 1853 editor of the *American Agriculturist*, which under his supervision has become one of the leading agricultural journals of the U. S. In 1866 he became sole proprietor of the same, and engaged in the publication of books. In 1869 the firm-name was changed to Orange Judd & Co. Mr. Judd has also been a railroad president, and was 1855-63 agricultural editor of the *New York Times*. He was the compiler of the first *Alumni Record* of his alma mater (1868 seq.), and for a time was publisher of the *Health and Home*, a periodical. He has been a liberal benefactor of the Wesleyan University.

**Judd** SYLVESTER, b. in Westhampton, Mass., July 23, 1813; graduated at Yale in 1836; studied at the Cambridge Divinity School, Mass., and was 1840-53 pastor of a Unitarian church in Augusta, Me., where he d. Jan. 20, 1853. He is best known by his powerful romance *Margaret* (1851), one of the most noteworthy works of fiction ever written in the U. S. His *Philo*, a poem (1850), *Richard Edney*, a romance (1850), and a volume of discourses on *The Church* (1854), all illustrate the strong purposes of their author's life. He was a hearty opponent of war, capital punishment, intemperance, and slavery. He left a MS. drama, *The White Hall*. See his *Life*, by Mrs. A. Hall, 1854.

**Jude, or Judas**—with the surname THADDEUS or LEBANÆUS, one of the twelve apostles, but it is not agreed whether he is the same as Judas, the brother of the Lord, nor whether he is the author of the Epistle of Jude, one of the canonical books of the New Testament. Of his life nothing is known with certainty; different traditions mention different places in which he is said to have preached and died.

**Jude, The Epistle General of St.**, was written by Jude, Judah, called also Lebbaeus and Thaddeus, one of the twelve apostles. It is directed against heretics and false teachers. It is written in impassioned language, recalling that of St. Peter's second Epistle. Its date is quite uncertain. The authority of this Epistle was contested in the early times of the Christian Church, because it contains citations of apocryphal writings, and recent critics have doubted its genuineness. Most commentators, however, maintain that it was written by Judas Thaddeus, and that Judas Thaddeus was the brother of the Lord.

**Judge**, a public officer who is invested with authority to hear and determine litigated causes, and to administer justice between parties according to law. The term *judge* is sometimes employed to designate any officer or person who exercises a discretion of a judicial nature in the performance of his official duties, as a juror, an arbitrator, or a public inspector, but in ordinary legal and popular usage it bears the sense expressed by the above definition. The judges of the superior courts of England are rarely designated by this name, but receive particular titles according to the court in which they sit. Thus, the judges of the court of exchequer are styled barons, and the principal one is known as chief baron. The chief judge of the king's bench is called the lord chief justice of England, while the corresponding judge in the court of common pleas is styled the chief justice of the common pleas. The other judges of

these two courts are termed justices, as, e. g., Mr. Justice Blackstone. The highest equity judge is designated lord chancellor. In the U. S. it is usual to apply the epithet "judge" to all officials of this kind, in whatever court they may sit. But the highest judge among the Federal judiciary is known as the chief justice of the supreme court, as Chief Justice Marshall. The methods by which judges are chosen, their tenure of office, the rules of law relating to the payment of their salaries, the extent of their legal responsibility, etc. are fully considered in the article JUDICIARY (which see). It will only be necessary to refer here to one or two additional points. It is a maxim of the common law that "no one can be a judge in his own cause." Impartiality in the administration of justice requires necessarily that the judge should be an entirely disinterested party. This disqualification applies not only in regard to cases in which the judge is a party of record, but as well to causes in which he has some private or pecuniary interest. For instance, a judge who is a stockholder in a corporation cannot do any judicial act in a cause in which that corporation is a party. A judgment or decree rendered in a suit in which the judge was interested would be voidable without any proof that he had been prejudiced or misled by considerations of his own advantage. A judge cannot sit under such circumstances, even with the consent of all the parties. In some of the States statutes have been passed embodying this common-law prohibition, and extending the same principle to other analogous cases in which a judge's personal interest in a cause is likely to be aroused. Thus, in New York it is provided that no judge can sit as such in any cause in which he is a party, or in which he is interested, or in which he would be excluded from being a juror by reason of consanguinity or affinity to either of the parties; nor can any judge take part in the decision of any question which shall have been argued in the court when he was not present and sitting as a judge. Moreover, it is declared that no judge shall have any partner practising in his court, and that no judge shall have any voice in the decision of any cause in which he has been counsel or attorney. So no judge of an appellate court is to take part in deciding a cause determined by him in the court from which the appeal is taken. It is further provided that no judge shall act as a counsellor, solicitor, or attorney in the court of which he is a judge, except in those suits in which he shall be a party or in the subject-matter of which he shall be interested. There is also a law of Congress prohibiting any judge of the U. S. courts from engaging in the practice of the law. Any person violating this prohibition is declared to be guilty of a high misdemeanor.

In the trial of a cause it is the province and duty of the judge to decide upon the admissibility of evidence. If his rulings are deemed erroneous, objection may be made to them by counsel, and exceptions taken, upon which a motion for a new trial or an appeal may subsequently be based. The credibility of the testimony is to be determined by the jury. So the judge decides upon the competency of witnesses offered to be sworn. The interpretation and construction of written instruments is also, as a general rule, for the court, and not for the jury. A judge cannot be called as a witness to testify as to what took place before him in the trial of another cause, though he may testify to foreign and collateral matters which happened in his presence while the trial was pending or after it was ended. Moreover, the same person cannot be both witness and judge in a cause which is on trial before him, whether he sits alone or with associate judges. In some cases, however, when a witness who testified in a former trial has since died, the testimony which he then rendered may be proved in a subsequent suit by the judge's notes or minutes when both actions are tried before the same judge. (See EVIDENCE, COURT.) There are some forms of legal business which may be transacted only before a court acting as such, while others may take place out of court, and before an officer acting as a judge. A distinction is that drawn between a *court* and a *judge*, the latter word being used to indicate that business before the officer is transacted out of court. (See CHAMBERS.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Judge** COL. THOMAS J., a native of Alabama, entered public life in 1843 as a solicitor in a State circuit court, and afterwards became a prominent lawyer and Whig politician; in 1861 was commissioner from Alabama to the U. S. government, but was not received as such by Mr. Buchanan; served in the civil war as a private, then as colonel, of the 14th Alabama, and afterwards as judge of a military court 1862-65, was judge of the State Supreme court 1865-68, and practised law at Greenville, Ala., D. Mar. 4, 1879.

**Judge Advocate**, in the name is most frequently used in the U. S., designates the person—a military officer—save



in very exceptional cases) who prosecutes before a general court-martial or military commission in the name of the U. S. He is detailed by the authority which appoints the court. Some of his principal duties are to prepare the case for trial, summoning the necessary witnesses; to see that the accused has the opportunity to exercise his right of challenge; to administer to the members of the court, in the presence of the accused, the oath prescribed by the 84th Article of War; himself to take that prescribed by the 85th; to see that the charges are technically accurate; to arraign the prisoner; to administer the oath to witnesses, and to present the evidence for the prosecution; to consider himself counsel for the prisoner so far as to object to any leading questions, or to any question to the prisoner the answer to which might tend to criminate himself. Art. 90; to give legal advice to the court when called on; to keep an accurate record of the proceedings, and to forward the same, properly authenticated, to the convening authority. The judge advocate has power to compel witnesses to appear and testify, and he may employ a reporter to record the proceedings and testimony.

There is also, in the U. S. army, a corps of judge advocates reduced to four in number by act of Congress of June 23, 1874. They hold the rank of major, and are required by law to perform their duties under the direction of the judge advocate-general. They are, however, generally stationed at department head-quarters as legal advisers to the department commanders, but are subject to detail by him for court-martial duty.

In the English service the judge advocate has not, since 1829, performed the duties of prosecutor. These devolve upon a staff officer ordered to perform them, or upon the prisoner's commanding officer, or at minor courts-martial upon the adjutant. The principal duties of the judge advocate under the English system are those of the judge or assessor called in (*advocatus*) to advise the court, and that of the clerk or notary who takes down the proceedings in writing.

**Judge Advocate-General**, in the U. S. army an officer at the head of the bureau of military justice at Washington, with the rank of brigadier-general, whose duties, as defined by sec. 1199 of the Revised Statutes, are to receive, revise, and cause to be recorded the proceedings of all courts-martial, courts of inquiry, and military commissions, and such other duties as heretofore performed by that officer in the U. S. army. The office of judge advocate-general has existed in England since the days of the Stuarts. The Articles of War of James II. prescribed that in all criminal causes which concerned the Crown, His Majesty's advocate-general or judge advocate of the army should inform the court and prosecute on His Majesty's behalf. He is now the legal adviser to the Crown in all cases requiring the sovereign's action as confirming officer of the proceedings of general courts-martial. He exercises the power of a supreme court of review as regards the proceedings of inferior courts. He is the supreme legal authority for the army, except as to questions arising under martial law, with which he has nothing to do. He has the right to appoint deputies, and is responsible for them. He is conservator of the proceedings of military courts, other than those held under martial law, and he is a subordinate member of the administration, and quits office with it.

**Jud'ges, The Book of the**, a historical book of the Old Testament, the seventh in order of the canonical books. It derives its name from a class of rulers or chiefs who ruled in Israel during the period which its record covers. The twelve tribes after entering Canaan formed only a loose confederation, without unity or national feeling or dignity. They had no head. They were at the same time engaged in such wars as all conquerors must maintain with those whom they displace, and they were also harassed by foreign foes. In emergencies men (or women) of talent and energy took the lead, their only authority being their ability. They were regarded as "raised up" or divinely sent. The name given to them is the same which we meet with in the Phœnician, "suffetes." When one had gained authority by displaying ability in a crisis, he became a "judge" in our forensic use of the term. This time was not one to awaken the national pride out of which history is born, or to produce historical records. In some cases, as in that of Samson, the judge became a popular hero and the subject of song and poetry. Such records of this time as remained are collected in the book of Judges. They are fragmentary and imperfect, as is abundantly shown by the lack of chronology. The book is said, in the Talmud, to have been written by Samuel. He certainly was not the original author of any of the parts, and it is more than doubtful if he was the collector. Some writers refer the authorship to Ezra.

**Jud'gment**, in law, a determination by a court of the rights of the parties in an action. This term is usually applied to the decision rendered upon a question in litigation in a common-law action, while the corresponding term, "decree," is ordinarily employed to denote the decision given in a court of equity. Both names are, however, sometimes used indistinguishably. In those States where the distinctions between common-law and equitable procedure have been abolished, the term "judgment" is alone generally employed for every form of decision in a civil action. A judgment differs from an order or rule in being the result of an action, while an order or rule is obtained by an application to the court in the nature of a motion. Judgments at common law may be rendered at different stages in the progress of the cause, and are hence distinguished as interlocutory or final. Interlocutory, in legal usage, means intermediate, and judgments of this kind are those which are rendered before the termination of the action upon some issue or litigated point distinct from the principal issue, but collateral or incidental to it, and which therefore do not wholly determine or complete the suit. Of this nature are judgments for the plaintiff given upon pleas in abatement, for they require the defendant merely to "answer over"—i. e. to furnish a better plea or answer, free from certain specified objections, and further proceedings are necessary before the final determination of the cause. (See ABATEMENT.) But, as Blackstone says, the interlocutory judgments most usually spoken of are those incomplete judgments whereby the right of the plaintiff is established by a decision upon the entire cause, and not merely upon some collateral point, but the amount of damages to be awarded is not ascertained. The damages payable are subsequently determined by a special jury of twelve men summoned and presided over by the sheriff, and therefore termed a "sheriff's jury." This process is known as a "writ of inquiry," and is necessarily resorted to because these interlocutory judgments are rendered without the intervention of a jury. Examples of such judgments will be given hereafter. A final judgment is one rendered upon the principal issue or entire cause, which determines finally and completely the rights of the parties engaged in the action, as where judgment is entered upon the verdict of a jury, awarding a certain amount of damages to the plaintiff or discharging the defendant. Judgments at common law, whether interlocutory or final, are of different forms, according to the nature of the action, the plea, the issue, and the manner and result of the decision. Thus, there may be a judgment upon demurrer, either sustaining or overruling the demurrer (see DEMURRER); or a judgment by *ad locum* ("he says nothing"), which is given against a defendant for a failure to plead or continue his pleading until issue is joined; or a judgment by confession, which is given against a defendant when he acknowledges the justice of the plaintiff's claim and agrees to comply with his demand, as by restoring certain property or by paying a certain debt, etc. If any of these various forms of judgment be given for the plaintiff, and the action be brought for unliquidated (or unascertained) damages, the judgment is interlocutory, since the cause has not been referred to a jury, and a writ of inquiry is necessary. If the action be brought for a specific sum of money which is due, as a particular debt, or for the recovery of certain chattels, the judgment is final, since there is no need of ascertaining damages, and the extent of the plaintiff's recovery is determined exactly and completely. Particular forms of judgment at common law against the plaintiff are the judgment of *non prosequitur* ("he does not prosecute"), which is rendered against him for a failure to plead; the judgment of *nolle prosequi* ("unwilling to prosecute"), given when he avers that "he will not further prosecute his suit"; the judgment of nonsuit, which is rendered when he abandons his cause or fails to make out a *prima facie* case against the defendant. Judgments rendered in favor of a defendant are always final. Judgments entered upon the verdict of a jury are also final, since the jury, at the same time when they try the issue, also assess the damages. A judgment rendered in favor of the plaintiff, except upon a dilatory plea (see PLEADING), is in the form *quod recuperet* ("that he do recover") certain chattels, or a certain debt, or the amount of his damages. A judgment for the defendant (with the same exception) is, in general, in the form *nil capiat* ("that the plaintiff take nothing"). In those States where the common-law practice has been abolished by codes of procedure, these various forms of judgment no longer exist, but forms analogous to the most important of them have still been retained, as, e. g., judgment upon confession, upon default, or by way of nonsuit. There are no interlocutory judgments in these States, but only final judgments. Orders take the place of interlocutory judgments. Judgments were formerly pronounced in open court, and are still always supposed to be so, but the regular common-

law practice has been for a long period for the party entitled to judgment to obtain the signature or allowance of the proper officer of the court, expressing generally that judgment is given in his favor. This is called "signing judgment," and stands in place of its actual delivery by the judges themselves. The judgment is afterwards entered on record. In some cases, when a verdict has been rendered by a jury, judgment is entered in opposition to it. This is called a judgment *non obstante veredicto*, "notwithstanding the verdict," and may be obtained by the plaintiff upon motion, when it appears that the defendant, for whom the verdict was given, pleaded in confession and avoidance, and the avoidance is bad in law, though sustained by the jury in point of fact. The confession is therefore left unqualified, and entitles the plaintiff to judgment. After judgment has been entered, proceedings may be instituted in an appellate court for its reversal, if exceptions have been duly taken in the course of the trial, by an appeal or writ of error. (See APPEAL.) If this be not done, and the judgment be for the payment of money or the recovery of specific real or personal property, it will be carried into effect by execution. (See EXECUTION.)

A final judgment requiring the performance of a specific act or the payment of a specific sum of money is a peculiar species of contract, termed a contract of record. (See CONTRACT.) If the judgment be not satisfied or discharged, it may itself be made the foundation of a subsequent action in the same way as a claim upon simple contract. It is, however, sometimes provided by statute that the leave of the court in which the judgment was rendered, must be obtained before action can be brought upon it between the same parties; and the provisions of statutes of limitation applying to contracts of record usually specify the same limit of time within which actions upon such contracts must be brought as with reference to contracts under seal, such as bonds. This period is generally twenty years as regards the judgments of the higher courts. In some States, however, domestic judgments are not barred by the statute. Such is the case in England, but actions upon them are not favored there. It is a peculiarity of a contract of record that if it be disputed, its existence must be tried by inspection of the record, and not by a jury. In order that a judgment may be valid, it must be rendered by a competent court, having jurisdiction of the particular cause of action and of the person of the defendant. It matters not what the general powers and jurisdiction of a court may be, if it act without authority in the particular instance, its judgments and orders are regarded as nullities, and all persons concerned in executing them are considered in law as trespassers. They are not voidable, but entirely void, and form no bar to a recovery sought (even prior to a reversal) in opposition to them. The jurisdiction of any court exceeding authority over a subject may be inquired into in every court where the proceedings of the former are relied on, and brought before the latter by the party claiming the benefit of such proceedings. There is, however, a difference between courts of general and those of limited jurisdiction—that the jurisdiction of the former is presumed, while that of the latter must be proved. But the presumption in the former case is not conclusive, but open to rebuttal. But where a court has acquired jurisdiction of a cause of action, it has authority to render judgment, and if error be committed, or the judgment be fraudulently obtained, or the proper and legal forms of procedure be disregarded, the judgment is voidable, and not void, and will be binding until vacated on motion to the proper court or reversed on appeal. A judgment rendered by a competent court, and not reversed, operates to extinguish the original cause of action, in accordance with the doctrine of merger (see MERGER), and is absolutely binding upon the parties to the action and all who represent them, determining their mutual rights and obligations, upon the principle of estoppel. A cause once decided is said to be *res adjudicata* ("a matter adjudicated or determined"), and cannot therefore be again made a subject of litigation. (This point is considered more fully under the topics ESTOPPEL and EVIDENCE. The rules as to estoppel in relation to FOREIGN JUDGMENTS are stated under that head.)

Judgments requiring in whole or in part the payment of money by a debtor are generally at the present day made to constitute a lien upon the debtor's lands by the force of express statutes, which prescribe certain penalties which must be complied with in order that the lien may attach and be enforced. As this subject is wholly statutory, the provisions in different States must be sought in their various statute-books. In New York the judgment must be docketed, i. e., registered in a particular book by the county clerk, known as the "docket-book," and it then becomes a lien upon all the debtor's real property situated within that county, and upon all that he may acquire within ten

years from the time of docketing. A transcript of the judgment may be filed in the clerk's offices of other counties where the debtor has lands, and it will then become a lien on these lands also. Judgments obtained by several creditors take effect according to the time of docketing. The lien may be extinguished by a payment of the amount of the judgment. After the debtor's personal property has been exhausted to satisfy the execution, if the judgment remains unsatisfied, his lands may be sold by the sheriff at any time while the lien continues, in accordance with certain prescribed forms. (See LIEN.)

An interesting question has come before the courts for adjudication as to the effect of a judgment for the plaintiff in actions of trespass or trover for the conversion of chattels, in transferring the property in the goods to the defendant. Some decisions have held that the mere rendering of the judgment has this effect, but the generally prevalent doctrine now is that the property does not pass until the judgment is satisfied.

The difference between judgments *in rem* and judgments *in personam* is stated under the topic IS REM. Only domestic judgments have been considered in this article, and the distinctions between these and foreign judgments will be found under the title FOREIGN JUDGMENT.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Judicial Committee of the Privy Council.**  
See COURTS, I. 3, 4, 6.

**Judiciary**, that branch of government or collective body of public officials which is invested with the power of hearing and determining litigated causes, of administering justice, and of interpreting and enforcing the laws. In all civilized countries the importance of securing an able, upright, and impartial judiciary, composed of men learned in the law, faithful and disinterested in the performance of duty, and under no subservience to governmental authority by which their decisions may be controlled or influenced, has been recognized; and for the attainment of these ends the judicial department of the government has been separated from the executive and legislative departments, each having mainly, if not entirely, exclusive powers and functions, and its mode of organization, the tenure of office by the judges, the extent of their authority, and their legal responsibility have been, as a general rule, so defined and regulated that judicial independence and integrity may be effectually promoted. In an especial sense is this true of England and the U. S., where the attainment and continued maintenance of civil and political liberty, in which these nations have made the greatest progress, have been recognized as depending fundamentally upon the just administration of the laws, of which the independence and unswerving rectitude of the judiciary alone afford a sufficient guaranty. "There is no liberty," says Montesquieu, "if the judiciary power be not separated from the legislative and executive. Were it joined with the legislative, the life and liberty of the subject would be exposed to arbitrary control, for the judge would then be the legislator. Were it joined to the executive power, the judge might behave with violence and oppression." (*Spirit of Laws*, bk. 11, ch. 6.) In England, as the liberty of the citizen increased, this division of power became more and more complete; and in the U. S., whose political system was, in large measure, a heritage from England, the judicial department of the Federal government was organized from the outset, in pursuance of provisions expressly embodied for this purpose in the U. S. Constitution, with entirely distinct powers from any other branch of the government. The judges cannot occupy any other official position—have no share in legislation or in the execution of the laws. Their functions are exclusively judicial, and are confined entirely to the exercise of the jurisdiction conferred upon the Federal courts by the Constitution or by the laws of Congress authorized by the Constitution. In the several States also similar exclusive functions are conferred upon the judiciary, though with a different extent of jurisdiction. The completeness of the separation between the judicial and the other branches of the government which has been effected in this country has not yet been attained in England. This diversity is attributable to the peculiar historical origin and development of the present system of English courts. In the early periods of Saxon and Norman rule, both legislative and judicial powers were vested in the same public body or assembly—under the Saxons, in the great council or parliament of the kingdom known as the *Witenagemote* (Sax., "meeting of wise men"), and under the Normans, in a similar assembly, the *Arch. Reges*, or the king's council." The judicial powers exercised by this national assembly were conferred upon the various courts as they were successively formed in later Norman reigns, while the council itself was gradually developed into the modern Parliament, whose powers are almost entirely legislative. But judicial prerogatives have never been wholly trans-



ferred from the legislature to the courts, and the highest appellate tribunal in the realm at the present day is the House of Lords, which is also the highest branch of Parliament. It has, however, been provided by a recent statute, known as the "Supreme Court of Judicature Act," which is to go into effect in Nov., 1875, that a new court shall be formed, to be designated "Her Majesty's Court of Appeal," in which the highest appellate jurisdiction shall be vested, and that no appeal shall afterwards be taken to the House of Lords except from judgments rendered prior to that time. The separation between the legislative and judicial departments will thus be made substantially complete, though it is true that some of the judges of this new court may be members of the House of Lords. The provisions of the judicature act are stated in the article *COURTS*. A union of judicial and administrative or political functions also prevails at present in a few other instances. Thus, the lord chancellor, who is the highest judicial officer in the kingdom, is also a member of the ministry in office for the time being, and loses his position by a change of ministry. He is the prolocutor (or Speaker) of the House of Lords, has the appointment of all justices of the peace throughout the kingdom, and exercises various other powers more distinctively political than judicial. The master of the rolls, also, who is a judge in equity, may be elected to represent a constituency in the House of Commons. But even in these exceptional instances the union of judicial with other diverse functions is but meagre in extent. The jurisdiction of the House of Lords, though in theory vested in the whole body of peers collectively, is in reality exercised by a small number of them, who are designated distinctively the "law lords." The administrative functions of the lord chancellor also appertain, in a large measure, to the performance of his judicial duties. As a result of the division of power among several branches of government, the judiciary occupy a distinct position, are entrusted with duties of a definite and uniform character, are removed to a great degree from political influences which might engender a partisan spirit, and the entire tendency of their official labors is to produce a habit of impartiality in the administration of justice and an especial capacity for judicial investigation.

Reference has already been made to the establishment of methods of court organization, and the defining and limitation of the functions and responsibility of the judiciary as a means of preserving their independence. The most important constitutional or legislative measures of this kind have reference to the methods of choosing judges, the nature and duration of their tenure of office, the payment of their salary, and their liability for judicial or extra-judicial acts. In England—and in the U. S. so far as relates to the Federal courts—judges receive their positions by appointment. In the former country the superior judges are all appointed by the Crown, while certain inferior magistrates are appointed by the lord chancellor or other high officials. In the latter, the Federal judges are appointed by the President "by and with the advice and consent of the Senate"—i. e. the Senate may confirm or reject his nominations. In the several States of the Union constitutional provisions of a similar nature were adopted at an early period, and it was declared in many of them that the appointment should be made by the governor, subject to the confirmation of the State senate, while in others power was given to the legislature to elect the judges. But within a comparatively recent period a large number of the States have made the judges elective officers, chosen directly by popular suffrage, in the same way as the members of the legislature or the governor. In Mississippi this change was made in 1833. But it was not till a similar example was set by New York, which adopted a constitution in 1846 providing for the election of judges, that any considerable number of States discarded their previous practice for a system of election. An elective judiciary is now said to exist in a majority of the States. The tenure of office of the English judiciary was anciently at the pleasure of the Crown, but in the time of Lord Coke (about 1600) it became customary to insert in the commissions of the common-law judges that they should hold office during good behavior. It lay, however, in the pleasure of the Crown to determine the form of the commissions until the Act of Settlement in the reign of William III. (1701), by which it was provided that the judiciary should retain their positions during good behavior, though they might still be removed on the address of both houses of Parliament. By an act passed in the reign of George III. (1781) they continue in office notwithstanding the demise of the Crown. These laws apply to all the superior judges, except the lord chancellor, and the tenure of office with this exception is practically for life. In the U. S. it is expressly declared in the Federal Constitution that "the judges both of the Supreme and inferior courts are to hold their office

during good behavior." But by a recent act of Congress any judge who has held his commission for at least ten years, and has reached the age of seventy, may resign, and his salary will be continued as a retiring pension during the remainder of his life. In most of the States the tenure of office was originally established as continuing during "life or good behavior," or until the attainment of a certain advanced age, as sixty or seventy years. In New York, for instance, Chancellor Kent was obliged to retire from office in 1823 on reaching the age of sixty, which was the constitutional limit. In those States, however, in which an elective judiciary has been established, the duration of the term of office is generally limited to a few years. Thus, in New York it was declared by the constitution of 1846 that the term of office of the principal judges should be eight years. In 1869, however, it was extended to fourteen years, with the qualification that the term should terminate when a judge reached the age of seventy. This fundamental change in the mode of selecting the judges and in the length of their terms of office which has taken place in so many of the States has given rise to no little controversy between the advocates of the old and those of the new system as to its effect in impairing, or tending to impair, the independence of the judiciary. The natural tendency of the system of appointment and a tenure of office during good behavior is manifestly to relieve the judiciary from all apprehension of losing their positions by failing to consult the interests or favor the wishes of the appointing power or by reason of any fluctuations of party politics. The faithful performance of duty, without regard to ulterior considerations of future advantage, is therefore more likely to be secured. Pre-eminent legal ability is more apt to be regarded than political services or party fealty as the chief qualification in a judge, and the responsibility of a bad appointment is readily fixed upon the appointing power, so that care and deliberation are likely to characterize the selection of the judiciary. The temptation to court popular applause and support, even by a sacrifice of judicial fairness and integrity, the influence of which would naturally be most powerful where an elective system prevailed, is much diminished when the judges feel no dependence upon the people for a continuance of their official position. On the other hand, the adoption of a system of election by so many of the States of this country is but a further extension of democratic principles upon which the structure of the government is founded, and it is mainly upon this ground that its advisability as a matter of public policy has been based. It is urged, moreover, that the uprightness and independence of the judges will be promoted by making them amenable to the popular will, and subject to public disapprobation and a forfeiture of their positions by corrupt conduct. But whatever mode may be established for the selection of the judiciary, only its tendencies can be spoken of with assurance, and not its necessary results. The influence of a healthy public opinion demanding integrity, ability, and a true judicial spirit upon the bench—a public opinion which is sure to prevail in the long run in this country—will be particularly effective in counteracting the evil tendencies which may exist in a system of election. In some of the States, moreover, there has been a return, in some measure, to the former practice by increasing the length of the tenure of office, and it is not improbable that a change of this kind will be generally adopted. But by no system of appointment or election can the absolute purity and impartiality of the judiciary be ensured. The remarks of Hallam upon this point in regard to the English judges are very suggestive: "It is always to be kept in mind that they are still accessible to the hope of further promotion, to the zeal of political attachment, to the flattery of princes and ministers; that the bias of their prejudices, as elderly and peaceable men, will, in the plurality of cases, be on the side of power; that they have frequently been trained as advocates to vindicate every proceeding of the Crown. From all which we should look on them with some little vigilance, and not come hastily to the conclusion that because their commissions cannot be vacated by the Crown's authority they are wholly out of the reach of its influence." (*Const. Hist.*, ch. 15.)

The subject of the salaries of judges is generally regulated by constitutional provisions, in order that they may not be subject to coercion or wrongly influenced in their discharge of duty by a reduction or deprivation of their means of livelihood. By the English Act of Settlement it was declared that the salaries of the judges should be ascertained and established, and by act passed in the reign of George III. it was provided that their salaries should be absolutely secured to them during their continuance in office. The U. S. Constitution provides that the judges "are at stated times to receive for their services a compensation which shall not be diminished during their continuance in office." In some of the States this provision is copied,

while in others there is a constitutional rule that judicial salaries shall neither be increased nor diminished during the term of office. The determination of the amount of salary to be paid belongs to the legislature, subject to these constitutional restrictions. The fluctuation in the value of money and in the cost of living render it inexpedient to specify a fixed salary in the constitution. The American constitutional provisions are more efficacious and salutary in relieving the judiciary from all subordination to the legislature than the laws of England upon the subject, since there the compensation is at all times subject to alteration by an act of Parliament. There has, moreover, been in recent times a growing appreciation of the necessity of providing for the judges sufficiently ample salaries to enable the state to secure the services of the ablest lawyers and jurists upon the bench. In many of the U. S. the salaries have hitherto been so meagre that the tendency has been for men of the highest legal attainments to remain in their lucrative practice at the bar rather than to seek or to accept judicial positions. In some of them, as in New York, the amount of compensation has recently been made more liberal and adequate. An ample salary, whose amount and time of payment are not liable to legislative or executive interference or control, is evidently an important safeguard to judicial independence, since a powerful means of intimidation which would otherwise be afforded is rendered unavailable.

The fearlessness and independence of the judiciary are further promoted by limiting their legal responsibility. It is a principle which has been said to have a "deep root in the common law" that judicial officers shall never be liable to a civil action for acts done in the performance of their legal duties and within the province of their legitimate jurisdiction, even though they act corruptly and oppressively. Nor are they liable, under similar circumstances, to a criminal prosecution. The impartial administration of justice requires that those who dispense it should not be exposed to any influences which would make them timid, hesitating, and over-cautious. "It is better," says an able English judge, "that an individual should occasionally suffer a wrong than that the course of justice should be impeded and fettered by constant restraints and apprehension on the part of those who are to administer it." The regular remedy against a judge who is guilty of criminal disregard or violation of duty or perversion of justice is impeachment. (See IMPEACHMENT.) As this is an inconvenient mode of trial, never resorted to except in the case of grave and flagrant offences, the judiciary are in a very exceptional degree freed from legal accountability. The constitutions of some of the States provide for a removal of judges by concurrent resolution of both houses of the legislature passed by a specified vote, the cause being entered on the journals, and a hearing having been accorded to the party complained of.

There are various other important and interesting questions in regard to the judiciary which might be considered in this connection, but these have been treated of under other topics. Such, for example, are inquiries relating to the position which a judge occupies and the functions he performs in different civilized countries in the conduct of a trial or the decision of causes; to the extent and nature of the jurisdiction which is conferred upon him in different courts; to the diverse character of the proceedings which may come before him for adjudication; to the important jurisdiction which is conferred upon the judiciary in this country of determining the constitutionality of legislative acts, etc. For a discussion of these and analogous topics see COURTS, JUDGE, JURISDICTION, LAW, EQUIT, ADMIRALTY, CONSTITUTION, TRIAL, CHAMBERS, APPEAL, JURISPRUDENCE. (As to the independence of the judiciary, see STORY on the Constitution; Kent's Commentaries, vol. i.; Lieber's Civil Liberty.) GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Judicium Populi** [Lat., "judgment by the people"], in Roman law, an early form of submitting to the decision of a popular vote the differences between high functionaries, accusations against magistrates, and other similar concerns in which the people as a whole was conceived not merely to be deeply interested, but to have a right to pronounce its sentence after due formalities. The *judicia publica* of the later republican period are considered by the text-writers to be substitutes for the *judicia populi*, and indeed it is probable that among all the Indo-European nations the powers of judges and courts of law have been derived from an earlier jurisdiction exercised by the people as judge, by the gradual elimination of those who were less able or less willing to act in such capacity, in the same manner that the powers of a supreme court of appeals, still nominally vested in the English House of Lords, have long been practically exercised only by the half dozen "law-lords," who owe their seats in that house to previous experience on the bench. The same theory will probably account

for the formation of all representative legislative bodies, and, still more obviously, for the origin of the modern jury, both these institutions being peculiar to the Aryan or Indo-European family of mankind. Indeed, it is so certain that the powers and faculties of early Greek and Roman judges differed in no degree from those which might be exercised by a popular assembly, that when for convenience it became necessary to entrust special judicial functions to individuals, the latter were neither elected nor otherwise designated with any view to greater individual competency, but were chosen by lot, all the citizens being equally liable to perform this service. As above noticed, it is probable that in the shadowy *origines* of Aryan law all questions affecting either public interests or private rights were equally decided by the popular assembly, from which all forms of authority excepting those resting upon brute force or the religious sanction have been gradually evolved. At the earliest period of which any clear evidence remains, actions brought by individuals in defence of their private rights (*judicia privata*), and resting upon special laws (*privilegia*), had been discriminated from the *judicia populi*, and were determined by special magistrates, while matters of public interest, *judicia publica* or *populi*, were still decided by the popular assembly. The tendency of all things to progress from the general to the particular is well illustrated by the gradual accumulation of statute law, which had to be interpreted by this assembly, leading to the withdrawal to private tribunals of other large classes of actions, to the substitution of the term *judicia publica* for *judicia populi*, and the final extinction under the empire of this ancient tribunal. In the mythical times of the Roman kings it is alleged that those monarchs presided over the assemblies of the people convened as a tribunal. They were naturally replaced in this prerogative by the consuls; until in B.C. 488 the *Lex Valeria de Provocatione* established magistrates called *questores* or *questores capitalium*, who were at first popularly chosen for special occasions, but soon exercised a more lasting authority (*questores perpetui*). By the *Lex Calpurnia de Praetoris Repetundis* (B.C. 149) the praetor became *ex officio* the president of the popular assembly. Other praetors were from time to time added, until in the time of Sulla they numbered nine, each exercising jurisdiction over a distinct class of offences; and this became the origin of the criminal courts, which existed until the fall of the empire. In the normal *judicium populi* any citizen might act as an accuser, while the *judices* (judges) were chosen by lot from among the people. Both accuser and accused had a limited right of challenging the judges so designated. The praetor presided, and, as he was not necessarily acquainted with the technicalities of law, was assisted by one or more assessors or juriconsults. When a magistrate was accused, the trial could not take place until his term of office expired, but meanwhile he was bound to give security for his appearance. The verdict was given by ballots inscribed upon tablets; they bore the traditional name of *leges* (laws), and were theoretically binding in future cases of the same kind, though the mobility of the Roman people, and their strongly developed fondness for public affairs, made them averse to surrender any real power to the force of precedents. When at length the powers of the popular assembly were lodged in a special body of *judices*, the name and general regulations of the earlier assembly were retained, but a series of conflicts arose as to the designation of the *judices*. By the *Lex Calpurnia* a body of 300 persons was inscribed in tablets (*album*), and from them the *judices* were to be selected by lot as occasion demanded. Before this time they were generally taken from the senatorial class, but during the popular struggle the senators gradually lost their prerogative, and were excluded by the *Lex Semproniana*, enacted B.C. 123, on motion of Cn. Gracchus, which limited the choice to the class of *equites* or knights. The *Lex Norcia* of B.C. 104 first denied with some minuteness the personal disqualifications which should exclude a citizen from the exercise of the judicial function. No one who had ever been tribune, quaestor, or *tribunus*, no senator or near relative of a senator, no non-resident in the city or suburbs, and no person under thirty or over sixty years of age, was eligible. The praetor, at the commencement of each term, was to choose 150 *judices* from whom the judges in each particular case were taken by lot. There were many subsequent alterations in this regard, and the nature of some of the changes involved in great doubt. By the *Lex Plautia* (B.C. 89) the *judices* were to be chosen from the *tribus* without distinction of class; by the *Lex Aculeia* (B.C. 70) they were restricted to the three classes (called *decuriae*) of senators, equites, and *tribuni aerarii*; another *decuria* was added by Augustus. At this time the whole number registered in the *Album judicum* was near 1000, and the ordinary number of judges in each given case was seventy. PORTER C. BRIS.



**Ju'dith** [Heb. *Yehudith*, feminine form of "Judah"], the heroine of one of the apocryphal books of the Old Testament, in which she is represented as inhabiting Bethulia, a town of Samaria, when it was besieged by an Assyrian army under Holofernes, and as having by stratagem cut off the head of that general and thus delivered her people from destruction. That the book of Judith is historical in its character is maintained by the Catholic Church, it being included in their biblical canon, but has been denied by most Protestant critics, chiefly, it would seem, from the difficulty of making its statements harmonize with any scheme of chronology. The Assyrian king called Nebuchadnezzar in the book of Judith has been identified in turn with almost every one of the Persian monarchs from Cambyse to Artaxerxes Ochus, but there are insuperable objections to each which have taxed the utmost ingenuity of the historical school of commentators. On the alternative hypothesis, that the book is a kind of religio-patriotic romance, intended to raise the courage of the chosen people at some period of grievous oppression by a foreign tyrant, there are two leading views—one, represented by Luther and Grotius, looks upon the book as an allegorical account of the Jewish sufferings under Antiochus Epiphanes. The Tübingen school of criticism and other recent German authorities (Volkmar, Baur, Hitzig) generally regard it as a production of the second century A. D., making Nebuchadnezzar stand for Trajan, Nineveh for Antioch, Assyria for Syria, Arphaxad for the Parthians, Ecbatana for Nisibis, Holofernes for the Roman general Lucius Quietus, and Judith for Judea. The occasion is assigned to 117–118 A. D., when the Jews and Parthians obtained a victory over Quietus. The book of Judith is not a part of the Jewish canon of Scripture. Lessons from it are read in the service of the Church of England. See Volkmar, *Das Buch Judith* Tübingen, 1869; Wolff, same title (Leipzig, 1861.)

**Jud'kins**, tp. of Warren co., N. C. Pop. 1432.

**Jud'son**, post-tp. of Blue Earth co., Minn. Pop. 661.

**Judson** ADONIRAM, D. D., b. at Malden, Mass., Aug. 9, 1788; graduated at Brown University, R. I., in 1807, and at Andover Theological Seminary, Mass., in 1810. Teaching a private school in Plymouth, Mass., he published in 1808 and 1809 his *Elements of English Grammar and Young Ladies' Arithmetic*. Feb. 6, 1812, he was ordained as a missionary to Burmah, under the auspices of the A. B. C. F. M. He married Ann Hasseltine, teacher in the academy at Bradford, Mass., and with her sailed for Calcutta Feb. 19, 1812. On the voyage his views regarding the ordinance of baptism underwent a change, and reaching Calcutta he identified himself with the Baptist denomination, giving reasons for his action in *Judson on Baptism*, which was republished in the U. S. This led American Baptists to interest themselves in foreign missions, and to the formation of the society now known as the American Baptist Missionary Union. Under the auspices of this society he became the founder in Burmah of one of the most successful missionary enterprises of modern times. Settling first at Rangoon, Judson labored for nearly forty years in Burmah, two of which he spent in prison, manacled and daily expecting execution. He translated the Bible into Burmese, and at his death had nearly completed a dictionary of that language in two volumes. Before his death he was surrounded by thousands of native converts and by many missionaries, American and Burmese. Mrs. Judson d. Oct. 24, 1826, and in Apr., 1834, he married Mrs. Sarah H. Boardman, who d. Sept. 1, 1845. In June, 1846, he married Miss Emily Chubbuck, who d. June 1, 1854. He d. at sea Apr. 12, 1850. *Memoirs of Judson* were published by W. Hague (1851), by J. Clement (1852), by F. Wayland (1853), by D. T. Middleditch (1854), and by Mrs. H. C. Conant (1856). (See also the *Memoir of Ann H. Judson*, by Prof. J. D. Knowles—an interesting sketch of an able and devoted woman, which incidentally illustrates, pretty fully, the origin and early growth of American Baptist missions in India; the *Memoir of Sarah B. Judson*, by Mrs. Emily C. Judson; and the *Life of Emily C. Judson*, by Prof. A. C. Kentwick, D. D. Of these three gifted women, the last mentioned (Emily Chubbuck Judson—better known under the *nom de plume* of "Fanny Forrester") attained to considerable literary reputation by a two-volume collection of essays and sketches bearing the name of *Alderbrook*, by a volume of domestic poems called *The Olio*, and by a volume of papers suggested by missionary-life, entitled *The Kathay to Shave*.)

M. B. ANDERSON.

**Judso'nia**, post-v. of White co., Ark., on the N. bank of Little Red River and on the Cairo and Fulton R. R., 53 miles N. E. of Little Rock. It is occupied by a colony of Baptists from the Northern States.

**Ju'el** (NIELS), b. May 8, 1629; entered early into the Dutch service, and commanded on several occasions under

Tromp and Ruyter. Having been placed at the head of the Danish navy, he gave it a new and thorough organization, and by his brilliant victories over the Swedish fleets in 1677 at Kolbergheide and Kjöge, and by his conquest of Gothland in 1676 and Rügen in 1678, made the Baltic a Danish water. In reward for his great services he received the island of Taasinge as a fief. D. at Copenhagen Apr. 8, 1697.

**Juggernaut.** See JAGGERNAUT.

**Jug'gling and Jug'gler** [from the Old Fr., *jonglère*; Middle Lat. (Ducange), *juglator* or *joculator*, literally, a "jester;" also, *jogalour* (Chaucer), *jocular* (J. Leland, *Collectanea*, vol. i. p. 235). But it is probable that the word owes as much to an independent Teutonic source as to the Latin *jocus*, as may be seen in the German *Gaukeln-jöcheln*, probably from *ge-wigian*, to "beguile." According to Larousse, *jongler* means, accurately, "to throw in the air objects which as fast as caught are thrown again." This he illustrates by quoting from Expilly: "The African Psylli *jonglaient* or juggled with serpents." This agrees singularly with the Sanskrit *jāṅguli*, "a snake-catcher, a conjurer." The Teutonic source has its affinity at least in the Sanskrit *jagala*, "fraudulent," "knavish." Juggling, which in the early ages of the world was, under the name of thaumaturgia or wonder-working, the principal aid to priests in performing their false miracles, has in modern times degenerated into a source of mere amusement, or one which only provides marvels to mislead the superstitious and ignorant. The principal art in juggling is legerdemain or sleight-of-hand and substitution, technically called among its professors *hanki-panki*, from two gypsy words, which are in the original Hindostani, *hokku bazi*, pronounced "honky bosey," meaning precisely the same thing (in Persian, *hoko baz*). As the gypsies also call theft by substitution *honki-pok* or *hukkni-pok*, it is possible that we have in this the origin of *hocus-pocus*. Many distinguished jugglers have been gypsies, and the Nāts or true gypsies of India are all jugglers, acrobats, or dancers. The juggler among the Romans was called *præstigiator*; with the Greeks he was a *thaumatoipoios*. Athenæus in his *Deipnosophists* describes an entertainment where naked girls vomited fire and jumped or rolled among swords, and he gives the names of the most celebrated jugglers of his time. From his account it appears that among the ancients, as at the present day in Egypt, drollery and dramatic art formed an important element in such conjuring. The writer has seen in and near Cairo native jugglers who by acting and humorously affecting to be aided by evil spirits very much enhanced the effect of their tricks. Trickery with cups, or thimble-rig, was known to the ancient Egyptians. The old-fashioned thimble-rig, so generally practised at races, which was performed by adroitly taking away the pea with the fingers of the same hand which held the cup, has of late been modified by an improved style of French thimble of vulcanite. The ordinary juggling tricks were common among the Anglo-Saxons. Strutt gives an interesting chapter on the *joculator* or *jongleur* of England in the Middle Ages. From passages in Chaucer, Sir John Mandeville, Froissart, and Benvenuto Cellini it is evident that the jugglers of the fourteenth and fifteenth centuries were familiar with the magic lantern, and were in fact far in advance of the science of the learned of their days. "Sometimes," says Chaucer, "in a large hall they will produce water, with boats rowed up and down upon it. Sometimes they will bring in the similitude of a grim lion or make flowers spring up as in a meadow; sometimes they cause a vine to flourish bearing red and white grapes; or they show a castle built with stone; and when they please they cause the whole to disappear." The jugglers of old—whether priests or *troupesters*, as they were called in England, or *jogalours*—formed a very close corporation and kept their secrets well. Even King James I. believed that they were aided by the devil. All of the ordinary miracles related of ancient wonder-workers, such as making heads speak, showing men whom no ropes could bind, and the like, are now performed with great ease. Among the Babylonians and Arabs it was usual to make arrows leap up and indicate the direction in which the king should advance against an enemy. "For the king of Babylon stood at the parting of the way, at the head of the two ways, to use divination; he made his arrows bright" (Ezek. xxi. 21). This was done by means of a hair: the Japanese juggler of the present day makes a butterfly flit around him by attaching to it a perfectly invisible silkworm's thread. From the earliest ages to the present day the world has seen pretenders to magic power or to intercourse with spirits performing miracles which after a few years have been retailed by jugglers. The great basis of false miracles, as well as the popularity of juggling itself, consists in the truth of the saying: "*Populus vult decipi*."—P.

ple wish to be deceived." Not many years ago a notorious thaumaturgist proposed to exhibit before a certain royal family a new miracle—a piano should play of itself. The royal family were delighted at the treat in prospect. Unfortunately, a day or two before the proposed miracle was performed a celebrated man of science, having been told what was to be done, did the deed himself very perfectly, and explained the process, the only result being manifest disappointment and annoyance on the part of the distinguished and credulous auditors. There is less novelty in jugglers' feats than is supposed. The sphinx is a very old invention; the feat of the rings, which in 1859 astonished New York, and which was supposed to be entirely new, had been explained years before in a very common little handbook of legerdemain.

A great principle in juggling is to attract the attention of the audience by some trifling movement, and thereby at that instant *distract* it from the banky-panky or adroit substitution of one article for another. In India a *naked* juggler will produce from a cup or bag several objects. These he has hidden under a false skin, his own having been gradually peeled away, and then laid on in a flap. By snapping his fingers or by pointing to anything the attention even of those forewarned is drawn away. A very trifling deviation of sight suffices for this, and by its aid an object may be brought out and then concealed before the audience perceives it. Cool audacity thus effects incredible marvels. The different juggling devices by which the face of a future husband is shown in a crystal or mirror, in liquids, as an apparition or in other ways, the manufacture of spiritual photographs, and all miracles performed in the dark, have been explained many times, and performed by professional jugglers without apparently making the million much wiser. One of the best juggling feats is that of the so-called second sight, popularized by the late Robert Houdin. The writer, having seen him play it, can testify to the adroitness with which it was done. It consists in one or more persons blindfolded or isolated telling the names of many objects supposed to be concealed from them, or else what is written on a paper. It is varied in many ways, and there are as many methods of performing it, the best consisting of wires with a galvanic battery and plates, by means of which signals are transmitted through the feet of the accomplices. This ingenious device is also used in gambling-houses. Many persons believe that gypsies possess secret arts and can tell fortunes. Among themselves they ridicule the idea of their being able to do anything of the kind, but at the same time no people are more superstitious or more easily imposed upon by the higher class of conjurers who employ mechanical tricks. It is to be desired that a few of the best works on juggling could be read by every one as a means of dissipating superstition, and of setting people on their guard against every variety of practical trickery. When Reginald Scot wrote his *Discoverie of Witchcraft*, a work which marks an era in humanity, he found it necessary to explain how the juggling tricks were done by which so-called diabolical deeds were effected. Of late years science has not disdained to assist this art, and many of the illusions now shown are really interesting, both as to skill and their association with the pretended miracles of a higher class of wonder-workers.

In ancient times a number of philosophers wrote against the thaumaturgy of the priesthood, and exposed their juggling tricks. Unfortunately, all their books are lost. The principal of these was by Celsus, whose work against the Magi is believed to have been a very able exposure of all the tricks of the ancient conjurers. Other writers of this kind are mentioned by Diogenes Laertius, and Suidas quotes the *Magikon* of Antisthenes. Among the many modern works which treat of juggling and wonder-working of every kind one of the best is *La Magie blanche dévoilée, ou explication des Tours de Magiciens, &c.*, par M. Deeremps (Paris, 1788). This was followed by a *Supplément au Testament de J. J. ou Sharp, l'habile de J. J. ou Sharp, et L'Explication des Tours de Magiciens*, by the same author. Deeremps was a gentleman, a scholar, and a diplomatist; his works abound in quaint quotations, and are well written in a pleasant lively style. To these may be added the *Récréations mathématiques et physiques d'Orlando* (4 vols. 8vo, Paris, 1750); *Les Récréations mathématiques et physiques de Girard* (4 vols. 1750). In 1808 Prof. J. N. Ponsin published among the *Mémoires* of Robert La Saussure *l'ancienne et moderne explication, a very excellent work, contemporary with the Magie Naturelle*, par M. Verzierand, *le Physique d'ensemble*, par J. L. de Fontenelle, and Madame Malcroyre, and *Sur l'usage de la Magie blanche dévoilée par les documents de la Chronique de la Physique, et de la Méchanique*, par MM. Comte et J. L. de Fontenelle. Regnaud Scott's *Discoverie of Witchcraft* (London, 1814) may also be studied, and the *Libretto di Società Nobilissima*

(Milan, 1850); also *Breslin's Last Legacy, or the Medical Conjuror* (London, 1784); *Natural Magic*, by Philip Astley, riding-master (1780); *Magie*, by J. S. Halle (Berlin, 1783); *Natürliche Magie*, by Funk: K. O. Eckharts-hausen, *Vorleser der Zauberkräfte der Natur* (Munich, 1819); *The Incomparable Science of Parlor Magic*, by J. H. Ander-son, a clever and lively work, which, in addition to ex-posing the secrets of gamblers, is accompanied in the later editions by a supplement on the magic of spirit-rapping, writing-mediums, and table-turning; *Hanky-Panky, the Conjurer* (London, 1899); *Magie and Prestidigitations* (London, 1818); and the *Conjuror's Guide* (Glasgow, 1804).

CHARLES G. LELAND.

**Jugur'tha**, king of Numidia, was an illegitimate grandson of Masinissa, was adopted by his uncle, King Micipsa, in 149 b. c., and attracted much attention from the people by his popular qualities. Sent with a Numidian force into the Roman service (134), he gained fresh distinctions and after the death of Micipsa murdered Hempsal, the king's oldest son, and put Adherbal, a younger son, to flight. Adherbal appealed to the Roman senate; but the bribes of Jugurtha secured (117) for him the larger and better part of the kingdom. In 112 he captured Cirta and basely murdered his rival. The consul Calpurnius Bestia was sent to attack Jugurtha, who bribed the consul to grant a peace (111 b. c.). Summoned in the same year to Rome under a safeguard, he there murdered Massiva, his enemy, and was expelled from Italy. War with Rome followed; in 110, Jugurtha defeated Aulus Postumius at Suthul, and sent his army under the yoke; in 109 was badly beaten by Cneius Metellus; was again defeated by Marius in 107; was taken prisoner by the craft of Sulla 107; was carried to Rome to adorn the triumph of Marius (104), where he was starved to death in prison.

**Ju'jube**, the fruit of *Zizyphus vulgaris*, order Rhamnaceae, a small tree of Southern Europe and Africa. Its fruit was formerly used for making "jujube paste," a pleasant confection, but the jujube paste of the shops is now made of gum-arabic, sugar, water, and egg-albumen, without jujubes. Jujube syrup and dried jujubes have useful pectoral qualities, and make a pleasant drink for the sick. *Z. nitida*, *Z. Jugosa*, *Z. Lotus*, and *Z. Spina Christi* are among the species of this genus which bear pleasant fruits. The jujube is occasionally grown in the Southern U. S.

**Jujuy'**, town of the Argentine Republic, South America, the capital of a province of the same name, has about 7000 inhabitants, who are mostly engaged in agriculture and the rearing of cattle.

**Jukes** (JOSEPH BEETE), F. R. S., b. near Birmingham, England, Oct. 10, 1811; graduated at St. John's College, Cambridge, in 1836, and devoted himself to geology. In 1839 he was appointed geological surveyor of Newbarn Hamlet, and from 1842 to 1846 he was naturalist on board H. M. S. Fly, engaged in the survey of the great barrier-reef along the E. coast of Australia. He published volumes giving the results of these explorations. Having joined in 1846 the geological survey of Great Britain, he wrote for it important memoirs on several districts, especially one on *The South Staffordshire Coal Field* (1853). In 1850, Prof. Jukes became director of the geological survey of Ireland, and he was for many years professor of geology to the Royal Dublin Society and the Royal College of Science at Dublin. His investigations on coral reefs, the distribution of mollusca, and the formation of riverbeds were important contributions to science. He wrote several elementary works on geology, as well as the elaborate article in the *Encyclopædia Britannica* (8th ed.), and contributed largely to the journals of learned societies. D. July 29, 1869.

**Ju'lia**, daughter of Augustus by his second wife, Scribonia, and his only child, b. in 39 B. C. She was distinguished as much for her intelligence as for her beauty, and was married to Marcellus in 25 B. C., after his death to Agrippa in 22 B. C., and after his death to Tiberius in 12 B. C. But her dissipation and profligacy by degrees assumed such a character and such a publicity that her marriage was dissolved, and she was banished to the island of Pandataria, an island near Naples, and thence to Rhodes, where she died, in 11 A. D. in want. It is probable that her hard fortune was due, at least in some degree, to the hatred of her step-mother, Livia, who struck successively every member of the emperor's family in order to make room for her own son, Tiberius. Of the five children whom Julia bore to Agrippa, only the two daughters survived her; of the three sons, two died young, and the third was put to death by Tiberius.

**Ju'tan**, post tp. of San Diego co., Cal., 37 miles N. E. of San Diego. Pop. 534.

**Julian**, tp. of Dubuque co., Ia. Pop. 1110.



**Julian** (GEORGE WASHINGTON), b. in Centreville, Ind., May 3, 1817; received a common school education; was several years a teacher; admitted to the bar 1840; elected to the legislature in 1845; delegate to the Buffalo Free-Soil convention of 1848; Representative in Congress 1849-51, and nominated for Vice-President by the Pittsburgh convention of "Free Democrats" on the ticket headed by John P. Hale. He was in 1856 prominent as a founder of the Republican party, and was again a member of Congress from 1861 to 1869, being during the last two terms chairman of the committee on public lands. He has been one of the most strenuous supporters of female suffrage.

**Julian the Apostate** (FLAVIUS CLAUDIUS JULIANUS), Roman emperor, b. at Constantinople Nov. 17, 331 A. D., was the son of Julius Constantius. In infancy he was imprisoned by Constantius II., but was well educated and trained in the Christian faith; was allowed in 355 to reside at Athens unconfined, and in the same year was proclaimed Cæsar, married to Helena, daughter of Constantine the Great, and was sent to govern Gaul, where he showed himself a just and wise ruler, an able general, and a virtuous man. In 360 his troops saluted him emperor at Paris; and Constantius beginning to interfere unduly in the affairs of Gaul, Julian marched with strong armies across Europe towards Constantinople. Constantius d. in 361, and Julian was hailed with universal joy as emperor, and soon after this avowed himself a pagan. He did not persecute Christianity, but tolerated all the sects, at the same time decidedly favoring paganism by his edicts and closing the Christian schools. In Mar., 363, he set out upon his Persian expedition, and after defeating the enemy in many engagements was mortally wounded in battle, and d. June 26, 363. This able ruler was in supreme authority only eighteen months, and yet his reign was one of the most memorable of antiquity. Julian was a writer of great talent, and left many writings in the Greek language, including a number of extant letters and orations, valuable to the historian; a satirical work of decided merit called the *Cæsars*; *Misopogon*, a satire upon the people of Antioch; some unimportant epigrams; and a celebrated work *Against the Christians* (ΚΑΤΑ ΧΡΙΣΤΙΑΝΟΥΣ), of which Theodosius II. destroyed all accessible copies, so that the work is lost, excepting some fragments preserved by Cyril and others.

**Jülich**, town of Rhinish Prussia, at the influx of the Effe into the Roer, has some manufactures of leather, soap, and vinegar. Pop. 5244. The districts of Jülich formed an independent dukedom in the fourteenth century, which was united to Berg and Cleves in 1511. In 1609 the ducal line became extinct, and succession disputes began between Brandenburg and Neuburg, which, although settled in 1666 by a division of the country, were not brought to a final conclusion until 1814, when the whole territory was given to Prussia.

**Julien'** (STANISLAS), b. at Orléans, France, Sept. 20, 1799; studied first modern European languages, Latin, and Greek, but was attracted to the study of Chinese by the lectures of Abel Rémusat, whom he succeeded in 1832 as professor in Chinese at the Collège de France at Paris. Besides several grammatical works on Chinese, destined to aid the student of the language, he has translated a great number of Chinese novels, dramas, historical, philosophical, and scientific writings. D. Feb. 14, 1873.

**Jul'ius** (NIKOLAUS HEINRICH), b. in Altona, Denmark, Oct. 3, 1783; studied medicine, and practised in Hamburg. In 1825 he travelled through England, in 1834-36 through the U. S., and later on through Germany, Poland, Belgium, and France, to study the conditions and management of prisons, on which subject he lectured in Berlin in 1827, published a periodical, *Jahrbücher der Straf- und Besserungsanstalten* (Berlin, 1828-48), and wrote several works: *Vorlesungen über Gefängniswesen* (1828), *Nordamerikanische sittliche Zustände* (1839), *Beiträge zur britischen Irrenheilkunde* (1844), etc. D. in Hamburg Aug. 20, 1862.

**Julius I.**, SAINT, bishop of Rome, was consecrated in 337, and took part with Athanasius in his struggle for the Alexandrian bishopric. D. Apr. 12, 352.—**JULIUS II.**, POPE (*Giuliano della Rovere*), b. at Albano in 1411, became a cardinal in 1471, and succeeded by simoniacal means to the pontificate in 1503. His career henceforth was chiefly military, his principal aim being to drive the foreigners out of Italy and free the Holy See from the domination of the great secular powers. The ambitious pontiff was a liberal patron of Raphael, Michael Angelo, and the other great artists of his time, and laid the cornerstone of St. Peter's church at Rome. D. Feb. 21, 1513.—**JULIUS III.** (*Giovanni Maria del Monte*), b. at Arezzo Sept. 10, 1487, became a cardinal in 1536; went as papal legate to the Council of Trent 1545; was chosen pope 1550, and was thenceforth chiefly remarkable for luxurious habits. D. Mar. 23, 1555.

**Jul'under**, town of the Punjab, in the plain between the Sutlej and the Beas, in lat. 31° 21' N. and lon. 75° 31' E. It was formerly the capital of a powerful Afghan principality, and has many magnificent monuments. Pop. estimated at 40,000.

**Ju'lus**, the typical genus of the family Julidæ, myriapods of the division Chilognatha, including the millipeds or thousand-legs and many other organisms. The true *Juli* are seldom more than three inches long, have numerous small feet, inhabit moist and dark places, such as holes in rotten wood, and are never, like the centipedes, truly venomous.

**July'** [Lat. *Julius*, named by Mark Antony in honor of Julius Cæsar], the seventh month of the Gregorian, and the fifth of the old, calendar. The ancient Romans called it *Quintilis*—that is, the fifth month.

**Jumbuser'**, town of British India, in the presidency of Bengal. It has a considerable trade in rice and cotton. Pop. 10,400.

**Junet'**, town of Belgium, in the province of Hainaut, has extensive breweries, glass-works, and manufactures of tiles and nails. Pop. 14,244.

**Jumil'la**, town of Spain, in the province of Murcia, carrying on important manufactures of earthenware and firebricks. Pop. 9613.

**Jun'na**, a river of Hindostan, and the principal affluent of the Ganges, rises in lat. 31° N. and lon. 78° 32' E., at an elevation of 10,849 feet. It flows first S., and then S. E., and after a course of 680 miles joins the Ganges at Allahabad. It is shallow and unfit for navigation, but by artificial means it has in many ways been made available both for agriculture and commerce. Delhi and Agra are situated on its banks.

**Jump'ing Branch**, post-tp. of Mercer co., W. Va. Pop. 1441.

**Junck'er** (HENRY DAMIAN), D. D., b. in Lorraine (then a part of France) 1810; came in youth to the U. S.; studied at Cincinnati, and in 1834 took priest's orders in the Roman Catholic Church; served chiefly among the German population of Ohio; became in 1857 bishop of Alton, Ill. D. at Alton Oct. 2, 1868.

**Junc'tion**, post-v. of Carlton co., Minn., at the junction of the Northern Pacific and the Lake Superior and Mississippi R. R.

**Junction**, post-v. of Hunterdon co., N. J., at the junction of the Delaware Lackawanna and Western and the Central R. R. of New Jersey.

**Junction City**, post-v. and tp. of Trinity co., Cal., 8 miles W. of Weaver'sville, the county-seat. Pop. of v. 440; of tp. 570.

**Junction City**, post-v. and tp., cap. of Davis co., Kan., situated on the crown of a low bluff at the confluence of the Smoky Hill and Republican rivers, which unite to form the Kansas River, and on the Kansas Pacific and the Missouri Kansas and Texas R. Rs. It has many churches and schools, 7 hotels, 1 national and 1 savings bank, 2 flouring mills, manufactures of carriages, agricultural implements, etc., and excellent water-power. There are extensive quarries of magnesian limestone, easily worked and largely used in building. Clark's Creek, in the vicinity of the town, is crossed by three Howe-truss bridges. It is an active business-centre for the surrounding country, and has 2 weekly newspapers. Pop. 2778.

**June** [Lat. *Junius*, for *Junonius*, because it was sacred to Juno], the sixth month in the Gregorian year; in the old style, the fourth month. During this month the sun reaches the northern solstice, which is marked by the first point of the sign Cancer. Hence the tropic is called the tropic of Cancer.

**Juneau'**, county of S. Central Wisconsin. Area, 325 square miles. The Wisconsin River washes its E. border, and it is traversed by the La Crosse and Milwaukee R. R. It has an undulating surface, a very fertile soil, with abundant timber and water-power. Cattle, grain, wool, and lumber are staple products. Cap. Mauston. Pop. 12,372.

**Juneau**, post-v., cap. of Dodge co., Wis., on the Chicago and North-western R. R., 145 miles from Chicago. It has 2 weekly newspapers, a grain-drill factory, 2 cheese-factories, churches, stores, hotels, etc. It was founded in 1845, and first named Victory, and then Dodge Centre. The court-house was built in 1848, and the first newspaper started in 1852. Pop. 300. E. B. BOLENS, ED. AND PROP. "DEMOCRAT AND GRANGER."

**June'-berry** (*Amelanchier Canadensis*), a wild shrub or small tree found throughout the U. S. and in Canada, with many varieties, offering considerable differences. It

bears a considerable resemblance in its characteristics to the apple and pear. The june-berry has been cultivated on a small scale for its fruit, which is of purple color, sweet, and about the size of the largest currants. The size of the tree differs greatly in the varieties, from thirty feet high (*botryopium*) down to three or four. Various names are given to the june-berry in different localities, such as shadbush, service-berry, and mountain whortleberry. The flowers are white, early, and abundant, on which account it is valued as an ornamental tree.

**Jung** (JOHANN), b. at Lübeck, Germany, Oct. 22, 1587; was professor of mathematics at Giessen 1609-14; studied medicine at Padua, graduating in 1618; settled at Rostock as a physician, becoming a professor there in 1624, and rector of the Johanneum at Hamburg in 1629. He was a very distinguished naturalist, ranked by Leibnitz in the same class of philosophers with Copernicus, Galileo, and Descartes. His researches in physical science incurred for him persecutions, on the supposition that he belonged to the Rosicrucian fraternity. Dr. Jung anticipated Linnaeus in proposing a binomial nomenclature for plants, and wrote largely on philosophy, mathematics, mineralogy, invertebrates, and botany, but many of his works were destroyed or rendered extremely scarce by a fire. Those which remained were edited by Albrecht under the title *Opuscula Physico-Mathematica* (Coburg, 1747). His life has been written by Guhrauer (Stuttgart, 1851) and by Avé-Lallemant (Lübeck, 1863).

**Jung-Buns'au**, town of Bohemia, on the Iser, has some manufactures of woollens. Pop. 8695.

**Jungerman'nia** [in honor of Prof. Ludwig Jungermann (1572-1631), a German botanist], a large and important genus of LIVERWORTS (which see). It gives name to the important sub-order Jungermanniaceæ (scale-mosses), which to the essential characters of the liverworts (Hepaticæ) join a moss-like habit. The U. S. have numerous species.

**Jung'frau** [Ger. "maiden"], one of the highest peaks of the Bernese Alps, and, on account of the beauty of its outline and the dazzling brightness of the everlasting snow which covers its top, one of the most remarkable mountains of Switzerland. Its height is 13,670 feet. Its top has been reached only by half a dozen persons; among them by Agassiz in 1841.

**Jung'huhn** (FRANZ WILHELM), b. at Mansfeld, Prussian Saxony, Oct. 26, 1812; studied medicine and botany at Halle and Berlin; served as a physician in the Prussian army, then in the French army in Algeria, and since 1835 in the Dutch colonies of Java. Here he made very extensive studies of the geographical, geological, botanical, and ethnological relations of the country, and his works on these subjects attracted great attention. In 1849 he visited Europe, but returned to Batavia in 1855, and d. at Lemberg Apr. 24, 1861. His chief work is *Java, seine Gestalt, Pflanzendecke und innere Bauart* (1852); besides this he wrote *Die Bataviaer in Siam* (1847), *Landchaftsansichten von Java* (1848), and in 1851 was commenced a description of the plants and fossils of Java, entitled *Pflanz-Jung-huhnien*.

**Jun'gle** [Sanskrit, *jungala*], in the East Indies, a name applied to those tracts of land, frequently very extensive, where the vegetation is rank, and often impenetrable. The jungles abound in tigers, elephants, monkeys, serpents, deer, boars, wild cattle, and other creatures, and are often very unhealthy. In the East they speak of "jungle-fowl," "jungle cows," "jungle fevers," etc. The term *jungle* is used with latitude, and much country which is sparsely settled, but by no means a wilderness, is thus designated.

**Jung'mann** (JOSEF JAKOB), b. at Hadlitz, Bohemia, July 16, 1773; studied at the University of Prague; became teacher at the gymnasium of Leibmeritz in 1799, and professor in 1815 at Prague, where he d. Nov. 11, 1847. In 1825 he published a history of the Bohemian language and literature, and in 1835 a complete Bohemian-German dictionary.

**Jung-Stil'ling** (JOHANN HEINRICH), b. at Grund, in Hesse-Nassau, Sept. 12, 1740, of a poor family, had to fight his way onward through many hardships. He was successively a charcoal-burner, schoolmaster, tailor, private tutor, etc. A Roman Catholic priest gave him a secret remedy for certain eye-diseases, and in 1771 he succeeded in going to Strassbourg to study medicine and get a diploma. Here he made the acquaintance of Goethe, who has given a charming picture of him in *Aus meinem Leben*. He now settled in Elberfeld as an eye physician, a business he never gave up; he always carried his instruments along with him, and he undertook more than 2000 operations. From 1787 to 1806 he held a chair in political economy at the universities of Marburg and Heidelberg, but this part of his activ-

ity was not very influential; he had at last no pupils at all. The last part of his life he spent at Carlsruhe, at the court of the grand duke of Baden, who gave him a pension, and thus enabled him to devote himself exclusively to literature. His writings have all a mystic, religious, half-apocalyptic character, even his romances, *Geschichte des Herrn von Morgenstern* (2 vols., 1770), *Florentin von Fehleborn* (3 vols., 1781), but still more his directly religious writings, *Theobald*, *Das Heinnich*, *Theorie der Geisteskräfte* (1808), etc. The most interesting of his works is his autobiography, of which the first part, *Heinrich Stilling's Jugend* (1777), is a wonderful book. He was three times married, and d. Apr. 2, 1817. His collected works were published in Stuttgart in 14 vols. in 1838.

**Junia'ta**, county of S. E. Central Pennsylvania. Area, 350 square miles. It consists, in general, of a long valley, subdivided more or less into minor valleys, and having the Blue Ridge on the N. W. and Tuscarora Mountain on the S. E. It is crossed by the Juniata River and the Pennsylvania R. R. It contains iron and limestone. The soil is very fertile, especially in the valleys. Cattle, grain, and wool are staple products. Carriages, wagons, and leather are leading articles of manufacture. Cap. Mifflintown. Pop. 17,390.

**Juniata**, tp. of Tuscola co., Mich. Pop. 1012.

**Juniata**, post v., cap. of Adams co., Neb., on the Burlington and Missouri River R. R., 24 miles E. of Fort Kearney, in a fine agricultural and grazing region; has some manufactures, a bank, a weekly newspaper, a fine high school, etc.

C. C. & R. D. BARCOCK, PUBLS. "ADAMS CO. GAZETTE."

**Juniata**, tp. of Bedford co., Pa. Pop. 1437.

**Juniata**, tp. of Blair co., Pa. Pop. 621.

**Juniata**, tp. of Huntingdon co., Pa. Pop. 393.

**Juniata**, post-tp. of Perry co., Pa. Pop. 983.

**Juniata River**, in Pennsylvania, rises near Altoona, 1155 feet above sea-level, and flows some 150 miles through the parallel-ridged mountains of Southern Central Pennsylvania, which rise from 800 to 1500 feet above the valleys (the latter often from 200 to 400 feet above the stream). It flows into the Susquehanna at Duncannon, 345 feet above the sea. Its principal affluent, the Raystown branch, is a beautiful and very tortuous stream.

**Ju'niper**, a genus of Conifera, sub-order Cupressineæ (cypress family), characterized by having its small cone transformed into a berry. The common juniper (*Juniperus communis*) is a small evergreen shrub, native of Europe and the U. S., where it grows on dry, sterile, hilly ground from New Jersey to Maine and along the great lakes. It is important for its fruit, which is used in medicine and in making gin. This fruit is a bluish-purple berry about the size of a pea, of a pleasant aromatic odor and sweetish terebinthinate taste, due to the presence of a volatile oil, in which also reside the medicinal virtues. Juniper is a gentle irritant, being in proper dose cordial to the stomach, and specially exciting to the function of the kidneys. It is accordingly used as a diuretic, but generally only to assist the action of more potent drugs of that class. In overdose it may cause great irritation of the urinary organs, with strangury and suppression of secretion. Juniper berries are largely used in the manufacture of gin, to which spirit they give the peculiar flavor and diuretic action. *Juniperus Virginiana*, or red cedar, is an indigenous and important evergreen tree growing on dry rocky hills in all latitudes of the U. S. EDWARD CURTIS.

**Ju'nius**. From the middle of the year 1767 to the middle of 1772 the British public was delighted or exasperated by a series of letters on political affairs in the *Public Advertiser* newspaper, displaying a pungency, a vehemence, an intrepidity, and a power of invective such as had never before been shown by any English political writer. The first of these letters (Apr. 28, 1767) appeared under the signature of "Poplicola." "Memnon," "Lucius," "Junius," "Philo Junius," "Brutus," and other signatures were subsequently resorted to, but the celebrity of the collection is concentrated upon the name of "Junius," affixed to the most remarkable letters, and to those which alone the letters signed "Philo Junius" excepted the writer authenticated by himself giving them to the world. The identity of the authorship of the rest is indeed a matter of inference, though of inference so irresistible as to be now not disputed by any one. In 1772 the correspondence suddenly ceased.

*Subject of the Junius Letters.* This may be briefly defined as the vindication of the public liberties. "The submission of a free people," so begins the first letter published under this celebrated signature, "to the executive authority of government is no more than a compliance with



laws which they themselves have enacted." This strikes the keynote of the whole. Every leading political occurrence of the day is turned to a vindication of popular liberty. It would be impossible in our space to enumerate the whole. It may truly be said that the British constitution never had a bolder champion than Junius, nor in the majority of cases a more learned or discriminating advocate. The amount of his legal and constitutional knowledge is extraordinary, especially if, as there is every reason to believe, he was not a lawyer. The characteristics of his style are energy, brevity, impetuosity, and the striking employment of metaphor. The principal drawback to the enjoyment of such talents applied in so good a cause is the writer's rancor and ferocity, and his incessant aspersions on private character. Yet this indignation, if excessive, may still have been honest. This question, however, depends partly on the solution of another enigma, which, more even than their literary excellence, has contributed to maintain the popularity of the letters. This is the mystery of their authorship.

*Authorship.*—Junius had apparently no confidants. His visor is never raised. He preserves throughout the same air of haughty superiority and profound, impenetrable secrecy. "My secret," he says, "shall die with me." The only person with whom he entered into anything like confidential relationship was Woodfall, the printer of the *Public Advertiser*. To him he wrote frequently in amicable and condescending terms, but always in the same feigned hand. Woodfall may have guessed the secret; it almost certainly was not entrusted to him. According to one account, the truth eventually became known to the government. "We know," George III. is reputed to have said, "who Junius is. He will write no more." The anecdote, however, is probably apocryphal. The mystery naturally excited intense curiosity in the public mind, and abundant pains have from that time to this been bestowed on unravelling it. The letters have been attributed, among others, to Burke, Dunning, W. G. Hamilton, Lord George Sackville, Dr. Butler, bishop of Hereford, Wilkes, H. M. Boyd, Philip Rosenhagen, Lord Temple, and Gen. Lee. Out of the whole of this list, Burke, Dunning, Lord Temple, and Wilkes are the only persons that can be credited with sufficient intellectual power to have produced the letters of Junius, and the evidence of place and circumstance, of sentiments and opinions, of political connections and of handwriting, seems decisive against them all. It is now generally admitted that either the authorship remains an impenetrable enigma, or that it belongs to one whose name was not mentioned in connection with it for forty years subsequently—Sir Philip Francis. Philip Francis, the son of a clergyman and schoolmaster of some literary repute, was b. in Dublin in 1740, and when the publication of the Junius letters commenced had for some years been a clerk in the war office. This circumstance supplied the clue to the discovery originally announced by Mr. John Taylor in his *Junius Identified*, published in 1814, during Francis's lifetime, and never contradicted by him. So accurate is the knowledge of war-office business betrayed by the writer that the conviction of his having been concerned in that department appears irresistible; nor can any other person in a similar position capable of having written the letters of Junius be pointed out. Many of the letters, in fact, are written on war-office paper. The hand, of course, is feigned; and before Francis's claims can be unreservedly admitted it is necessary to inquire whether the simulated hand can be identified with his. This investigation has been made in the most painstaking manner by Mr. Chabot, the eminent expert in handwriting, who, at the instance of the Hon. Mr. Twisleton, has compared not merely the acknowledged handwriting of Francis, but that of every other claimant of mark, with the hand of Junius. His results, with copious plates, have been published by Mr. Twisleton, and will leave little doubt that, so far as the evidence of handwriting is concerned, the identification of Junius with Francis is tolerably complete. The argument has also received unexpected strength from the discovery that a letter which occurs accompanying a copy of verses in the feigned hand of Junius, sent to a young lady at Bath, is itself in the hand of Francis's cousin and intimate friend, Tilghman, with whom Francis is known to have been staying at Bath at the very time.

The external evidence for the Franciscan authorship of Junius, then, appears on the whole as strong as could be reasonably expected. The impression left by the whole investigation cannot be better summed up than in the words of Mr. Merivale: "All the lines of investigation which have been followed in order to trace the authorship of this or that known individual, except Francis, fail at a certain point. They end in impossibilities. The remaining path, to which one clue only leads us, becomes plainer and plainer the farther the investigation is conducted." The ingenuity

of most formidable opponents has been exerted to discover some demonstrable incompatibility between the circumstances attending the production of the letters and the authorship of Francis. None such has been adduced. Francis, as was said of Godolphin, is never in the way and never out of the way. The one argument against him is derived from the evidence of style. But the distinction established is rather one of degree than of kind. There is no such incompatibility between the style of his acknowledged writings and that of the Junius letters as to render it morally impossible to attribute them to the same writer. It is not as though a pamphlet attributed to Swift should bear the impress of Bolingbroke. The admitted productions of Francis might pass for the work of a disciple of Junius. The real difficulty is, that Francis should never have equalled himself. This certainly is a difficulty, and is hardly obviated by Lord Macaulay's sensible but somewhat superficial reply, that every work of the same author cannot be the best. It can hardly, however, be held to count for much against the weight of external testimony, especially when the extraordinary moral resemblance between Francis and Junius is taken into account. Whoever Junius was, he must have been in temperament very much such a man as Francis is known to have been—vehement, combative, opinionated, disdainful, sarcastic, enthusiastically and disinterestedly devoted to the public good as he conceived it, but capable of the most unrelenting and unscrupulous animosity to all who crossed his path. To appreciate these characteristics it is essential to follow the next episode in his career. Appointed to a magnificent employment, a seat at the council of the governor-general of India, with a suddenness which certainly suggests the suspicion that his secret had become known, he quitted England for Calcutta in 1774. His official career was a constant series of disputes with the governor-general, Warren Hastings, culminating in a duel, in which he was seriously wounded. It is difficult to pronounce positively as to the merits of the controversy. Infinitely inferior to Hastings in administrative capacity, Francis does appear to have possessed more enlightened views as to the duties of government, and to have wished to introduce a spirit of equity and clemency into the administration of Bengal which would have greatly benefited it. Unable to contend with the genius and fortune of his rival, he forsook India in disgust, retiring, however, with a large fortune, said to have been partly acquired by high play. On the return of Hastings he became the life and soul of the memorable impeachment directed against him, his whole behavior during which, both as regards his unmitigated virulence and his underhand method of action, tends as strongly as any other proof to confirm his identity with Junius. When in his extreme old age the authorship was first publicly imputed to him, he neither denied nor admitted it, but his demeanor showed that he wished it to be believed. D. in 1818.

As the impersonality of Junius added much to his celebrity, so it must be admitted that the moral authority of his letters is impaired by their association with Francis. Much that might otherwise have passed for honest indignation is thus shown to have been prompted by personal rancor. With every deduction on this ground, the letters remain substantially the work of a patriot entitled to the gratitude of his countrymen for his spirited vindication of their liberties and laws. Their rank as a British classic is secure, although, as need hardly be said, their fame is in a great measure due to the scarcity of good political writing in their day. With a multitude of similar productions now forgotten they supplied the place of regular leaders in the newspapers, and would excite comparatively little attention in an age like ours, when so large a proportion of the literary ability of the day is absorbed by the public press.

The best authorities on the question of Junius are Mr. Taylor's *Junius Identified*; Dr. Mason Good's essay, prefixed to most recent editions; Mr. Twisleton's elaborate investigation of the handwritings of the various candidates; and the excellent *Life of Sir Philip Francis*, commenced by Mr. Joseph Parkes and completed by Mr. Herman Merivale. Mr. Parkes leaves no stone unturned to establish Francis's authorship, but attributes to his hero numerous letters and pamphlets which he certainly did not write, including one pamphlet signed "Irenarch," which was in fact written by a connection of the author of this notice. Sir Alexander Cockburn is understood to be preparing a work on the subject. (For the theory which identifies Junius with Lord Lyttelton, see *LYTTELTON* (THOMAS).)

R. GARNETT.

Junius, post-tp. of Seneca co., N. Y. Pop. 1420.

**JUNIUS** (FRANCIS), b. at Heidelberg in 1589, a son of Franciscus Junius, went to England in 1620, and became librarian to the earl of Arundel, in whose house he lived for thirty years. He was an enthusiastic student of the Teutonic and Anglo-Saxon dialects, on which he wrote

learned and valuable works. D. at Windsor Nov. 19, 1677. He published an edition of Uhlasi's translation of the gospels into Gothic, and a *Glossarium Gothicum* in five languages, of which the English part was reprinted at Oxford in 1743 with the title *Etymologicum Anglicanum*, and was the chief authority on etymology used by Dr. Johnson in his dictionary. Junius was an uncle of Isaac Vossius, and bequeathed his MSS. to the Bodleian Library at Oxford.

**Junius** (FRANCISUS), otherwise called François De Jon, b. at Bourges, France, in 1545; studied classical philology and Protestant theology at Geneva; was pastor of a Walloon congregation at Antwerp, and became in 1568 chaplain to the prince of Orange. In 1573 he was called to Heidelberg by the elector to aid in a translation of the Old Testament; he was also professor of theology at Heidelberg, and afterwards at Leyden, where he d. in 1602. His principal work was the translation of the Old Testament into Latin in conjunction with Tremellius (Frankfurt, 5 parts, 1575-79), which passed through twenty editions, the best being that of 1724. The other works of Junius were collected at Geneva in 1613—*Opera Theologica*, with an autobiography written in 1595. (See Haag, *La France Protestante*, and Herzog, *Real Encyclop.*, s. v.)

**Junk**, a sea-going vessel, such as is built in Japan, China, Corea, Tonquin, and Siam. It has three masts, a high poop and fore-castle, a wooden anchor, and usually has a wooden or painted eye on each bow, as if to enable it to see its way. The sails are ordinarily of matting. Junks, though slow and clumsy, are often surprisingly seaworthy. The amount of commerce carried on in them is very great, but vessels built on the European models are gradually taking their places.

**Junk-Ceylon'**, or **Salang**, an island in the Indian Ocean, belonging to Siam, in lat.  $7^{\circ} 46' N.$ , lon.  $98^{\circ} 18' E.$  It is 20 miles long and 10 miles broad, and exports tin, edible birds' nests and sapan-wood to the British settlements in the Strait of Malacca.

**Jun'kin** (GIBBES), D. D., LL.D., b. near Kingston, Pa., Nov. 1, 1790; graduated at Jefferson College in 1813; studied theology in New York City, and was for many years pastor of churches at Milton and McEwensville, Pa.; was president of Lafayette College 1832-41, and again 1844-48; of Miami University 1841-44, and of Washington College, Lexington, Va., 1848-61, leaving the latter post at the outbreak of the war on account of his loyalty to the Union. Dr. Junkin was a prominent champion of "Old School" Presbyterianism, and wrote several theological and controversial treatises. D. at Philadelphia, May 29, 1868.

**Ju'no**, the third in order of discovery of the asteroids. It was found by Harding at the Lilienthal observatory, near Bremen, Sept. 1, 1804. It shines as a star of the eighth or ninth magnitude, and is of a whitish color, and not nebulous. Its sidereal revolution is performed in 592.66 mean solar days. Its orbit is inclined to the ecliptic  $139^{\circ} 1' 20''$ . Its diameter and magnitude are not well known.

**Juno** [Lat., gen. *Junonis*], in the Roman mythology, the queen of heaven and the wife of Jupiter, identified with the Cupra of the Etruscans, and later with the Hera of the Greeks. She presided over womanhood, the marriage-bed, maternity, and chaste wedlock, and over new-born children; and in public affairs she guarded the finances and public justice.

**Junot'** (ANDRÉ), duke of Abrantes, b. at Bussy-le-Grand Oct. 23, 1771; studied first law, but entered in 1792 a battalion of volunteers; distinguished himself at the siege of Toulon; accompanied Napoleon as aide-de-camp in Italy and Egypt, and was made general of division and commander-general of Paris in 1800. Somewhat displeased at the prodigality and lack of discretion which he (and especially his wife) showed, the emperor sent him in 1805 as ambassador to Lisbon; but he very soon left his post, repaired to the army in Germany, and distinguished himself in the battle of Austerlitz. In 1806 he was once more made commander-general of Paris, but in the next year Napoleon was compelled to send him and his wife away again. He was placed at the head of a small army corps destined to invade Portugal, and his success was so brilliant in this undertaking that Napoleon made him duke of Abrantes. Having been defeated at Vimiera by Wellington, he concluded the convention of Cintra with the English, which highly displeased Napoleon, and during the campaign of 1812 he was mentioned as "wanting energy" in one of the emperor's reports. In 1813 he was made governor of Illyria, and his mental derangement now became apparent. He was brought to France, and at Montbard he threw himself out of a window, and d. a few days after, July 22, 1813.

**Junot** (LAURE), duchess of Abrantes, b. Nov. 6, 1784, at Montpellier, France, of a rich merchant family of the name of Peranon. Having married Gen. Junot in 1800, she became one of the most brilliant ladies of the French court. She was beautiful, witty, with a great talent for intrigue, and her audacity was as boundless as her prodigality. Napoleon called her *La petite peste*. After the death of her husband and the fall of Napoleon, she still maintained her social position in Paris and Rome, and made in 1831 a great sensation by her *Mémoires sur Napoléon* (18 vols.), which were followed by *Mémoires sur la Restauration* (6 vols., 1836) and *Souvenirs d'un Ambassadeur en Portugal* (2 vols., 1837). But she was now poor and sick, and d. in a house of charity in Paris June 7, 1838.

**Jupati' Palm**, the curious *Raphia tædigera* of the lower Amazon valley. Its trunk is barely eight to ten feet high, but it puts up a magnificent crown of pinnately compound leaves, some of which are often sixty feet long. The dried leaf-stalks contain a pith which is used instead of cork, and the hard and light outer crust is very useful in joinery.

**Ju'piter**, the fifth planet in order of distance from the sun, and far the largest and most massive of all the members of the solar system. Jupiter travels at a mean distance from the sun of 475,692,000 miles. The eccentricity of his orbit is 0.048239, so that the distance of the centre of his orbit from the sun is equal to  $0.048239 \times 475,692,000$  miles, or 22,947,000 miles, and his greatest and least distances from the sun are respectively 498,639,000 miles and 452,745,000 miles. The longitude of the perihelion is  $11^{\circ} 55'$ , so that the centre of the orbit is in lon.  $191^{\circ} 55'$ ; and in any true delineation of the orbit a distance corresponding to 22,947,000 miles, on the scale adopted, must be set off in this longitude, and a circle struck with this point as centre, and a distance corresponding to 475,692,000 as radius will represent the orbit of Jupiter with sufficient approximation; for, though the eccentricity of the orbit is considerable, the ellipticity is very slight indeed, and on any ordinary scale for drawing the orbits may be left out of consideration. (The semi-minor axis is less than the semi-major axis in the ratio of  $\sqrt{1 - 0.048239^2}$  to 1, or approximately as 1 : 1 - 0.0025 : 1, or about 998 to 10,000; so that the excess of the semi-major over the semi-minor axis is less than the 830th part of either semi-axis.) It is worth noticing that the earth's mean distance from the sun being 91,430,000 miles, its fourth part, or 22,857,500 miles, differs very little from the eccentricity of Jupiter's orbit measured in miles. The plane of Jupiter's path is inclined  $1^{\circ} 18' 40''.3$  to the ecliptic, the rising node lying in lon.  $98^{\circ} 55\frac{1}{2}'$ . The reader must not fall into the mistake, however, of supposing that the most massive planet of the solar system moves in a plane inclined even at this small angle (less than  $\frac{1}{4}^{\circ}$ ) to the medial plane of the system; for the plane of the ecliptic to which we refer the others is itself inclined to the medial or invariable plane. As the rising node of the invariable plane is in lon.  $102^{\circ} 52\frac{1}{2}'$ , less than  $3^{\circ}$  from Jupiter's rising node, and its inclination  $1^{\circ} 35\frac{1}{2}'$ , differing less than  $17'$  from Jupiter's, we see that the plane of Jupiter's orbit very nearly coincides with the invariable plan of the solar system. Jupiter completes the circuit of his orbit in a mean sidereal period of 4332.5848 days, or 11 years (tropical) 314.92 days, or roughly 11 years 10 months 9 days—counting 304 days for the months. His mean daily motion in his orbit is  $299''.129$ ; and as the earth's mean daily motion is  $3548''.193$ , it follows that his mean daily loss in heliocentric longitude as compared with the earth amounts to  $3249''.064$ ; hence, the mean interval between successive conjunctions of the earth and Jupiter (amounting to as many days as this arc is contained in  $360^{\circ}$ ) is equal to 398.867 days—in other words, this is Jupiter's mean synodical period. Jupiter's mean diameter = 85,000 miles; his greatest about  $\frac{1}{4}$ th more; his least about  $\frac{1}{4}$ th less; his polar compression being about  $\frac{1}{4}$ th. Thus, his equatorial diameter = 87,500 miles and his polar diameter = 82,200 miles. His volume exceeds the earth's 1233 times, but the mean density of his substance being only equal to about one-fourth the earth's, his mass does not exceed hers more than 304 times. As compared with the sun's mass (regarded as unity), Jupiter's has then been estimated by various astronomers: by Laplace,  $\frac{1}{1047}$ ; by Nicolay,  $\frac{1}{1074}$ ; by Airy,  $\frac{1}{1514}$ ; by Santenay,  $\frac{1}{1461}$ ; by Bessel,  $\frac{1}{1047}$ ; by Krüger,  $\frac{1}{1047}$ . Taking  $\frac{1}{1047}$  as a fair mean of the latest and best values, we see that Jupiter's mass is but a small fraction of the sun's. Nevertheless, as compared with all the other planets, Jupiter is not merely first in mass, but he more than outweighs them taken all together. This will be seen from the following table, representing the masses of the various known members of the solar system, the earth's mass being represented as 1000:



Smaller planets.		Larger planets.	
Mercury.....	65	Jupiter.....	300,860
Venus.....	88.5	Saturn.....	95,932
Earth.....	1000	Uranus.....	12,650
Mars.....	118	Neptune.....	16,733
Asteroids together		Total.....	419,935
less than.....	100		2,168
Total.....	2168	Grand total.....	422,103
		Jupiter's mass.....	300,860

Mass of all the planets except Jupiter, 121,243

Thus we see that Jupiter's mass bears to the mass of all the other planets taken together a ratio of nearly 5 to 2; and in passing we may notice that three-fourths of the remaining mass, after Jupiter is removed, appertains to one planet—viz. to Saturn.

Jupiter is surrounded by a system of four satellites. These were discovered by Galileo in the year 1610. Their distances from Jupiter's centre are equal, respectively, to 6.05, 9.62, 15.35, and 26.99 radii of Jupiter, and their sidereal periods of revolution are respectively 1d. 18h. 20m., 3d. 13h. 4m., 7d. 3h. 43m., and 19d. 16h. 32m. Their diameters have been estimated at 2352, 2099, 2436, and 2926, taking them in the order of their distance from Jupiter; so that the third is far the largest, exceeding even the planet Mercury in size. But in mass these bodies are not so great, relatively, as we should judge from their dimensions, at least comparing them with the smaller planets and our moon. The following table presents their masses and densities. (It is to be noticed that the values given in many handbooks of astronomy are incorrect):

Satellite	Mass, that of Ju. piter = 1.	Mass, that of the earth = 1.	D. n. ity, that of earth = 1.	D. n. ity, that of water = 1.	Diameter in miles.
I.	0.0000173	0.00320	0.198	1.148	2352
II.	0.0000232	0.00598	0.374	2.167	2099
III.	0.0000885	0.02663	0.325	1.883	2436
IV.	0.0000427	0.01283	0.253	1.468	2926
Our moon.....	0.0000378	0.01136	0.556	3.373	2164.6

The motions of the satellites of Jupiter have afforded an interesting subject of study to astronomers, and a subject which has been fruitful of instructive results. When they were first discovered it was supposed that by observing their eclipses and occultations astronomers could determine the longitude, and it was even hoped that the difficult problem of determining the longitude at sea might thus be solved. This hope, however, soon proved to be unfounded, since even when observed on land an eclipse or occultation is not found to occur (apparently) at precisely the same instant when observed with telescopes of different powers; and the determination of longitude requires that the exact instant of the occurrence of a celestial phenomenon should be ascertained. But before long a discovery of great importance rewarded the observation of the eclipses of Jupiter's satellites, originally carried on in order to form tables of the motions of these bodies. It was found that an eclipse or reappearance occurred sooner than the predicted time when the planet was in opposition or nearly so, and later when the planet was approaching conjunction with the sun, or had recently reappeared in the twilight skies after conjunction. The explanation of these peculiarities was first perceived by Roemer, who showed that they are due to the motion of light with finite velocity. The light-message conveying to us the news of an eclipse or occultation or reappearance of one of Jupiter's satellites thus takes a longer or shorter time in reaching the earth according as Jupiter is at a greater or less distance. It was thus found that light travels at the rate of about 192,000 miles per second. Another interesting fact revealed by the study of the moons of Jupiter is the relation between the motions of the three inner moons. From the values given above for the sidereal revolution it is easily calculated that the sidereal motions of the three inner satellites respectively are  $8^{\circ}.478706$ ,  $4^{\circ}.223947$ , and  $2^{\circ}.096567$ . The sidereal motion of the innermost is not, it will be observed, exactly double that of the second, though nearly so; nor again is the sidereal motion of the second exactly double that of the first. But this relation holds *exactly*: the sidereal motion of the first added to twice the sidereal motion of the third is equal to three times the sidereal motion of the second; or thus:

$$8^{\circ}.478706 + 2(2^{\circ}.096567) = 12^{\circ}.671840 = 3(4^{\circ}.223947).$$

Add to this the observed fact that when the first and third satellites are in conjunction, the second is in opposition to them, and we perceive that *for all time* these three satellites circle under the following conditions: starting from the case just described, we have, first, I. and III. in conjunction, II. in opposition to them; when I. has gained three-quarters of a revolution on III., we have

$$\text{Sid. mot. of I.} + 2 \text{ sid. mot. of III.} =$$

$$\text{Sid. mot. of I.} + 2 \left( \text{sid. mot. of I.} - \frac{3\pi}{2} \right) =$$

3 sid. mot. of I.  $- 3\pi = 3$  sid. mot. of II. (because of the relation stated above).

Hence, sid. mot. of I. = sid. mot. of II.  $+ \pi$ ;

i. e. when I. has gained three-quarters of a revolution on III., it has gained half a revolution on II.; but it was in opposition to II. at starting, it must therefore now be in conjunction with II., and III. is in quadrature to both. Proceeding similarly, we perceive that when I. has gained three-fourths of a revolution once again on III., I. is in opposition both to II. and III. Another of these intervals brings I. and II. into conjunction, and III. in quadrature to both. A fourth such interval brings about the same arrangement as at first—viz. I. and III. in conjunction, and II. in opposition to both. It is clear, therefore, that I., II., and III. can never be in conjunction at the same time.

The telescopic study of Jupiter has led to results of considerable interest. It has been found that his globe is surrounded by belts variable in width and color. Usually the equatorial region is occupied by a yellowish-white belt, the bands bordering this belt on either side being darker and usually tinged with brown. Towards the poles the belts are commonly less marked in color, and slightly tinged with a bluish hue. From the movements of spots on these belts it is inferred that the planet rotates on an axis inclined only about three degrees from perpendicularity to the plane of Jupiter's orbit, and that his rotation period is 9h. 55m. 26s. But the marks from which this rotation has been inferred manifestly do not belong to the solid frame of the planet, since they have been found to have a proper motion, resembling that which Carrington discovered in the case of the solar spots. The great depth of the Jovian cloud-layers, their variability in shape and color, the rapid motions implied by their change of aspect, and the small density of Jupiter's vast orb, all suggest the belief that his condition resembles rather that of the sun than that of the earth. Apart from these considerations, it seems impossible to believe that the sun, which pours but one-twenty-seventh part of the heat on Jupiter which he pours on the earth, can be the originating cause of atmospheric disturbances in Jupiter, which manifestly exceed greatly in intensity those which take place in our own air. Prof. Benjamin Peirce has also shown that on the nebular hypothesis both the planets Jupiter and Saturn must still be in an intensely heated condition, and are probably in large part still vaporous.

R. A. PROCTOR.

**Jupiter, Juppiter, or Diespiter** (gen. *Joris*), in the Italian mythology, the king and father of the gods and the just ruler of men; later identified with that far less noble conception, the Greek Zeus. Jupiter gave the rain, the thunder and lightning, the storm and calm. He was the protector of public justice and private virtue, the leader of armies, and the sender of instructive portents. He was the god of air and light, and the especial patron of Rome and her people.

**Jupiter Ammon.** See AMMON.

**Ju'ra**, one of the Inner Hebrides, belonging to the county of Argyre, Scotland. Area, 84 square miles. Pop. 844. The western coast is rugged and precipitous; the eastern, sloping and pleasant. Oats, barley, and flax are raised and black cattle reared. Between Jura and Scarva is the whirlpool of Corrievekin.

**Jura**, a department of France, on the frontier of Switzerland. Area, 1943 square miles. Pop. 287,634. The largest part is occupied by the Jura Mountains, which yield excellent timber and extensive pastures, on which large herds of cattle and sheep are raised. The remaining lowlands and the valleys have rich soil, well adapted to agriculture and the cultivation of vines. Iron-mining is the principal industry of the department; wine, cheese, and timber its main products. The inhabitants are thrifty and well educated. Cap. Lons-le-Saulnier.

**Jura**, the name of a system of mountain-ranges, generally from 5000 to 6000 feet high, which cover parts of France, Switzerland, and Germany. They consist of a peculiar kind of limestone, called the Jura limestone, and are generally covered with fine pine forests. In the Swiss Jura many stalactitic grottoes are found, and caves abounding in bones of extinct animals. In several places large rivers, as the Orbe, the Doubs, and the Creuse, are lost in the ground and their course concealed for some distance. The highest peaks are Moleson, 6588 feet, and Reculet de Toiry, 5643 feet.

**Juras'sic, The**, is the "Period" in the earth's history that intervenes between the Triassic and the Cretaceous, and thus the second or middle division of the Mesozoic Age. The term is also applied to the group of rocks that were formed during this period, and is derived from the Jura Mountains, between France and Switzerland, in which an extensive series of these rocks occurs and has



been carefully studied by many distinguished observers. The term Oolite (œov, an "egg," and λίθος, a "stone," in allusion to certain limestones that in texture present the appearance of the roe of a fish) is sometimes used as synonymous with Jurassic, but it is more appropriately restricted to one of the subordinate epochs of the period. Where best developed the rocks of the Jurassic indicate to us repeated recurrences of similar conditions of deposit, accompanied by closely related faunas. Each such group of rocks with its associated fauna forms a natural "formation," and is defined above and below by a "break" in the series, the break being evidenced by an unconformable arrangement of the contiguous strata due to an interval of upheaval and denudation. Such a formation is in fact built up of the successive deposits of one sea or delta, and the entire series represents to us the successive movements of upheaval and depression, and records the accompanying migrations of life that in that area constituted the great geological events of the Jurassic period. In the accompanying table we give the classification of the subdivisions of the Jurassic and its formations, as found developed in Western Europe and Great Britain:

A Table of the Classification of the Subdivisions and Formations of the Jurassic Period.\*

		CRETACEOUS.	
		Conditions.	Formations.
MESOZOIC or SECONDARY AGE.	JURASSIC PERIOD.	Fresh water.	Purbeck beds.
		Third Oolitic Sea.	Upper Oolite.
		Second Oolitic Sea.	Middle Oolite.
		First Oolitic Sea.	Lower Oolite.
		Second Liassic Sea.	Upper Lias.
	TERTIARY PERIOD.	First Liassic Sea.	Middle and Lower Lias.

The detailed history of geological progress thus recorded is, however, due to the peculiar geographical condition, during that period, of the region referred to. During times of upheaval it was a valley bordering the widespread Jurassic seas, and during intervals of depression it became a gulf or limited marine area, overwhelmed by the temporarily advancing waters of the ocean and peopled by successive faunas, each in turn derived from the common source, and each in turn more or less completely cut off from its successor by the recurring movements of upheaval. Outside of this limited area the conditions of the general Jurassic ocean seem not to have been notably affected by the undulations of its bed, and consequently events that were strongly marked in Western Europe were not elsewhere recorded by alternations of the strata or subdivisions of the fauna. Hence, whilst we recognize Jurassic strata by Jurassic fossils in Russia, widely spread over Asia to India, in the Rocky Mountains of the U. S., in the Andes of South America, in the Arctic regions, and in Australia, yet we can hardly expect to be able to subdivide the rocks accurately according to the above classification, or to assign the fossils with any certainty to the subordinate divisions of the period. In the U. S., in addition to strata doubtfully assigned to this period on the Atlantic border, there occur "true Jurassic strata full of characteristic fossils about the Black Hills and the Laramie Mountains, and also at the base of other ridges in the Rocky Mountains." (Dana.)

The paleontology of the Jurassic is of exceeding interest to the student, who here finds himself on a border land, with the palæozoic types of fossils, rapidly disappearing on the one hand, and on the other forms appearing which usher in existing life, and amidst all a fauna thoroughly characteristic of Mesozoic times. Every great group of

the animal kingdom is represented—marsupials in the Stonesfield slate and Purbeck Beds; birds (*Archæopteryx* from Middle Oolite); whilst reptiles at this time attain to their maximum development, dinosaurs (*Scelidosaurus* and *Megalosaurus*) on the Jurassic lands; Enchosaurs (*Ichthyosaurus*, *Platysaurus*, and *Phocaenus*), with crocodiles (*Telosaurus*) in its waters; pterodactyles flitting through the air. Fishes, too, are abundantly represented by sharks (*Hypodus*, *Acrodus*, and *Chimeroids*), sturgeons (*Chondrosteus*) and a host of sauroid and other ganoid forms. Amongst Mollusca, the cephalopodous *Ammonites* and *Belemnites* are most abundant, as are also the genera *Terebratula* and *Rhynchonella* amongst brachiopods. Echinoderms abound. Eucrinites amongst the crinoids have all but passed away, but their place is well filled by multitudes of *Pentacrinites*, and in certain strata corals are well represented. The most characteristic forms of the period are perhaps to be found in the Ammonitidae, Belemnitidae, and Pentacrinites. Upon the whole, the Jurassic fauna would appear to have its nearest existing representative in that of our Australasian lands and seas; such forms as the marsupials, as *Centronia* and *Callorhynchus*, as *Trigonia* and *Waldheimia*, etc., appearing like the last descendants of Jurassic prototypes.

EDWARD C. H. DAY.

**Jurieu de la Gravière** (JEAN BAPTISTE EDMOND), b. in France Nov. 19, 1812; entered the navy in 1828; became captain of a corvette in 1841; was engaged in the Chinese war in command of the *Bayonnaise*; was promoted to a full captaincy in 1850; served in the Black Sea during the Crimean war; was made rear-admiral Dec. 1, 1855, and placed at the head of a squadron in the Adriatic. In Oct., 1861, he received the command of the squadron sent against Mexico in pursuance of the triple alliance between France, England, and Spain, and as imperial commissioner adjusted with the government of President Juárez the famous treaty of Soledad, which was repudiated by Napoleon III. He became vice-admiral in 1862, and has written several works, the most esteemed of which is the *Voyage en Chine* (1854).

**Jurieu** (PIERRE), b. at Mer, in Orléanais, Dec. 24, 1637; studied theology at Sedan; visited Holland and England, and succeeded his father as pastor of the Reformed church of his native city. In 1674 he was appointed professor of Hebrew and theology at the academy of Sedan, but when this institution was broken up in 1681 by the Jesuits, and he himself put under persecution for his *La Politique du Clergé de France*, he sought refuge in Holland, and was elected pastor of the Walloon church in Rotterdam, where he d. Jan. 11, 1713. In spite of his restless and irritable spirit, which drove him from one controversy into another, he was of great aid and comfort to the Protestant Church in France, and among his numerous writings there are many of great value, as, for instance, *Histoire Critique des Dogmes et des Cultes* (1704) and *Histoire du Calvinisme et du Papisme* (1682).

**Jurisdiction** [Lat.], in law, is the power possessed by a person or body of men to dispose of a cause or question judicially. It may originate, as it has often done in England, from long usage, or it may be conferred, as it usually is in this country, by statute or by constitutional provision. Jurisdiction may be either *concurrent* or *exclusive*. By this distinction is meant that sometimes two or more courts, indifferently, may entertain a cause, while in other cases it can be disposed of by one alone. Thus, an inferior court, e.g., a justice of the peace, frequently has concurrent jurisdiction with a superior court of minor causes. The action may accordingly be commenced in either. An instance of exclusive jurisdiction is that of a probate court in determining the existence and validity of a will. Jurisdiction is also original and appellate. It is original when a court entertains the cause in the first instance, appellate when it is brought from another court. Again, jurisdiction may be either of the subject-matter or of the person. The court may, for example, have general power over the subject, but it may not be presented in such a way that its authority can be exercised. Where jurisdiction does not exist the act of passing judgment is wholly inoperative and void. Thus, if a State court should pass upon a question which is reserved by the U. S. Constitution exclusively for the Federal tribunals, its judgment would be without effect. An instance would be the assumption of the functions of a court of admiralty. It is not necessary, where there is a total want of jurisdiction, to raise the question by an appeal from the decision. It may be shown to be of no avail in a wholly independent and collateral proceeding. Thus, if a person were sentenced for a criminal offence by a court having no jurisdiction, he might be discharged on a writ of *habeas corpus*.

This power to declare the judgment of a court nullity is one of great delicacy, and should be exercised with much caution. Still, in a clear case there should be no shrinking

\* As recorded in Western Europe and Great Britain.



from its use, as otherwise much injustice may be done. A distinction has been taken as to the presumption of jurisdiction between an inferior and a superior court. It has been laid down as a rule that "nothing shall be intended to be out of the jurisdiction of a superior court except that which specially appears to be so; on the other hand, nothing shall be intended to be within that of the inferior court unless it be expressly so alleged." In determining to which particular class a court belongs, it will be necessary to consider the statutes and usages of the particular State in which the case arises, especially as to such courts as surrogates', general sessions, and justices of the peace. A court may have a limited jurisdiction, such as the circuit or district court of the U. S., and not be an "inferior" court within the meaning of this rule. Even as to the superior courts, the presumption of jurisdiction may be rebutted by proof to the contrary, unless, having jurisdiction under a certain state of facts, its record contains a recital of those facts, in which case the record, by a technical rule of law, is not to be contradicted by extrinsic evidence. Wherever the record expressly or by implication shows that the court proceeded without jurisdiction, there is no presumption in its favor, and its acts are plainly void. The rule also fails of application when the court proceeds in the exercise of some special statutory authority; for as to this, it is deemed to be an inferior rather than a superior court. When the case is one of an "inferior court," another set of rules prevails. The court cannot obtain jurisdiction by deciding that the conditions precedent to the rights to hear and determine the matter in hand exist, when in fact they do not. The most that can be said in any case is that its decision is apparently correct, but the facts may be disproved by extrinsic evidence. Thus, a board of assessors having power to tax residents of a town could not gain jurisdiction over a non-resident by deciding that he was a resident, when he was not so in fact. So, in any case where the record of an "inferior" court does not show upon its face the existence of the facts necessary to give jurisdiction, they are presumed not to have existed, though extrinsic evidence may be offered to the contrary, and the jurisdiction thus be upheld under these rules. If a court-martial should assess a fine without giving the accused an opportunity to be heard, the decision will be wholly void; the court would in such a case have no jurisdiction over the person. The same rule would be applied to a magistrate having power by statute to issue a warrant or an attachment under special circumstances that were not complied with. Where a judge acts wholly without jurisdiction, his decision may not only be disregarded by other courts, but he may render himself liable to an action for damages at the suit of the party injured.

This question of want of jurisdiction is frequently presented where an attempt is made to enforce in the courts of one State the judgment or decree of the courts of another State. The U. S. Constitution provides (art. iv., § 1) that full faith and credit shall be given in each State to the public acts, records, and judicial proceedings of every other State, and Congress is empowered to prescribe the manner in which such acts and proceedings shall be proved and the effect thereof. Under this provision the court of the one State may inquire into the jurisdiction of the court of the other State, and refuse to recognize a judgment rendered without jurisdiction. The Constitutional clause assumes that there is a record to which recognition can be given; and a professed judgment rendered without jurisdiction is in fact no judgment. There must be jurisdiction both of the subject matter and of the person. Accordingly, if judgment was obtained against a defendant in one State without notice, it could not be enforced against him as a judgment in the courts of another State, as the court acted without jurisdiction over his person. It would be immaterial though the courts of the State where the judgment was rendered deemed it valid. A judgment of this kind may sometimes, by force of statutory provisions providing notice by means of newspaper publication instead of that which is personal, have a local effect when it is wholly discarded in other States for want of true jurisdiction over the person. This question frequently arises in the case of an action for total divorce. If one of the parties, having become domiciled in one State, obtains a divorce from the other in his absence and without personal notice, the judgment may be valid by the local law of the State where it is rendered, and yet not be recognized in another State, on the ground of want of jurisdiction. If, on the other hand, the absent party had appeared and submitted to the jurisdiction of the court, the judgment might have been valid in both States. A like question may arise as between the courts of different nations. Thus, the English courts will, as a general rule, recognize as conclusive a judgment rendered in the courts of an American State where the latter has full jurisdiction over the subject. Assuming, what is

doubtful, that this rule would be applied there to an action in this country for divorce from an English marriage, still, if an Englishman, dissatisfied with his marriage relations, should leave England and acquire a domicile in one of our States, the wife still remaining in England, and obtain a divorce valid by its laws, the English courts would not recognize its existence on account of the defect of jurisdiction. It is scarcely necessary to add that questions of jurisdiction thus become of great practical moment in the administration of justice of various states or nations under the rules of private international law.

Under the jurisprudence of the U. S. government, the judicial power is prescribed in the Constitution. It is, for most purposes, left to Congress to determine in what courts it shall be vested. It is, however, provided that there shall be a supreme court, and that it shall have *original* jurisdiction in two classes of cases—one in all cases affecting ambassadors, other public ministers, and consuls, and the other in which a State shall be a party. In all other cases the court shall have appellate jurisdiction, with such exceptions and under such regulations as Congress shall make. The effect of this provision is that Congress cannot confer upon the supreme court "original" jurisdiction in any other cases than those that are expressly mentioned. This is an instance of an application of the rule that the expression of the power in one case is an exclusion of it in all other cases. "Original" jurisdiction in all other cases to which the judicial power of the U. S. extends must be exercised, as far as Federal tribunals are concerned, by some of the "inferior" courts referred to in the Constitution as within the power of Congress to establish. (See CONSTITUTION, U. S.) It cannot, however, be claimed that the supreme court of the U. S. cannot exercise appellate jurisdiction in the two classes of cases in which its jurisdiction is original. Thus, a State may be a party in a State court to a proceeding in which the validity of the laws of Congress may be involved, and the case may be appealable on that ground. The fact that it was a party would be no hindrance to the appeal to the supreme court of the U. S. In fact, there are two general grounds on which a case may be brought before a U. S. court, one being the nature of the case, and the other the presence of a particular party. The fact that the presence of a party makes a case one for original jurisdiction does not prevent the exercise of appellate jurisdiction where that depends on the nature of the case.

The jurisdiction of a State court may or may not be prescribed in a State constitution. Where it is, an act of the legislature extending or abridging its jurisdiction in opposition to the constitutional provisions will be void. Where there is no constitutional direction, the whole matter is within the control of the State legislature, which may in that case erect and abolish courts at will, and parcel out their jurisdiction according to its pleasure. Though such an abolition of a court should displace judges who held office for a specified term, no legal objection would stand in the way, as no contract is created between the State and the judges ensuring their continuance in office for the designated period.

Some suggestions may be useful as to the question whether consent of parties will confer jurisdiction. It is manifest that a judicial tribunal cannot be created by consent. If parties should in the most solemn form agree that they would submit a question to a tribunal created by themselves, the most that their unaided act would amount to would be to appoint an arbitrator and to give him authority to make an award. (See AWARD.) Under the same general view it may be shown that it is impossible by consent to extend the powers of an existing court to subjects over which the law gives it no control. While these positions are true as to jurisdiction "over the subject-matter" of a cause, they cannot be applied with the same breadth to jurisdiction "over the person." It is frequently the case that general power to decide a question exists if the parties are properly before the court, and the law prescribes a particular mode of bringing them there. If that mode is not observed, regularly the court has no jurisdiction. In such a case, if a party waives an observance of the prescribed mode, and voluntarily takes part in the action, the court may, upon the consent thus given, entertain the case. This view could not be taken of a case where the court could not, by the most strict adoption of regular forms of procedure, acquire jurisdiction. An illustration is found in the jurisdiction of a State court over a foreign consul. The U. S. Constitution for public reasons withdraws the consul as a defendant from the State courts. He cannot, accordingly, be sued there by his consent. There is here no question of an adoption of regular forms. The State court has nothing to do with the case, and can no more acquire jurisdiction over the person of the consul by his consent than it could obtain the right to dispose of an admiralty cause in the same manner. T. W. DWIGHT.

**Jurisprudence** is both the *philosophy* and the *science* of law. *Law*, as the subject-matter of jurisprudence, is the body of rules regulating the relative rights and duties of men in society, declared and politically enforced by public authority. As a branch of *philosophy*, jurisprudence is concerned with the *origin* of law, its nature, and its connection with the other phenomena which make up the universe. As a *science*, it classifies into system the body of our knowledge acquired by a study of its actual development and history, and traces the principles which connect its various results. As *philosophy*, it teaches the theory of all possible law: as *science*, it teaches the facts and principles of all actual law.

Jurisprudence, regarded as a whole, comprises not only a study of what the law is and has been, but of what it would be if the principles to be extracted from it were correctly worked out. It permits us to test those principles themselves by a standard external to them—by our abstract notions of what is right and reasonable, by our observation of what is useful, by the visible wants and tendencies of society. "It may be said of laws, that mankind have but *one law*, though every nation has had its *own system of laws*. For positive law is not essentially a simple collection of isolated rules and ordinances, arbitrary or conventional in their nature, but it is a system, exhibiting, amid all its variations in time and place, invariable and fixed principles and relations, which constitute the foundation or identical part of all laws; that is to say, universal or natural law." (2 *Law Rev. and Mag.* (Lond.), N. S. 348.) "For as reason and reflection are natural to man, and are as important parts of his nature as the highest of its instincts, so laws founded on the right exercise of that reason are natural laws in the best and highest sense of all." (Duke of Argyll, *Reign of Law*.)

The nature of man as a rational and moral creature points out the ends and objects of his existence on earth, and the means furnished by external nature by which, in the exercise of his activities in society, they may be attained, and in the progressive exercise of these activities establishes the various relations which bind together and classify mankind in a social order. Arising out of the nature of men, and its relation to the physical and moral universe, and developed in history in the progressive culture of the race, jurisprudence may be traced and studied both *deductively* and *historically*. The conclusions reached by this double analysis, and reconciled, constitute the science. Law and government appear as facts in human history simultaneously. They never exist apart, and from their nature cannot; it being the very office of government to declare and enforce law, and law, consisting of those rules of conduct which are enforceable and actually enforced by that public authority embodied in government. Law and government are therefore correlates. Each implies the other. From the simplest to the most complex political organizations—the family, the tribe, the nation—as society develops historically, law is always present; but in the logical order its idea is prior, for governments exist in order that law may be declared and enforced.

The study of human nature gives rise to the *conception of a moral order*, the realization of which constitutes man's highest good, and the pursuit of which employs all his activities. It constitutes the *final cause* of man's existence, the purpose and perfection of his being, his end and destiny. Whatever conforms to that moral order is *right*; whatever violates it is *wrong*. Subsidiary to that conception of universal moral order, and forming parts of it, through the medium of which in combination it is to be realized, are subordinate conceptions of the human reason declaring and defining the relations of men with each other in society, of men with each other in relation to external nature, and to the universe of things, material, intellectual, and moral. Illustrations of these are conceptions of the family, the state, of property, of contract, etc. To conform to that universal moral order—that is, to do whatever is *right* and avoid whatever is *wrong*—the nature of man recognizes as his *duty*; which at the same time he is conscious, by virtue of the *freedom of his will*, that he may choose not to perform; the exercise of which, in that way, however, he feels to be the breach of an *obligation*. The conception of this moral order binding him, as a rational free agent, to its observance, is the idea of *moral* duty, the rules of which, analyzed and classified, constitute the science of *ethics*; and those rules, habitually practised, are named *virtues*, their habitual violations, *vices*. Among virtues we find that of *justice*, which is defined to be the *habitual disposition to render every man his due*; and those claims, whatever they may be, which belong to man as matters of justice are called *rights*. The duties resting on all to render to each his rights are called *obligations*, the violation of them, *wrongs*; the relations between men thus established are distinguished as *jurid*.

Rights differ from other *moral claims* of men upon each other in this—that the latter are *duties*, depending for their fulfilment altogether upon the *good-will* of those bound by them; the former carry with them a claim to be *enforced by physical compulsion*. But as the mind of man is not the subject of physical force, the *rights* which are susceptible of being enforced must be such only as constitute claims upon the *external conduct* or *overt acts* of others; but for the purpose of determining the *moral quality* of these it often becomes necessary to investigate the *mental conditions* of the agent at the time of their commission, as in questions of motive, intention, negligence, sanity, intoxication, nonage, etc. And the physical force required for their enforcement is furnished by the *public authority*, representing the *rational will* of the community in the administration of law. That *public authority*, organized in every separate, independent community constituting a *state* or *nation*, is its political and civil government; and to it is referred the determination, from time to time, in each successive stage of its history, of the question, What are the *just and natural moral claims* of each member of society upon all which it will enforce as *legal rights*; and its declarations to that effect are the *positive laws of that state*. The supreme public authority inherent in every independent state or nation, whereby it organizes its political and civil government, is called *sovereignty*; and the mode in which the government exercises the powers of sovereignty is its constitution. There are no *legal limits* to sovereign power, for it declares what the law is; it is bound only by moral restraints, but the constitution of a state may impose *legal limitations* upon the government; and this gives rise to *public or constitutional law*.

There is, however, a *supreme law* which binds and restrains the sovereignty of individual states. It is the *law of nations*, or *international law*. It consists of a body of rules regulating the relative rights and duties of independent nations in that mutual intercourse demanded by the progressive advancement of human society. It is the application of the right reason and cultivated conscience of mankind to the relations of men organized into separate and independent communities and as subjects of distinct national sovereignties. It is developed by diplomatic discussions and state papers; by the decisions of judicial tribunals in private controversies, where the litigants have no common municipal superior; by the treaties of philosophical jurists; and is embodied in a traditional code of international usage and the modifying legislation of treaties and conventions. It is not, as has sometimes been said, without a *sanction*; for, although sovereign nations recognize no common superior with power to prescribe the rules of their conduct, nevertheless each sovereign is a public authority which by resort to the *ultima ratio* of just war, is entitled, according to the public opinion of the civilized world, to enforce the commands of international law; any breach of which, though directly injurious to but one, is also an offence against the rights and peace of all.

Each individual member of human society is under a *moral necessity*—that is, owes the duty by the rational exercise of his will—to conform to the universal moral order by the habitual observance of all the rules of morality and the practice of those virtues which constitute the ideal excellence of life and character; and is therefore not only entitled, but required by the constitution of his nature, to employ the means necessary to enable him to perform that duty. The means to this end are furnished by the organization of mankind in society, and the materials for its development provided by the material universe with which he is placed in contact or connection. But both duties—to attain the end and use the means—rest *equally* on all; and the liberty of each man's will in the pursuit of his highest good is limited by the proper exercise of the wills of all others. The harmony of this coexistence is the establishment of *civil and social order*, which is the sphere and scope of human freedom, personal, civil, and political, being *liberty regulated by law*, the principle of which is *equality in right*.

The perfection of civil order, it is manifest, therefore, consists in the largest liberty of *individual action* compatible with the *equal liberty* of all others—that is, compatible with the *general good*; and the question requiring solution in every case as it arises or is foreseen is, To what extent is the public authority justified in imposing physical restraint upon, or applying physical coercion to, individual action? It has been found impossible hitherto to announce any principle which will theoretically answer that question for all cases. There has been found, indeed, as yet, no common agreement as to the true principle on which the public authority intervenes forcibly at all. Some ground it on the principle of *self-defence*; some, on the preservation of the *status quo*; some, on the abstract nature and quality of rights as enforceable; some, by the application of the



maxim, "Do as you would be done by;" others, by the principle that any one may prevent what will make his physical condition less comfortable than it is by nature; but the opinion most generally received is, that the proper limit of the law, as the applied or threatened public force, is in every case a question to be determined by the *cultivated reason and enlightened conscience of mankind*, testing and correcting their conclusions by *progressive experience* as it advances in civilization, resorting to *expediency and utility*, not as the standard and measure of truth, but as its *evidence and confirmation*, seeking the perfection of man in the historical realization in human society of *ideal justice*.

Consequently, every system of civilized jurisprudence will be found to contain two elements—one deduced by the public reason from the general principles of natural justice; the other dogmatically fixed by recognized custom or by express legislation, and affected by the peculiarities of national character, history, and situation. The latter is arbitrary, accidental, and positive; the former is its rational element and unchangeable foundation. "It would be hard," says Burke, "to point out any error more truly subversive of all the order and beauty, of all the peace and happiness, of human society than the position that any body of men have a right to make what laws they please, or that laws can derive any authority whatever from their *institution merely*, and independent of the quality of their subject-matter. . . . *All human laws are, properly speaking, only declaratory*. They may alter the mode and application, but have no power over the substance of original justice."

*Jurisprudence*, then, is distinguished from *ethics* as a part is from the whole, being one of the branches of that larger and more comprehensive department of human knowledge. On the other hand, its own province includes—1. *Natural Law*, or that theory of human relations, and the rights and obligations implied in them, deducible from the nature of man and of the things around him, and of which his social and individual advancement require the enforcement, if necessary, by physical power. 2. *International Law*, or that body of rules deducible from the relations of man, organized into separate and independent communities, and which are applied (1) to regulate the intercourse of sovereign states, and of which the ultimate sanction is just war; (2) to determine the rights and obligations arising between individuals considered as subjects of separate sovereign jurisdictions, by judicial tribunals acting and deciding on private controversies. The former is called public international law; the latter, private international law. 3. *Public or Constitutional Law*, or that body of customary or enacted rules which form the frame of political government or constitution of the state, prescribing the divisions of political power, the functions of public authorities, and the relative rights and duties of the national government and the subjects of its jurisdiction. 4. *Municipal Law*, or the domestic law of particular states, prescribing the relative rights and obligations of all persons subject to its jurisdiction as members of that separate community. Examples of this are to be found in the *Roman law*, conspicuously called the *civil law*, which forms the base of the civil rights and duties of a large number of modern states, in which it has been preserved since the days of the supremacy of the Roman empire; and the *common law of England*, which consists chiefly in a body of principles applied in the historical development of the English people, embodied in traditional customs, deduced by judicial practice and decision, by the application of reason to the varied and multiplying relations of men and things in a community remarkable for vigorous and continuous growth, and from time to time supplemented by express legislation. The *canon law* also constitutes part of the municipal law of those states where it is or has been recognized, being originally a body of rules established by the ecclesiastical authority of the Christian Church, acting with civil power over certain matters claimed by it to be, by reason of their spiritual nature, exclusively within that jurisdiction, but since, in accordance with more enlightened views as to the true division of the civil and spiritual authority, adopted by the civil power of the state as part of the body of its municipal law. Under the head of municipal law is to be found the whole body of authoritative rules regulating the *personal status* of the individual members of the state, and the relations annexed to and growing out of it, with the corresponding rights and obligations, such as husband and wife, parent and child, etc.; also the relations of men to one another as constituted by *contract, property*, and all those civil relations which are based on their mutual intercourse. A large part of every such system becomes law by the unconscious operation of social instincts, growing into habitual observances, thus forming what is known as *customary law*, which becomes scientifically developed by a long series of *judicial decisions*, making new applications

of recognized principles, discovering new principles by the analogy of reason, and supplied as necessity or convenience requires by the express aid of *legislation*. When the mass and body of municipal law thus built up has grown enormous, confused, and unwieldy, a comprehensive legislation reduces it to the written form of a *code*, such as those of Justinian and Napoleon, on which, as on a new foundation, the work of development begins again.

Consult *Droit Naturel*, Henri Ahrens (Leipsic, 1868); *Philosophie du Droit*, Lermier (Paris, 1853); *Political Ethics*, Fr. Lieber; *Inquiries, Elementary and Historical, in the Science of Law*, Jas. Reddie (London, 1847); *Principles of Jurisprudence*, D. C. Heron (London, 1873); *Elements of Jurisprudence*, C. J. Foster (London, 1853); *Sphere and Duties of Government*, William Humboldt, Tr. Jos. Coulthard (London, 1854); *Inquiries in International Law, Public and Private*, Jas. Reddie (Edinburgh, 1851); *Principles and Maxims of Jurisprudence*, J. G. Phillimore (London, 1856); *Two Treatises on Government*, John Locke (London, 1821); *Universal Jurisprudence*, J. P. Thomas (London, 1828); *System of Universal Law*, Heineccius, tr. Turnbull (London, 1763); *Doctrina Juris Philosophica*, Warkönig (1830); *Philosophia Juris*, Warkönig (1855); *Vocation of our Age for Legislation and Jurisprudence*, Savigny, tr. Hayward (London, 1831); *Lorimer's Institutes of Law* (Edinburgh, 1872); *Ancient Law*, Sir Henry Sumner Maine; *Province of Jurisprudence*, etc., Austin; *Spirit of Laws*, Montesquieu; *Jurisprudence*, C. S. M. Phillips (London, 1863); *Westlake's Private International Law*; *Phillimore's International Law*; *Lawrence's Wheaton's International Law*. STANLEY MATTHEWS.

**Jurisprudence, Medical.** This is the name given to a science of comparatively recent origin, and which forms a syncretism of law with medicine. Its boundaries in the physical world are coextensive with the whole field of natural history, while in law, although more largely related to the domain of crime or public hygiene, its assistance is often required in cases involving the application of chemistry to the mechanic arts. It is also designated as *forensic, juridical, or state medicine*, and is defined as the *science which treats of the application of the laws of nature to the administration of justice and the preservation of the public health*. Nearly all the physical sciences contribute to the wants of this new sister, while with an equally wide range it enters into the myriad channels of municipal law, and follows human relations in all their phases, whether personal, domestic, or social. The application of medical jurisprudence to the admeasurement of physical facts affecting the civil or criminal responsibility of persons amounts practically to this only, that medicine furnishes the lights of her experience, and law applies them according to the established rules of her tribunals and under the equities of each particular case. Medicine furnishes the principle, law the rule, for its application to the artificial relations of civil life; and thus, without collision or conflict, each science treads its appointed path and performs its required part in human government. Some idea of the range over which experts may have to travel in order to decide problems in medical jurisprudence will be had from enumerating the various sciences into whose fields these inquiries must enter. The first is natural philosophy in its restricted sense, and involving more particularly *meteorology* and its influences upon animal or vegetable life; next, *physical geography and climatology*; following these in all their various divisions and subdivisions come *anatomy, physiology, pathology, therapeutics, surgery, chemistry* in its multiple relations, *botany, hygiene, and mental philosophy or psychology*. It is needless to say that no one can be equally proficient in all these sciences; and yet without some knowledge of the general principles of each, and of their nomenclature, a medical jurist would fail at the very outset to know in which of all these fields he must look for a rational solution of any problem committed to his judgment.

Although, as before said, medical jurisprudence as a science is of comparatively recent origin, one of its departments, that of public health, has always engaged the attention of lawgivers from the earliest days of established governments. Among the Hindoos, and more lately among the Israelites, we have the best evidence from their religious codes of the important part which it occupied in their ceremonial law. The frequent lustrations and isolations of the person enjoined as part of the habitual duty of all sectaries converted a physiological safeguard into an act of worship, and thus protected the health of the community while ensuring that of the individual. For so urgent is the necessity of personal purification among a people proverbially unclean, and in a climate disposing to pestilence, that Mohammed required his followers to cleanse themselves with sand wherever water could not be obtained. From this incorporation of sanitary observances into the



religion of a country, it followed that priests became the earliest custodians of public health, and, it may be truly said, the first medical jurists on record. The Jews, with all their traditional respect for the teachings of the Pentateuch, and their adherence to the tabernacle ritual of their religion, do not appear to have followed its injunctions as closely in their domestic life as consistency would demand. Much that was commanded by Moses is now practically ignored, and Leviticus has given place to modern science and household convenience. In striking contrast to this is the still enduring imperative of Brahma, for even at this day in India caste is forfeited by touching articles forbidden in the religious code, and the priest among the Hindus remains in many senses the supreme lawgiver, as in ages past.

It is not difficult to conceive that a people as enlightened as the ancient Egyptians must have had canons of medical police by which to guide their civil life. According to Herodotus, they had laws regulating marriage and the relations of the sexes; distinguishing between mortal and dangerous wounds in order to affix penalties; prescribing modes of embalming and interring the dead; and in other respects maintaining what would now be called a system of sanitary and criminal police. Nor, after reading the ordinances of Lycurgus, or the physical rubrics laid down by Pythagoras and Plato, need we ask whether they had studied the laws of our bodily life. Both these philosophers believed and taught that medicine was a branch of legislation. Beyond this, however, there is nothing to show that anything approaching to a distinct science of forensic medicine was ever conceived by them. No union of the principles of law and medicine appears in the jurisprudence of Greece, for, except in questions of public disease or medical police, medical men were not often consulted by the tribunals of that country. The chief concern there was to secure a robust population capable of bearing arms, and in their prevalent ideas as to the best mode of perfecting the human species they were led to the barbarous practice of abandoning delicate infants and rearing only strong ones. Even Plato advises that children with diseases of inheritance should be left to chance for their future development. To perfect this dogma of their political economy, and to provide for the health of cities and camps, formed about the entire scope of state medicine in Greece. The opinions of Hippocrates and Aristotle on a few subjects relating to the sexes and to wounds express all that was practically used at that day. Nevertheless, so much is there in the authority of a name that many of the principles of the canon law, as formerly recognized in the ecclesiastical courts of Europe, were unquestionably founded upon the teachings of Aristotle, whose *Organon* was the Bible of the schools of philosophy down to the time of Bacon.

In passing to Rome we meet at once a superior character of legislation. A later age and a more advanced knowledge of the duties of municipal government to its citizens placed medical police on a higher plane of action and of authority. As early as the reign of Numa Pompilius a law was enacted which was intended to protect the life of an heir by requiring medical assistance to be summoned in all cases of difficult labor, and forbidding the burial of a pregnant woman until the fetus should first have been extracted. And such was the controlling influence of Greek philosophy in legislation that in the *Pandects* of Justinian, where various titles are arranged referring to crimes, physical deformities, and questions of legitimacy, courts were instructed not to be guided by the judgment of living physicians, but to form their opinions exclusively "upon the authority of the most learned Hippocrates." Yet the existence of an *archiater* or state physician, who was himself both physician to the court and the acknowledged head of the medical profession, must have imparted to his opinion great weight with the judges, notwithstanding the institutional reverence for Hippocrates. According to Tacitus, the bodies of Germanicus and Agrippina were medically examined, and in the former slight traces of poison were found; but as the specific signs thereof are not given, we are left to conjecture how, in the absence of chemical knowledge and familiarity with the characteristic pathology of such cases, any rational judgment could have been arrived at in the premises. Nor, again, are we informed at whose command the autopsy was made, and whether the same was undertaken as part of a judicial inquisition into the cause of their sudden death. Probably, autopsies upon private individuals were not infrequent under similar circumstances of death, but if so, we have no sufficient record to make it the basis of any inference of their judicial character.

In the whirlwind of savage customs which ruled Europe during the Dark Ages legal medicine could hope for no positive recognition. In its stead, ordeals by fire, water, or the judicial combat were introduced as so many direct

interrogations of the Deity. Human responsibility was judged, even before courts of justice, by the haphazard results of chance, and superstition usurped the place of reason. But inasmuch as it is easier to adopt a system of laws than to frame one, the wiser conquerors of Rome were not slow in availing themselves of the rules of her jurisprudence. They drew largely from it, nor did they ever cease paying that homage to her laws which they had so emphatically denied to her empire. It would not be difficult to show that the Roman law had authorized the calling of physicians before courts in cases requiring expert testimony; and finding the same rule prevailing in the jurisprudence of the Ostrogoths in Italy and of Charlemagne in France, it is easy to conjecture the source whence the rule was derived. This may be said to include the whole aspect of legal medicine as presented to us in the laws of antiquity, nor is the little progress shown by it there to be wondered at when we reflect, that most of the physical sciences upon which rest its foundations had scarcely risen upon the horizon of human thought. No Harvey had yet shown that blood, instead of air, circulated through the arteries; no Vesalius had established a system of rational anatomy; no Boerhaave or Van Helmont had yet explored the mine of chemistry through which Priestley and Lavoisier were destined to descend into the very storehouses of nature.

It is now generally admitted that the application of medical knowledge to jurisprudence, and the practical recognition of a science of forensic medicine, only commenced about the middle of the sixteenth century. The criminal code of the Germanic empire, originating with Charles V., and enacted by the diet held at Ratibon in 1532, is the first public recognition and the first legal application of the science with which we meet in modern history. This celebrated code enacts that physicians *shall* be called by courts in all cases where death has been occasioned by violent means, whether accidental or criminal. One of the first and most notable fruits of this new authority given to medicine to enlighten jurisprudence was the speedy overthrow of many dominant superstitions, which had formerly fettered the public mind and cost the lives of hundreds of innocent people. The literature of mediæval Europe on the subjects of witchcraft and demonology forms an instructive chapter in the history of human opinion. Those who are curious to inform themselves in this department will find no richer mine than in the pages of Hallam and Calmeil. Subsequent to the days of Charles V. the ordinances of the kings of France combined in the form of codes what had formerly been only customs, thus engrafting the common law of locality upon systems of positive enactments. In 1606, Henry IV. gave letters patent to his chief surgeon, by which he was authorized to appoint two physicians in each town, who, in the nature of coroners, should investigate and report upon all cases of accidental death. In the English law the office of coroner was not originally given to physicians, this officer being the adjunct simply to the sheriff in the government of counties. In 1667, Louis XIV. decreed by royal ordinance that in all criminal matters requiring reports, courts should be assisted by at least one of the physicians named by his chief surgeon. Of such binding obligation were all these ordinances that a decree of the Parliament of Paris in 1662, and of the Parliament of Dijon in 1680, set aside judgments of inferior courts because they had been rendered without the intervention of medical experts.

As a branch of instruction and a special science, medical jurisprudence is but a new-comer in the schools; and as its first teachers were physicians, so its first altars were erected in medical colleges. Inasmuch also as its first seeds were sown in the bosom of the old civil law, so, too, those countries first cultivated it which had themselves derived the foundations of their jurisprudence from the same source. Haller's lectures on juridical medicine, published in 1782, indicate the establishment of a chair of instruction in Germany at a day when no similar instruction was probably given in any of the European schools. In 1792 the first professorships of the science were created in France, and in 1803 the University of Edinburgh followed the example. In England it would appear that no similar chair was established in any college until the year 1820, although in the U. S. it had been made the subject of lectures as early as 1804. So far as can now be ascertained, the first lectures on medical jurisprudence ever delivered in this country were given to the students of Columbia College, N. Y., by Dr. James S. Stringham, then professor of chemistry, in 1804. The chair he filled until his death in 1817, when he was succeeded by the late Dr. John W. Francis, one of the most eminent physicians which our country has ever produced. Dr. Francis held the chair until 1826. While Dr. Stringham was delivering his lectures on medical jurisprudence in Columbia College, Dr. Charles Caldwell gave a course upon the same subject



in Philadelphia during the winter of 1812-13, and in 1815 Dr. Beck was called to fill a similar chair in the Western Medical College. Since that time, and advanced into prominence by Dr. Beck's encyclopedic work upon the subject, forensic medicine has been considered as part of a regular course of medical study, and many schools have accordingly introduced it into their scheme of lectures, though generally as a subordinate branch and appendant to some established chair. At last, also, the law-schools have recognized it in many instances, and adopted it as an adjunct science, collateral to, and not in the main line of, required studies. Slowly and surely, however, it is working its way to that eminent position which belongs to it in the internal economy of government, since it is truly a part of the *jus gentium* or necessary law of every state, whether in its capacity of medical police or of forensic medicine.

The philosophy of medical jurisprudence is founded in the necessity of frequently applying the laws of nature to the administration of justice, no less than in employing them in the preservation of the public health. In a large range of subjects it is occupied, therefore, with the consideration of topics that are, strictly speaking, exclusively medical in character. The law looks to, and in fact employs, forensic medicine as, in every sense, an *amicus curiæ*, and as a counsellor retained not in the interest of one party, but in that of justice generally; and the philosophy of this science, as it has gradually been unfolded, has shown the essentially legal necessities upon which it rests. Its duty, like that of equity, is to soften the rigors of the law wherever particular instances are shown to merit some modification in the application of universal principles to them, or some light not attainable from any other source than nature is needed to determine the just limits of human responsibility whether for crime or private wrong. In this way, forensic medicine forms an auxiliary branch of municipal law, affording both circumstantial evidence and skilled opinions upon the inferences to be judicially drawn from such evidence. While, as we have before seen, it treats of the whole realm of nature so far as it applies to man in society and to government as the arbiter of human differences, it is usual for convenience' sake to classify its subjects into divisions founded upon their practical applications. The following is a synopsis of these topics in their legal aspects and under the complexion they assume before courts. It will be seen that they may all be arranged into distinct groups, belonging either to *Medical Evidence*, *Medical Police*, *Legal Chemistry*, or *Psychology*. This differentiation of topics implies also that general medical knowledge does not necessarily furnish the special proficiency in each department required to constitute any physician an expert in it. *Specialists* are recognized in all departments of science, and to them exclusively belongs the right of testifying as experts in their own field. Hence, even an eminent physician may be no expert in some branches of surgery, nor in the chemistry of poisons, or the arts, or in psychology; and this without detriment to his general professional standing. And upon these reasons rests the necessity of grouping the subjects with which medical jurisprudence concerns itself into such classes as may render them distinct specialties before courts, with special witnesses to illuminate the topics mooted in issue.

*Personal Identity.*—This is the birthright mark affixed by nature to all human beings. It is an individual prerogative which can neither be lost nor effaced. Being indelible, it is ineradicable. The philosophy of every age has recognized this as a primordial fact. Horace tells us that we may expel Nature with a pitchfork, and yet she will return; and Lord Bacon asserts that "Nature is often hidden, sometimes overcome, seldom extinguished." The necessity at law of proving personal identity is of such a variable character as to render it impossible to enumerate in advance all the circumstances under which it may become indispensable to establish it. In homicide, burglary, arson, bigamy—in fact, in every variety of crime—the identity both of the perpetrator and the victim must be proved. In heirship, in payments of checks, and in scores of similar civil transactions, the same necessity often arises. The sources whence proofs of personal identity are obtained are such as belong partly to our physical and partly to our mental constitution. They consist of all those physical features, whether congenital or acquired, which can distinguish one body from another: such as *sex, stature, age, complexion, age, demeanor, voice, mental traits and culture, habits, scars, and deformities*. Identification of the dead as well as the living is often necessary. This is of course more difficult in proportion to the length of time the person has been dead. But even skeletons can be and have been identified when a sufficient amount of bones can be found to reconstruct by anatomical theory the missing parts. Great skill is of course required for such an investigation, and in cases of homicide the proof of the *corpus delicti*

should rest upon something more than conjecture. Unless an expert can prove the identity of the remains against all objections made thereto, his testimony should not be received as conclusive, since it cannot amount to certainty.

*Abortion.*—The only significance which abortion has at law is derived from its *intent*. There are occasions when it is lawful to commit it as a medical necessity, to save the mother's life in preference to that of the fœtus. Of this necessity physicians are the only proper judges, and in order to purge the act from all suspicion it should be performed as the result of consultation with and concurrent opinion of others. But whenever it is done without any pre-existing medical necessity, and solely with the intent of destroying the child, it is a crime in the eye of the law. In some States no indictment for abortion will lie previous to quickening, but a better knowledge of the physiology of utero-gestation is undermining these dogmas of the canon law by showing that a child is just as much a living being *before* as *after* quickening; and if the common law regards an infant *in utero* as capable of inheriting an estate, it cannot in consistency refuse to regard its slaughter as the killing of a human being. Not only is abortion when criminally accomplished a crime, but even the administration of drugs to pregnant women with intent to produce it, although unsuccessful, is a high misdemeanor.

*Infanticide.*—The killing of a new-born child is at law a crime, subject to the same rules of responsibility as belong to any other form of homicide. There are some peculiar difficulties in the way of obtaining precise evidence of live birth as a *vincit quæ non* to the fact in issue. But when this is once established, and it is proven that the child had an independent existence of its own, then the crime can be subjected to the rules of ordinary evidence. Infanticide may be of two kinds—viz. either by *omission* to take necessary precautions to protect the child against exposure, hunger, and accidents, or by *commission*, meaning thereby the direct application of means feloniously employed for the purpose of destroying its life. In the former case the mother may herself and singly accomplish it; in the latter, she may similarly act alone or with or through an accomplice. It has also been held that if a child upon whom an act of abortion is commenced dies subsequently to birth from injuries received while in the womb, the act becomes a homicide. Live birth may exist at law without the child having breathed or the umbilical cord being severed, provided only it be completely delivered from the mother's body and have an independent circulation of its own.

*Rape.*—This crime consists in the carnal knowledge of a female forcibly and without her consent. In law, certain persons have no legal capacity to assent to such an act, and when done to them it is always unlawful in the perpetrator. Thus, children under ten years, idiots, and the insane can have no assenting minds, and assent is never presumed, not even in the unchaste. By carnal knowledge is meant sexual bodily connection. Force may be either *express* or *implied*, the former implying any direct threats or personal violence; the latter, duress, either by moral fear, fraudulent imposition of person, deceitful representation of the nature of the act, magnetic sleep, anæsthesia, or narcotics. Impotence of copula is a good plea in defence, but even a eunuch may commit this crime. So a husband may be an accessory to a rape committed upon his wife, and a man may be indicted for rape upon his own concubine, since at any time she may withhold her assent. But whether it is rape to have carnal intercourse with a demented woman at her own solicitation has been doubted. What constitutes want of will has been variously interpreted. It is agreed by all authorities that the resistance of any woman should be, so far as her condition will allow, sincere and continuous throughout the act.

*Impotence and Legitimacy.*—Marriage is at law a consensual contract entered into by two competent parties for the purpose of procreating children. The natural basis of this contract is purely physical. Aside, therefore, from statutory regulations relating to evidence of such a contract having been entered into, each party is presumed to guarantee his own physical competency to the other, and the absence of this, if shown to have existed at the time of the marriage, and to have been unknown to the other, constitutes *fraud* to that extent. As fraud vitiates every contract into which it enters, it follows that the marriage of an impotent person is voidable, provided no laches be shown in the party wronged. But inasmuch as impotence is a matter of *experience*, and not necessarily one of inference, the law requires the *triennalis cohabitatio* before it will entertain any suit for a nullity founded upon this fact alone. If one knowingly marries an unfruitful person, he can claim no remedy at law, nor can a party plead his own impotence as a ground for a sentence of nullity. The incurability of the impotence must also be determined before any suit for nullity will lie. And if the impotent party



refuses surgical treatment, the act will be taken as *pro confesso* to the prayer of the petitioner.

It follows from the necessary consequences of marriage that children born in wedlock have a presumed character of *legitimacy* which distinguishes them from bastards, who are in the eye of the law the children of no one, and have no inheritable blood. And so far is this doctrine pushed at common law that every child born in wedlock, no matter how soon after the marriage of its parents, is legitimate. But this presumption may be rebutted by showing either the impotence of the husband or his continuous absence from the country, with the simultaneous *crim. con.* of the wife. A mere probability of non access by the husband is not sufficient to repel the presumption of legitimacy, nor is his advanced age. It is not necessary for the party objecting to the legitimacy to prove that access was impossible, for if the evidence places it beyond all reasonable doubt, it will be sufficient to repel the presumption. Whether, therefore, a child was begotten *in or out of* wedlock where the marriage precedes the birth, the presumption of paternity will be the same, and the like evidence is required to bastardize the issue. That evidence is proof of non-access by the husband. Parents may testify to children being born out of wedlock, but a wife is not a competent witness to prove non-access of her husband and to bastardize the issue, even after such husband's death.

**Wounds.**—The only legal aspect under which wounds can be considered is that which connects them with assaults terminating in maiming or homicide. Under the English statutes against *wounding* some very nice distinctions have been made touching the constituents of the offence, but these have not generally been adopted in this country, our courts giving a wider interpretation to the meaning of the term, and treating the subject only in connection with such assaults as are or have been fatal to life. The questions therefore considered by them have been such as tended to show the probable criminal connection of certain wounds with death. To state them briefly, they are these: Did death immediately follow the wound? Was the wound in itself mortal? Was it the probable cause of death? What was the interval of time between the two? Did any disease of a mortal character meanwhile intervene and destroy the life of the patient? and if so, was it induced by the wound? Did the patient refuse medical treatment? or was the medical treatment unscientific? and did it cause death? What was the condition of the patient previous to the wound? All the authorities agree that the party inflicting the wound is responsible for its immediate consequences; and even though a mortal disease was present, and the wound only accelerated the death, the act is still homicidal.

**Poisons.**—Poisons, in legal significance, are substances which act not *quantitatively*, but *qualitatively*, to the destruction of health or life, by reason of their inherent deleterious properties. They are naturally noxious, and may be classified either chemically into mineral, vegetable, or animal, or physiologically, and according to their effects, into irritant, narcotic, or acrid-narcotic. Restricting ourselves only to their legal aspects, the questions to which they give rise before courts are, like wounds, such as tend to show their criminal connection with a person's death. The evidence in such cases is largely medical, although extraneous circumstances may throw much light upon the problem of the alleged perpetrator; and such moral evidence is allowed, according to its due weight. To constitute the offence of administering poison some portion of it must be taken by, or applied to, the person of the one receiving it, but it need not be swallowed. So if poison intended for one person be accidentally taken by another, it is still murder in the giver, for the *intent* of homicide inheres. Hence, whether the substance be poisonous or not, provided it be given with the *intent* to take life, the act is felonious. And where death ensues from alleged poisoning, it is not necessary to prove the particular substance used, nor the quantity required to destroy life; nor is it necessary to prove that such a quantity was found in the body after death. It is sufficient if the jury are satisfied from all the circumstances, and beyond a reasonable doubt, that death was caused by poison administered by the prisoner.

**Malpractice.**—It is a time honored principle of law that every professional man in offering his services as such to the public impliedly covenants to bring to their discharge the ordinary skill of his vocation. The public having no means of ascertaining this in advance of experiment, they may be said to confide in him of necessity, and any want of due qualification on his part is, to that extent, a fraud upon his employers. The errors committed by professional men, whether due to want of skill or negligence, are termed *malpractice*, and for such they are amenable in damages to any person who has been injured thereby. From the difficulties inherent to the treatment of disease, mere errors of judgment are not considered malpractice in themselves

wherever the party has not otherwise offended by either negligence or rash experiments. There may be, thus, bad practice by *omission* as well as *commission*, but both must be proved, for they cannot be inferred from acts turning alone upon diversities of medical practice. The law knows no difference between systems of medicine. All it requires in any practitioner is ordinary skill and a faithful discharge of the duties of such a person when employed to *relieve* the sick, for it does not consider his contract in general as one to cure, but simply to do all that his professional skill can accomplish towards promoting that result.

**Medical Evidence or Reports.**—In law there are two classes of witnesses—viz. *ordinary* and *skilled*. The former testify to what they know; the latter give opinions upon facts in issue. To these witnesses the term *expert* is applied. An expert being, legally, one instructed by experience, it follows that any person may be admitted to testify as such upon matters belonging to his profession. The range of scientific investigation being so vast in medicine, there has in consequence arisen a necessity for differentiating experts, and limiting the term alone, in any given case, to those who have had special experience in the department of practice under review. Hence, there are *chemical* experts, *surgical* experts, and *specialists* in medical practice, who are better informed and better qualified to testify as such than general practitioners of medicine; and to them courts will give preference as experts. It is of course at times extremely difficult to draw the line of distinction, but wherever it can be it should be; for where men are equally proficient there will be less opportunity for differences of opinion, and positive contradictions of each other will form the *exception* rather than the rule, as they so often do now. Experts may give opinions either upon *direct* or *hypothetical* facts, but not upon conclusions of law. They may refresh their minds from memoranda, but cannot use them as substitutes for memory, nor quote from professional books, nor give opinions upon the merits of any case.

**Life Insurance.**—The only aspect under which medical jurisprudence considers life insurance is that which springs out of the *suicide* of the party insured. The question there being whether the party intended to take his life in fraud of his contract with the insurers, and was a legally responsible being at the time, the whole problem turns upon the fact of his mental condition. If sane, then the act was felonious and the policy should be avoided; but if insane, then the act was not *his* in legal contemplation, but that of a being under the coercion of disease. All authorities agree that suicide of itself does not prove insanity in the perpetrator. Consequently, we must look outside of the act and to the whole history of its victim to determine the probabilities of his mental state. Decisions have been very conflicting in the conclusions of law to which they have arrived, some permitting the moral responsibility of the suicide to weigh in the balance of justice, and some, again, excluding it. On the whole, however, the current of decisions, both in this country and in England, has been steadily turning towards the exclusion of the element of moral responsibility, and narrowing it down to the simple questions of whether the party knew what he was doing, intended to do it, and was not impelled thereto by disease—meaning insanity.

**Survivorship.**—Where two persons perish in a common calamity, it is often important to be able to determine which died first, with reference to the rights of succession to an estate. In order to solve such a problem, many circumstances of a purely physical character must be taken into account, relating to sex, age, strength, disease, season, and temperature, not omitting the peculiar form of death to which they were subjected. Many times it is impossible to arrive at any satisfactory conclusion, and courts are driven to the necessity of advising a compromise between the parties, as in the celebrated case of *Gen. Stewart*, where Lord Mansfield said that he knew of no principle of the common law by which the issue could be settled. The English law has no provisions upon this subject, and borrow all its light from the civil law. The *Cole v. Turney* has devoted three sections to it, and given us all the modern statutory law which is possessed by any of the continental nations. A very few cases only have been adjudged by our courts as yet, the subject being of infrequent mention even in textbooks. The most extensive comments upon it are to be found in the fourth volume of Mr. Ewing's *Criminal and Foreign Law*, and to it we accordingly refer those who desire more information. The following are the two divisions into which all questions of survivorship may be included: viz. 1st, as to the survivorship of mother and child where both die during delivery; 2d, as to the survivorship of persons of different ages and sexes perishing by a common accident.

**Insanity.**—This topic, under all its various legal aspects, will be found treated in its appropriate alphabetical place.



There are other topics belonging to the domain of medical jurisprudence, like *riability, feigned diseases, the Casarian section, hermaphroditism, deaths by heat, sunstroke, lightning, starvation, and cold, and spontaneous combustion*, which have few if any special legal aspects, and we leave them accordingly to be discussed under their more appropriate physical complexion. The topics we have reviewed in a brief and comprehensive way are those upon which courts are most often called to adjudicate, and whose literature is adorned by authoritative decisions defining the responsibilities of parties raising issues under them. These decisions we have not cited, because out of place in a popular encyclopædia. They may easily be found by referring to digests and works on medical jurisprudence.

JOHN ORDON AUX.

**Ju'ry, Trial by.** Jury trial in its modern form is certainly a product of English social and political forces. Although the new codes of several continental states of Europe have professed to borrow it, they have materially modified its form, have confined its use to certain classes of cases, and it is at best an unnatural and sickly excrecence upon their national systems of jurisprudence. In England and the U. S. alone does the jury flourish as an essential part of the social organization—as an institution around which all other means and modes of administration are grouped. The object of this article is briefly to describe the origin of the jury trial, to state the most important steps in its course of development, and to give a general summary of the rules which regulate its use.

The jury trial in its present matured form involves two very different elements, each equally important, but having no historical or theoretical connection. They are (1) the decision of the facts in a judicial trial by a number of individuals distinct and separate from the official judge or magistrate; and (2) the free choice of these individuals from among the mass of ordinary citizens. The Romans possessed the first of these features in their administration of justice; the origin of the second is to be found in the tribal customs of the German peoples who overran the provinces of the Western empire, including the Angles and Saxons who settled in Britain. In the "ordinary" jurisdiction of the Roman magistrates an action was brought before the prætor, the pleadings or allegations of fact were put in according to prescribed forms, the issue was joined, and the rule of law applicable to the case as thus presented was announced by him. With this proceeding the function of the court or magistrate ended. The cause was at that stage referred to another person—sometimes called the *judez* and sometimes the *arbitrator*—who heard the evidence, passed upon the issues of fact, and rendered a decision in conformity with the rule of law announced by the prætor. He was not an official magistrate. A limited number of citizens seems to have been annually chosen in some manner to perform this duty, and from the class thus constituted one was selected for each trial. In certain specified actions several triers of the facts were employed instead of the single *judez*, who were termed *recuperatores*, but in what respect their functions differed from those of the *judez* is not known with any accuracy and certainty. The analogy between the entire course of proceeding in the "ordinary" actions of the Roman law and the English common-law forms of action and jury trial was very striking; there was the same separation of the questions of fact from those of law, and the decision of the one by an official magistrate, and of the other by a lay tribunal having no official forensic status, but appointed for the very controversy submitted to it. This system of administering justice continued in existence for several centuries, but the "ordinary" jurisdiction of the magistrate gradually gave place to the "extraordinary," in which, like the English chancellor, he decided all the issues of fact and of law in a single decree, without the intervention of any other assistant. Finally, by a constitution of the emperor Diocletian, the "ordinary" jurisdiction was abolished, and the trial of all causes was conducted in every stage thereof before the prætor or other judicial officer constituting the court.

It is evident, therefore, that this important element of the jury trial—the separation of the law from the facts, and the dual tribunal for their decision—was not borrowed from the Saxon ancestors of the English nation. On the contrary, the German tribes which overran the Western empire and settled down in the conquered provinces, had not attained to the conception of any such refinement in the administration of justice. It was the very central principle of their primitive civil polity that the decision of all private controversies, as well as the ordering of everything which pertained to the public welfare, was committed to the collective freemen gathered together in their local assemblies. This system of self-government was carried to an advanced degree of development by the Saxons in England. The folk-courts or *gemotes* of the "shires" were

composed of the assembled freemen, presided over by the *ealdorman* or by his deputy, the *gerefa*. Here they determined, according to their rude customs which had the force of law, the disputes between man and man concerning property and other private rights, and also the accusations which at the present day would be regarded as criminal and punishable by the state. The courts of the "hundreds" were gatherings from the smaller districts into which the shire was divided, but with a similar organization and the same functions. In this institution of the early Saxons the modern method of selecting the triers from among the great body of citizens at large had its certain origin. Although the whole course of progress from these rude folk-courts to the completed jury cannot be traced with absolute precision, yet the principal steps of the onward movement, the most important transitions which marked the passage from one epoch to another may be described.

The first of these progressive steps was the employment of *compurgators* or *conjurators*, who by their oaths established the existence or not of the fact in dispute, and thus guided the folk-court to its decision. A judicial trial of that primitive age had no element in common with a trial of the present day. There were no written allegations of the facts; no evidence was offered; no witnesses deposed as to their knowledge of the transaction. A charge was orally made and orally denied. In the place of a trial and of witnesses, each party was accompanied by a number of relatives, friends, or neighbors, who, in the presence of the assembled freemen, joined with him in making oath that his statement—the charge or the denial—was true. These were his *compurgators*; and the early codes of the Germanic nations contain numerous provisions prescribing the number of them requisite to establish or to repel any particular accusation or demand, such number varying according to the rank of the party and the gravity of the offence or the value of the property in controversy. These *compurgators* were in no sense witnesses, for they might be wholly ignorant of the real facts in dispute; nor were they a jury, for no evidence was submitted to their consideration. They were merely friends of the party who summoned them; they knew his character, and by their united oaths they at once attested that character and their confidence in his truthfulness and in the justice of his cause.

The next step in the progress was a movement far in advance of the rude contrivance last described. *Compurgators* were no longer used; even the primitive folk-court had become obsolete. The function of deciding a particular case was entrusted to a limited number of freemen taken from the district, which number consisted of twelve or some multiple thereof. This delegated body, unlike the *compurgators*, acted upon a knowledge of the facts involved in the controversy, but such knowledge was not acquired by means of any evidence laid before them. They were carefully chosen from among the persons familiar with all the circumstances of the case, with the parties, and with the property. To this end they were invariably selected from the inhabitants of the "vicinage"—that is, the district of territory immediately surrounding the lands in question or the residence of the litigants. On being appointed they examined no witnesses, but rendered their verdict, *vere dictum*, on oath based upon their personal knowledge previously obtained either from a sight of the occurrence or from the tradition of the vicinage. These *recognitors*, as they are called, were the undeveloped jury—a jury, as it were, of witnesses. The unwieldy and turbulent assembly of freemen is replaced by a small and compact tribunal; a decision upon knowledge has been substituted for the mere numerical preponderance of oaths. All the subsequent modifications consisted of measures contrived to aid this body of men taken from the vicinage by the testimony of other persons. In the reign of Henry III. the practice was introduced of joining with these *recognitors* others who were actual witnesses of the transaction, but still all united in rendering the verdict. During the reign of Edward III. a still more important and radical change was effected. Witnesses were added to or connected with the *recognitors*, who communicated to the latter their knowledge of the facts, but took no part in the decision. In this stage of the progress we find for the first time the feature of testimony communicated to the triers by parties who do not join in rendering the verdict. The innovation once made, the progress was rapid of aiding the *recognitors* by the testimony of outside parties; but as yet great irregularity prevailed in all parts of the proceeding. There were no rules of evidence; the witnesses instructed the jurors without any oversight by the court; there was in fact no orderly, public forensic contest. These defects were remedied in the reign of Henry IV. The trial was from that time conducted entirely in public and in the presence of a presiding judge; all the witnesses were sworn, examined,



and testified under his direction, and pursuant to the requirements of established rules. This was finally developed, as the result of a long and continuous progress, the jury trial substantially as it exists at the present day. The ancient requirement, however, still remained operative, that the jury should be summoned from the immediate vicinage. As the original reason for this rule had been abandoned, the rule itself became an anomaly, and a hindrance to a fair and impartial trial. As soon as the sole reliance came to be placed upon the testimony of witnesses, the prior knowledge of the triers themselves was an obstacle rather than a help to an orderly and legal investigation of the facts. It was not, however, until the reigns of Anne and of George II. that Parliament interposed, abolished the old rule as to the vicinage, and provided that jurors should be selected from the body of the county. By a decision of the court of king's bench, made a short time subsequent to these last-named statutes, it was held that if a jury rendered a verdict upon their own private knowledge, it was error—that they ought to have informed the court, so that they might be sworn as witnesses. We have thus traced the jury through all its phases and modifications, and we find that since its introduction it has undergone a complete change from the primitive notion both in form and in principle. The triers were once carefully selected from among those most familiar with the parties and the facts, and they decided the controversy upon that prior personal knowledge. Equal care is now taken to choose only those persons who are absolutely ignorant of the parties and of the facts, and who come to the hearing with their minds a complete blank in respect to the matters in dispute which are to be settled by their verdict.

The jury trial is even more completely wrought into the political organization of the U. S. than into that of Great Britain. It is expressly protected by every constitution, state and national. The most common forms of the constitutional provision are, "In all criminal prosecutions the accused has a right to have a speedy public trial by an impartial jury," and "The right of trial by jury shall remain inviolate." The other forms of the guaranty, which may be more minute and detailed than these, do not differ from them in any substantial manner. The judicial interpretation put upon these clauses in all the States may be summed up and expressed in one comprehensive and fundamental principle—namely, the provisions in question do not create, nor enlarge, nor restrict the right of trial by jury, but retain it and preserve it inviolate in all those classes of cases, civil and criminal, in which it existed by the common law or by any prior legislation of the State itself. In no more emphatic manner could the people have shown their attachment to an institution which secures and maintains all their other civil and political liberties and rights. The jury trial, thus guaranteed to the people of the U. S. until they voluntarily discard it, is therefore the common-law trial by jury. All the features and elements of the institution itself which had become settled as a part of the common law, and all the fundamental rules by which its constitution was preserved and its use was controlled, are also incorporated into the organic law of the States and placed beyond the reach of modifying legislation. These essential and unchangeable elements of the common-law jury trial are the following: (1) The jury itself must invariably consist of twelve men. It is useless to ask a reason for this requirement. The old Germanic codes constantly show the number 12 or its multiples or fractions; the recognitors were originally 12 or some multiple; and this number has been handed down to our day. (2) The jury must be drawn from the body of the county in which the trial is had—that is, from among the resident freeholders and taxpayers of the county. The historical and statutory origin of this requirement has been already stated. (3) The verdict must be unanimous. The historical origin of this rule must be found in the early custom of purgators in a prescribed number agreeing in their oaths, and of recognitors to the number of twelve agreeing in their decision. (4) The jury must be impartial. This most important requisite involves the selection of each jury in some manner by lot from the freeholders of the county. While the principle of a chance selection is undoubtedly preserved inviolate by the constitutions, the particular mode in which that principle shall be made operative, may be regulated by statute according to the discretion of the legislature. There is, in fact, a great diversity in the modes of drawing and summoning the juries among the several States, and the common-law methods have been quite generally departed from. A list of freeholders and taxpayers is prepared at stated intervals and preserved in the clerk's office of each county. From this list certain designated officials choose by lot the names of those who are to serve at each court; the persons thus selected are summoned and must attend unless excused, forming what is termed the "panel;"

finally, from this panel the clerk draws by lot the requisite twelve "good men and true" for each case as it is brought on for trial. The impartiality of the jury is also secured by the right of challenge given to the litigant parties. The various classes of challenge are as follows: (1) "*To the array*," by which the party objects to the entire panel for some error of the officer in drawing or summoning them; (2) "*To the polls*," by which the party objects to an individual as he is drawn from the panel. The challenges of this class are of two kinds—namely, "*for principal cause*," and "*to the favor*;" "*for principal cause*" when the objection if it exists would disqualify the person as a matter of law; "*to the favor*" when the objection would simply be a sufficient ground to reject the juror as a matter of fact. The object of these challenges is to secure persons as jurors who possess the legal qualifications, who are not in any degree related to the parties, and who have not formed or expressed an opinion upon the matters at issue. In addition to these challenges, in which reasons therefor must be assigned, there is in criminal trials another species termed "*peremptory*," by which a juror may be objected to and excluded without the assignment of any cause or ground for the objection. The number of such challenges permitted in each trial varies with the grade of the offence, and differs in the several States. These peremptory challenges are in some instances allowed in civil cases by statute. Trial by jury, as above described, is preserved by the constitutional provisions already referred to in all criminal prosecutions which are cognizable by courts of general sessions and of oyer and terminer, or by courts of whatever name corresponding to these tribunals. The only offences that can be punished without the intervention of the common-law jury are those minor offences that are cognizable by courts of special sessions and by police magistrates possessing the jurisdiction of these last-named tribunals. It is also preserved in all civil causes of a legal nature which are cognizable by common law courts of a higher jurisdiction than that of justices of the peace. Some of the States provide a mode of waiver of jury trial in civil cases. It follows that all civil causes of an equitable nature, or which are cognizable in courts of equity or of admiralty or of probate, and all causes of a legal nature which require an accounting for their decision or which may be brought before a justice of the peace, may be tried without a jury. (See GRAND JURY.) JOHN NORTON POMEROY.

**Jus gen'tium.** This is not to be confounded with the more modern phrase, *ius inter gentes*, or "the law of nations," "international law." By the first phrase Gaius understood those rules and usages of justice which all nations use alike, as opposed to *ius civile*, the law of Rome itself, so far as it was peculiar. The *ius gentium* contained many rules of an international code, such as the sanctity of ambassadors, but covered quite a different ground from that of the international science. T. D. WOOLSEY.

**Jussieu', de,** the name of a celebrated family of French botanists and physicians, the most noteworthy of whom were the following: (1) ANTOINE DE JUSSIEU, M. D., b. at Lyons July 8, 1686, d. in Paris Apr. 22, 1758. (2) ERNEST, b. Aug. 17, 1699, d. Nov. 6, 1777. (3) JOSEPH, b. 1701, d. Apr. 11, 1779.—(4) ANTOINE LAURENT, one of the fathers of botanical science, b. at Lyons Apr. 12, 1748; studied medicine in Paris, where he was an academicien and botanical professor. Following his uncle Bernard, who had made the sketch, he was the first to introduce the natural system into botany, disposing all known genera in defined natural orders. His *myrica aqua* is the *Genesee Plantarum* (1789), and he was the author of many botanical papers of great value. D. Sept. 17, 1836.—5. His son ADRIEN, b. Dec. 23, 1797, succeeded his father in 1826 as professor at the museum; became professor of organography in 1833, and was for many years a brilliant lecturer, an able scientific writer, and one of the first botanists of his time. D. June 29, 1853.

**Jussieu (LAURENT PIERRE)**, nephew of Antoine Laurent, b. in the department of Isère Feb. 7, 1822, was a member of the Chamber of Deputies 1839-42, and wrote many educational and popular works designed for the diffusion of useful knowledge among the masses. One of these, *Simon de Saint-Emilion, ou le vin de France* (1848), passed through more than thirty editions and was translated into eight or ten languages. He received the Montyon prize for the similar work, *Quatre siècles de Saint-Jude Nantais* (1829), and for many years of technical educational journals.

**Juste (Théodore)**, b. at Russell, Belgium, in 1818; is secretary of the Belgian board of education, and a very prolific writer on Belgian and French history. The most prominent of his works are: *Histoire du territoire de la Belgique* (1838), *Histoire de la Belgique et de la Flandre* (1846), *Le soulèvement de la Hollande en 1813, et la fondation du royaume des Pays-Bas* (1847).



**Justice.** Justice is an attribute of a man in his intercourse with his fellow-men, of the law in relation to those who are under it, of the state toward its subjects or citizens as far as their political position and rights are concerned, and of the judge in his office of deciding between the claims of two private parties or of a person and the state. We also speak of primitive justice, and of just and unjust punishment, in which case the state may be just or unjust in its penal laws, and the judge, in the application of law or evidence which he makes to a particular case. Justice also, as a moral quality, denotes a certain fairness of mind in estimating truth or in weighing the claims of persons to a certain sort of treatment in social intercourse. Finally, God is conceived of, and is represented in the Scriptures, as being just, as when he is said to have no respect to persons, to have a day of righteous justice in which he will render to every man according to his deeds, and as being faithful and just to forgive sins, because he has conferred a right to forgiveness by a solemn promise.

Justice *justitia* in Latin comes from *justus*, "just," which is connected with the very important words *jubeo*, "bid," "order," "ordain;" *jus*, "right," "the system of right or law;" and *judex*—i. e. *judicor*, "judge;" and also with *juro*, "swear;" *juramentum*, "oath;" and *jurgo* (*jure ago*), "altercate," "quarrel," "scold." Perhaps the original sense of *jus* is "law," that which the community has ordered, but the Romans early introduced a moral element into the word. There was justice according to law, and natural justice. Thus, the Roman lawyers speak of slavery as being contrary to *ius naturale*, although allowed by *ius civile*. The words *just* and *righteous* coincide in part, but *righteousness* has the general moral sense of conformity to the law of right in the moral dispositions of the soul, as well as in outward actions. Justice inclines more towards legality, and towards that which is external.

Greek philosophy, after Socrates began to teach, occupied itself much with discussions touching justice. One of Plato's leading definitions of it is that a person should "do his own things"—i. e. mind his own business, keep within his own sphere of action, and not invade the sphere of another. In this definition the question what a man's "own things" are—an expression nearly identical with the apostle Paul's "do his own business" (1 Thess. iv. 11)—must be determined by an enlightened conscience or by an outward rule; and Plato would determine each man's sphere by state authority. Aristotle makes a distinction between political and natural justice. The Stoics carried out the thoughts on ethics of the older philosophers in one direction beyond their predecessors; in their hands the ethical system of classical antiquity bore its best fruits, and their thinking has affected the forms of thought or morals ever since. They conceived of virtue as consisting in a life according to nature—meaning by nature both the law of general or divine and of human nature; and of justice, after a definition of the Platonic school, as that which assigns to each his due or worth. Cicero follows them in calling justice an affection of mind, *sanam enique tribuens* (*De Fin.* v. § 23, 65); i. e. which assigns to each person his own. The doctrine of a law of nature, or a *ius naturale*, having principles which may oppose the laws of the state, was borrowed by the Roman lawyers from the Stoics, and produced in their hands important results: in theory, for instance, as we have already said, slavery became contrary to natural right, although the institution in the empire could not be shaken.

The modern doctrine of personal or subjective rights (for which see the article RIGHT and RIGHTS) helps us to a clearer notion of what justice is. If each person is a centre of power according to natural law and the divine will, for the purpose of developing his manhood, he and his acts impose on others the obligations not to interfere with these powers; and it is one of the offices of the state to decide what these powers or rights are. A just man is one who fully respects the rights of others or fulfils his obligations towards them; a just state, just law, and judges are such because they render to each one his rights; and in the case of the judge not only the rendering to each one of his rights, but such a state of mind as involves conformity to the truth of law and of evidence enters into the quality of justice.

As laws are expressed in general terms, it may be that the "letter killeth" in a particular case. Here, according to the rule, *summum jus est summa injuria*, equity modifies the decision of the judge in accordance with the circumstances. This is really a justice which law in its abstract form cannot reach. Equity is equality, and deciding different cases by the same rule would be inequality, which is injustice.

A word is needed in relation to penal justice or punishment. This consists, and can consist, only in taking away from a man one or more of his personal rights, as life, freedom of motion, property, personal honor, or of his rights

granted to him by the political constitution. Is it not strange that whereas justice has been found to be the apportionment to each one of his rights, here justice is made to consist in taking away from a person his life or some other right? Yet there is a reason why the two forms of justice, although thus differing, should be called by the same name. Penal justice is such not only because it is according to law, but also because it gives to the transgressor his due according to the law of righteousness. Law would be unequal if it did not recognize the radical difference between the just man and the unjust. It expresses the feeling inherent in the human soul that the wrongdoer ought to suffer, and punishes him in the only way open to the law—that is, by depriving him of his prior rights or place in the state.

T. D. WOOLSEY.

**Justice of the Peace**, a subordinate magistrate appointed or chosen to exercise certain judicial and administrative functions of a subordinate character within the limits of a county, borough, or town. The office of justice of the peace was established at a very early period in the history of the English law. The public officials, however, who anciently possessed similar powers were not designated by this particular title, but were styled *conservatores pacis* ("conservators or preservers of the peace"). The mode in which they derived their authority was also different from that established in later times. Some claimed their power by prescription; some were bound to exercise it by reason of the tenure of their lands; while the larger number were elected by the freeholders of the county. But at the commencement of the reign of Edward III. (1327) the system of election was discontinued, and it was ordained by Parliament that such magistrates should be appointed by the king or under the king's commission. But still they were called conservators, wardens, or keepers of the peace until 1361, when, by statute, as Blackstone states, "they acquired the more honorable appellation of justices." They are now appointed by the lord chancellor by virtue of the king's special commission under the great seal. The form of the commission addressed to the justices was determined in 1590. This is in the name of the king, and directs the person therein appointed to "keep our peace in our county of —, and to keep all ordinances and statutes for the good of the peace, and for the good rule and government of the people, and to chastise and punish all persons that offend against the said ordinances." It also requires them to inquire of and determine felonies and other misdemeanors. It was the former practice to specify in the commission the names of a few justices who were men of greater competency or distinction than their associates, and to declare that without the presence of at least one of these no judicial business should be transacted. These were said to be of the *quorum*, a term derived from the first word of the clause by which this special privilege was conferred. A Latin term was adopted because legal documents were then expressed in that language. But now all or nearly all of the justices are included in the *quorum* clause, and it is no longer necessary, as it was formerly, to specify in a warrant that the justice who issued it is of the *quorum*. There are certain property qualifications required at the present day in order that a person may be appointed a justice. Thus, he must have in possession, for his own use and benefit, an estate in lands of the clear yearly value of £100 above all incumbrances, or he must be entitled to the reversion or remainder of an estate of the yearly rental value of £300. The person appointed is obliged to take an oath that he is properly qualified by an ownership of the requisite estate, and if he is not so qualified he forfeits £100 by acting as a justice. As a general rule, the justices serve gratuitously, but in the cities and larger towns there are certain justices appointed, called stipendiary magistrates, who receive a fixed salary.

In the U. S. the institution of justices of the peace has been adopted from England. They are county or town officers, and are in some States elected by the people, in others appointed by the executive. Their terms of office are usually of short duration, rarely continuing longer than three or four years, and as a rule their mode of compensation is defined by law. The rules of law governing their appointment, tenure of office, powers, and responsibilities are generally defined by statute with great fulness, and the extent of their authority made to depend entirely upon statutory provisions. The functions of justices of the peace are very multifarious, and in minor details differ considerably in different States. It will therefore only be practicable to state the general powers which they possess both in England and in this country, so far as these are substantially similar. These powers are either administrative or judicial. Important administrative functions are those which justices exercise as keepers of the peace. Thus, they may arrest without a warrant any person committing a felony or a breach of the peace in their presence, and



commit him to prison. They may issue warrants for the arrest of alleged criminal offenders against whom a charge has been made supported by an affidavit, or search warrants authorizing a search to be made upon a person's premises for goods which he is accused by complaint under oath of having stolen or embezzled, when there appears reasonable ground for suspicion that they are there concealed. A justice may also bind over to keep the peace any person who engages in an affray in his presence or makes threatening demonstrations of violence against others, or who is brought before him by any other peace officer, as a constable or a sheriff, after being arrested for a breach of the peace, or who is charged with having threatened to commit a criminal offence against the person or property of another by a complainant who maintains his charge by a sworn affidavit, and who upon examination under oath satisfies the justice that there is reasonable ground to apprehend the commission of the offence by the person complained of. In determining whether such reasonable ground exists, the justice acts judicially, and in like manner many of his administrative functions are incidental to the exercise of judicial prerogatives; as, for example, the issuing of subpoenas for witnesses, binding over witnesses to testify, examining persons accused of crime and committing or discharging them, taking recognizances, committing persons for contempt of court, admitting to bail, etc. As a general rule, also, justices have power to take affidavits and acknowledgments of debts. In some States they have, besides, a right to celebrate marriages. In the exercise of judicial functions justices of the peace have either a civil or a criminal jurisdiction. In criminal cases they have power to try offenders charged with offences of a minor grade, without the aid of a jury, by what is known as a summary proceeding. Such offences are drunkenness, idleness, vagrancy, profane swearing, mendicancy, keeping disorderly houses, gaming, and other similar practices. Such proceedings must, however, be conducted according to the course of the common law in trials by jury. The defendant must be duly summoned, and must have an opportunity to make his defence. This form of proceeding was introduced into the English law by various acts of Parliament, and was generally adopted in this country as a part of the common law. At the present day, however, the nature and extent of the power to try and convict by summary process are usually defined by statute. It has been decided that such legislation is not in contravention of the common provision in State constitutions that no person shall be deprived of life, liberty, or property except by the judgment of his peers or of the law of the land, although this is interpreted as requiring trial by jury in most cases of criminal prosecution. The power of summary conviction existed previously to the adoption of such constitutions, which must be construed with reference to the previous state of the law. No legislation can, however, be adopted providing for trial without a jury except in regard to offences of the same grade or class as those to which this mode of proceeding was formerly applicable. Justices also have power to make a preliminary examination of all persons arrested upon a criminal charge, and if there is reasonable ground to believe that the offence alleged has been perpetrated, and that the person accused is guilty, he may be committed to prison, or, in a proper case, admitted to bail. If the offence charged be of a minor grade, it may also be tried before justices in a special criminal court with a jury, but if it be a grave and serious crime, the prisoner will be committed for trial before a higher court. All States do not agree in their legislation as to the various offences which may be tried before justices, it being provided in some that all misdemeanors may be thus tried, while in others this is only true of specified classes of misdemeanors. The trial of felonies is almost invariably vested in the higher criminal courts, as, e. g., courts of oyer and terminer where such tribunals exist. (See CRIME.) In England there are four courts composed of justices of the peace: the petty, special, quarter, and general sessions. The general sessions is a court of record, and may be divided into two branches for the despatch of business. By statute it must be held four times a year if occasion shall require. When held at the regular period, it is called the quarter sessions; otherwise, the general sessions. The petty sessions and special sessions are courts of inferior importance. In this country similar tribunals sometimes receive corresponding names, as the courts of special sessions in New York State. In some States, however, they are termed simply justices' courts.

In many of the States of this country justices' courts have received by special legislation jurisdiction in civil cases. The causes declared cognizable in such courts are those which involve claims to property of but little value or demands for small amounts of damage. Thus, in New York the larger number of cases which are declared tri-

able in justices' courts are those in which the sum claimed does not exceed \$200. Such courts generally have no power to try causes involving the title to land. The extent of their jurisdiction must be ascertained by special reference to statutes.

A justice of the peace is not liable to a civil action for any injury to another committed in the exercise of his judicial functions if he had jurisdiction of the proceeding or cause of action in connection with which the injury occurs, and acted honestly and in good faith. As he, however, is a magistrate of special jurisdiction, his privilege in this respect is not so extensive as that of judges of superior courts of record. (See JUDICIARY.) If a justice has no jurisdiction of a particular case, and has the means of ascertaining his want of jurisdiction, he will be responsible to any person who suffers damage from his unwarrantable exercise of judicial power. But where the pleadings and allegations of the parties apparently give jurisdiction, the justice will be protected in an honest and faithful exercise of the power to which he believes himself entitled, even though he be chargeable with mistake or error. But even if he has jurisdiction, he will be liable to an action if he acts maliciously, corruptly, or with wilful intent to commit wrong. In case of corruption also a justice may be subjected to a criminal prosecution, either by indictment or information. (See INDICTMENT, INFORMATION.) For any neglect of duty or malfeasance in the performance of ministerial duties he is not protected by his judicial privilege, and is liable in damages for any injury which others may sustain by reason of such neglect. In some States it is provided that justices may be removed from office in a specified manner for a violation or disregard of their official duty, on good cause shown. In New York they may be removed by the supreme court, after due notice and an opportunity of being heard, for causes to be assigned in the order of removal.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Justices, Lords.** See COURTS, I, 21.

**Justifiable Homicide.** See HOMICIDE.

**Justification.** I. THE TERM is theological—used more prominently at the Reformation period and since. From 1520 to 1544 the Romish Church, through its leaders, was willing to admit justification to be by Christ, while the Reformers claimed it to be by Christ alone, the little word "only" becoming thus the pivot of Protestantism. Luther's well-known "*Articulus stantis vel cadentis ecclesiæ*"—justification the article of a standing or a falling Church—expresses his conviction of the great importance of the doctrine. The Westminster Assembly, in their elaborate Confessions, followed the Reformers. The more condensed statement, in the *Larger Catechism*, is as follows: "Justification is an act of God's free grace unto sinners, in which he pardoneth all their sins, accepteth and accounteth their persons righteous in his sight; not for anything wrought in them or done by them, but only for the perfect obedience and satisfaction of Christ, by God imputed to them and received by faith." (Ans. to Q. 70.)

II. THE DOCTRINE INVOLVES. 1. *The fact that justification is more than pardon.* The latter is, indeed, to the former a condition sine qua non. But justification has special reference to the prescriptive part of the law, as pardon has to its penalty. It is the official announcement that the subject stands acquitted and accepted before the lawgiver or judge: its *verbal* legal sense would be, *God's declaration of the sinner's right standing in respect to law for the sake of an equivalent substitute for personal righteousness.* "Who was delivered for our offences, and raised again for our justification" (Rom. iv, 25).

2. *The Standard is God's Immutably Law, which Man cannot, but which Christ does, satisfy.* No inherent goodness, none that human nature, weakened by sin, can present, will satisfy the law, which is not weak in respect to the sinner, although he may be in respect to it. That it remits none of its original claims the fact of a *condemnation* bears witness. Hence, inasmuch as man's obedience is imperfect, God must either pronounce that perfect which is not, or else a righteousness which is perfect, and can be declared to be so, must be substituted for it. "There is the very same need of Christ's obeying the law in our stead in order to the reward, and of his suffering the penalty of the law in our stead, and the same reason why one should be accepted on our account as the other." (Edwards.)

3. *Justification is not an End in Rightness, nor the same as Sanctification.* Sanctification is the development of the new life begun in regeneration, and is progressive. Being, like its germ, a transformation of character, and wrought within, it is, in this sense, infused. But justification, though indeed instantaneous, in which it is like regeneration, and *ad extra*, in that it brings "blessings"—i. e., for the sinner, *before the law*—is unlike either, indi-



cating a *state* of privilege to which the believing sinner is brought by virtue of what Christ, by his obedience, has done for him. Theologians speak of the *imputation* of Christ's righteousness. Thus, Pros. Edwards: "And by that righteousness being imputed to us is meant no other than this, that the righteousness of Christ is accepted for us, and admitted instead of that perfect inherent righteousness which we ought to have in ourselves." "Even as David also describeth the blessedness of the man unto whom God imputeth righteousness without works" (Rom. iv. 6).

4. *Union with Christ renders such a Method of Justification Possible, and Faith in Him makes it Actual.*—On the part of him who undertakes it a substitution must be voluntary and gratuitous; it must also be according to the will of the lawgiver and judge, so that it can still be said, "It is God that justifieth." Furthermore, there must needs be a moral union in which the transaction can be effected. This is provided for in the *incarnation* of the Son of God, whereby he becomes "like unto his brethren." "Of him are ye in Christ Jesus, who of God is made unto us wisdom and righteousness and sanctification and redemption" (1 Cor. i. 30). But if Christ's obedience is the *procuring* and *meritorious* cause of justification, faith is its *instrumental* cause, or the condition of receiving it. "Therefore, being justified by faith, we have peace with God through our Lord Jesus Christ" (Rom. v. 1). "But to him that worketh not, but believeth on Him who justifieth the ungodly, his faith is counted for righteousness" (Rom. iv. 5).

III. *ADDITIONAL REMARKS AND EXPLANATIONS.*—(1) Two points in justification were emphasized by the Reformers: (*a*) *Christ alone*, excluding human merit. "We are brought into peril and exposed to danger," says Melancthon, "for this one only reason, that we believe the favor of God to be procured for us, not by our observances, but for the sake of Christ alone. If the exclusive term *only* is disliked, let them erase the apostle's corresponding terms *freely and without works.*" (*b*) *Faith only*, to the exclusion of meritorious works. Thus Luther (at the Diet of Augsburg): "Nor can I embrace Christ otherwise than by faith only. Faith *alone*, before works and without works, appropriates the benefits of redemption, which is no other than justification, or deliverance from sin. This is our doctrine; so the Holy Ghost teaches and the whole Christian Church. In this, by the grace of God, will we stand fast. Amen." (2) "The Fathers" are often quoted as holding the same doctrine. For example, Justin Martyr, who says: "In whom could we transgressors and ungodly be justified, but only in the Son of God? O sweet exchange! O unspeakable contrivance! that the transgressions of many should be hidden in one righteous person, and the righteousness of one should justify many transgressors!" (3) When justification is confounded with pardon, or with sanctification, or when a native or infused goodness is made the ground of justification, or, again, when its *forensic* sense is eliminated from the word, and it is interpreted to mean *being made righteous*, instead of *being pronounced so*, the doctrine then held or taught is other than the justification of the Reformation and the Reformed churches. (4) Justification, though of Latin origin, is not classic. The Greek (New Testament) terms are *dikaïos* (adj.), used ordinarily of personal character, but found in the expression, "the just shall live by his faith," *dikaïosmia* and *dikaïosmis* (of which justification is meant to be an equivalent), "a justifying act," *dikaïosmēn*, "righteousness" (but according to Robinson's New Testament Greek Lexicon), "the righteousness which God reckons or imputes to believers because of their faith in Christ" (Rom. iii. 22; Phil. iii. 9); and the verb *dikaïōō*, to "hold as righteous," to "declare righteous," to "justify." "God is said to justify a person, to regard or treat him as righteous, by reckoning or imputing to him faith as righteousness."

J. R. HERRICK.

**Justin I.** (JUSTINUS), an emperor at Constantinople, by birth a Gothic shepherd of Tauresium in Moesia, b. 450 A. D.; went to Constantinople to seek his fortune; enlisted in the imperial guard; acquired fame for valor, and at last became commander of the guard; by craft and skilful management induced the army to salute him emperor after the death of Anastasius (518 A. D.). The emperor could not read or write, but under the advice of the quaestor Proclus his reign was on the whole a just one, and advantageous to the empire. D. Aug. 1, 527, and was succeeded by his nephew, Justinian.

**Justin II.** (FLAVIUS ANICIUS JUSTINUS), emperor of the East, succeeded Justinian I., his uncle, in 565. His reign was characterized by the defection and death of Narses and the occupation of nearly all of Italy by the barbarians. In the North the Avars gained great advantages, and in the East a bloody war went on with the Persians. The emperor d. Oct. 5, 578, and was succeeded by the excellent Tiberius II.

**Justin** (JUSTINUS), the author of a compendium of Roman history, extracted from a vast work by Trogus Pompeius, who lived in the time of Augustus. (See TROGUS.) It seems rather to be a collection of extracts than an abridgment, and in it much important information has been preserved from oblivion. Especially in regard to the early wars with the Parthians it is almost the only source of information. Nothing is certainly known of Justin, who is sometimes called Justinus Frontinus, at others Junianus Justinus, but he probably lived in the fourth century A. D. The first edition of his work, *Justinii Historiarum Philippicarum Libri XLIV.*, was printed at Venice in 1470 by Jenson; best Venetian edition 1522 (Aldus); most complete by Frotscher (3 vols., Leipsic, 1827). An English version by Arthur Golding was printed in 1564, and five other translations have since appeared.

**Justinian the Great** (FLAVIUS ANICIUS JUSTINIANUS), Roman emperor at Constantinople, b. of Gothic peasant ancestry at Tauresium in Moesia, probably in 483 A. D.; went in youth to Constantinople, where his uncle, afterwards the emperor Justin I., was in high favor; was educated by the latter, to whom Justinian was a faithful and useful servant after the uncle's elevation to the purple. In 520 he was appointed commander of the Asiatic armies, and in 521 consul, and soon after married Theodora, an actress and courtesan, to whom he was always tenderly attached. Justinian's celebrated reign seems to have derived little of its splendor from the ruler himself, whose great talent lay in the selection of able lieutenants. His generals, Belisarius, Narses, and Germanus, carried the terrors of the Roman arms into Africa, where the Vandal kingdom was overthrown; into Italy, where, after long years of warfare, the Goths and Lombards were conquered; into Persia, where, after a twenty years' struggle, Persia obtained a nominal triumph, but Constantinople gained the real victory. Huns, Avars, Arabs, Gepidae, were repelled, often by setting tribe against tribe, oftener by the direct expenditure of gold. Constantinople and the whole empire was adorned with splendid buildings, of which the present mosque of Santa Sophia is the most famous. Silk-culture was introduced, and manufactures, agriculture, commerce, notwithstanding the fearful burdens of incessant wars, appeared to prosper. The greatest monument to Justinian's fame is the *Corpus Juris Civilis*, the work of Tribonian and his assistants, but one which Justinian planned, and in which he took a profound interest. Justinian is accused of vanity and avarice, and his treatment of Belisarius shows that he was capable of meanness and ingratitude; but his private life was in the main correct. In his later years he was a Nestorian. He persecuted heathenism and certain heretical sects, and d. Nov. 14, 565, leaving no legitimate offspring.

**Justinian II.**, surnamed RHINOMETRUS, b. 669, succeeded Constantine IV., his father, in 685, and was one of the worst of the Eastern emperors. Notwithstanding some splendid successes in Syria, Sicily, and among the Slavi, he abandoned the fruits of his victories; in 695 was seized, his nose cut off, and he was banished to the Crimea, whence in 705 he returned and took fearful vengeance upon all adversaries. His reign is a record of shameful excesses. During the insurrection of Philippicus Bardanes the emperor was killed, Dec., 711 A. D.

**Justin Martyr** (FLAVIUS JUSTINUS), b. at Flavia Neapolis, the ancient Shechem, the modern Nablous, in Samaria, about 105 A. D.; studied philosophy in the schools of Asia Minor, Greece, and Egypt. None, however, of the different systems satisfied him, and about 132 he turned away altogether from pagan philosophy and embraced Christianity, of which he became an able and zealous defender. Of his personal life nothing is known with certainty, but it seems probable that he resided at Rome during the latter part of his life, and suffered martyrdom here about 165. Of his writings, the *Liber contra omnes hereses* is lost; the genuineness of the *Oratio ad Græcos* and *Epistola ad Diognetum* is contested; but his *Apologia prima* and *secunda* and his *Dialogus cum Tryphone Judæo* are among the most important productions which the Christian literature from the second century contains. The best edition of all the works which pass under his name is that by Otto (3 vols., Jena, 1842-46). Translations into English of the *Apologia* by William Reeves (1709), and of the *Dialogus* by Henry Brown (1755).

**Jute** is the fibre of *Corchorus capsularis* and *olitorius* (order Tiliaceæ), Indian annuals from five to ten feet high, with stalks as thick as a finger. The name is taken from the Orissa *jhot*, which is derived from the Sanskrit *jhat*, to "be entangled." It appears to flourish best in a hot, damp atmosphere, with a heavy rainfall and rich alluvial soil. The acreage under cultivation in 1872 (an exceptionally productive year) was 921,000. The plant is utilized in a variety of ways. The tops serve as potherbs,



the leaves as manure, the stalks for fences, the seed for oil-cake, the root for paper, and the inner bark for fibre. Although India is the great source of jute supply, the plants yielding it have long been cultivated in China and the East. Attempts have been made to acclimatize them on the lower banks of the Mississippi, in England, and in Algiers. The results are said to be satisfactory. The harvest is in July and August. The stalks, cut with a bill-hook, have the fibre (which constitutes the inner bark) separated by maceration. The cultivation is carried on chiefly by the ryots of Bengal, and often by means of co-operative guilds. The commission which has recently reported to the Indian government on the culture, etc. of the jute-plant complains of the extreme carelessness of the cultivators in the selection of the seed.

Until 1830 it was practically unknown to Europe, and was only used in the native manufactures as the material for the gunny bags in which Indian produce was exported. At first only used for cordage and coarse bagging, successive improvements in its treatment have made it also available for other and more profitable purposes. As cordage it is too easily affected by moisture to be considered a success. An immense quantity is used in making coarse bagging. Not only Indian products, but those of nearly every other nation, are transported in gunny-bags of this material. Carpets are now made from it, and it is mixed with cotton and silk for dress-stuffs. As it will serve for every kind of coarse textile fabric, it is manufactured in a variety of forms. It is used as a substitute for hair, and can be made into admirable chignons. Bright-colored stair-carpets can be sold at threepence per yard, whilst "carpet bed-covers" are produced at one-third the cost of wool. Jute is the most important export from Calcutta after cotton, opium, and rice. In 1828 the quantity exported was only 264 cwts., valued at £62. Cheap Russian flax for a time kept down the English demand, but the Crimean war led to increased requirements, and the Bengalee cultivators seized the favorable moment. From 1858 to 1863 the average exportation was 967,724 cwts. In 1872-73 the quantity exported was 7,080,912 cwts., worth £4,142,547. This industry has been created without government aid or encouragement. In 1872 there were 3,955,455 cwts. imported into Great Britain from India, and 69,000 cwts. from other countries. France took 148,876 cwts. from Calcutta and 550,500 from England; Trieste took 9000 cwts. direct; Holland, 5357 from India, and 58,610 from England; Germany had 77,881; Belgium, 31,192; Spain, 20,768; and other countries 16,176 cwts. by re-exportation from England. Factories for the manufacture of jute on modern principles and under European management are springing up in India. Those at Barnagpūr, near Calcutta, employ 4700 natives, who under seventeen European overseers work up yearly about 16,000 tons of jute. The success has been great. The importation of jute (raw) into the U. S. was in 1871 72, 41,867 tons, valued at \$2,666,859; in 1872 73, 63,329 tons, at \$3,165,744; in 1873-74, 36,991 tons, at \$1,693,947; in 1874-75, 43,402 tons, at \$2,013,391. The value of the jute manufacture in the U. S. is estimated to be not less than \$4,500,000.

Jute is easily dyed, but the beautiful colors it so readily takes up are fugitive except when carefully executed. It is readily brought to a rich cream-color, either in the fibre, yarn, or cloth, but until very lately it was considered next to impossible to bring it to a full white without injuring the strength of the fibre. Dr. Hodge, in a paper read at the British Association in Aug., 1874, claims that it has been completely obviated by methods patented by his son and then in practical operation at Mile Cross, county Down. In this case the worn-out gunny-bags should furnish plenty of paper material. It is already used for coarse wrapping paper. The jute manufacture has its chief seat at Dundee, and gives employment to more than 20,000 persons. In 1872 the quantity imported into that port direct was 1,828,614 cwts. Since the opening of the Suez Canal the fibre has reached Dundee, been spun and woven, the goods shipped back, and paid for within six months of the date of the bill of lading. It has led to the revival of the whale fishery in Baffin's Bay. The bulk of the whale oil is used in the treatment of jute. The Dundee chamber of commerce has represented that an Arctic expedition is desirable, that new haunts of oil-bearing animals may be explored. Thus, the labors of the scientific discoverers in the frozen North will bring an increase of prosperity alike to the workman of Scotland and the peasant of Bengal.

WILLIAM E. A. ADON.

**Jüterbogk**, town of Prussia, in the province of Brandenburg. It has some manufactures of woollen and linen stuffs, and a lively trade in flax and cattle. Pop. 6093.

**Jutland** [Dan. *Jylland*], a peninsula between the North Sea, the Skagerrack, and the Cattegat, is the largest province of the kingdom of Denmark. Area, 9697 square miles.

VOL. II.—94

Pop. 788,119. It is traversed by a ridge of low hills, to the W. of which the country is heath, lined with a range of sandbanks along the coast. The eastern part is beautiful and fertile, hilly, rich in forests of beech and oak, indented by numerous fjords, dotted with small but thriving towns, and cultivated like a garden. The Jutes formed the nucleus of those swarms which under the name of the Northmen devastated the coast of Germany and France and conquered England, and they have still retained in their characters something shrewd, daring, and indomitable, which distinguishes them from the islanders, who are softer and livelier, but weaker.

**Juvenalis** (DECIMUS JUNIUS) was b. probably in the latter part of the first century of our era at Aquinum; studied rhetoric and declamation; was an intimate friend of Martial, and d. in Rome in the eighty-second year of his age; but any further details of his life are not known. Sixteen satires written in heroic hexameters have come down to us under his name, but some scholars consider only the first nine and the eleventh to be by Juvenalis, and even these seem to have been much interpolated. There is a certain rhetorical coldness about his satires; he lacks the humor of Horace and the elevated moral enthusiasm of Persius. But his descriptions of life and characters are often highly picturesque or cutting. The best editions are by Heinrich (Bonn, 1829) and O. John (Berlin, 1851); best English editions by Mayor (London, 2d ed. 1875), and by Maclean (London, 1857). (See also *Der echte und der unechte Juvenal*, by Ribbeck, Berlin, 1865.)

**Juvenile Offenders.** The first organized movement for the reformation of juvenile offenders seems to have been made in London, Eng., in 1817. It grew out of the efforts of the denomination of Friends to follow up effectually the work of John Howard in the visitation and the amelioration of the condition of prisoners in public penitentiaries. Howard died in 1790. In the early years of the present century, Elizabeth Gurney, afterwards the saintly Elizabeth Fry, commenced her remarkable work among the female inmates of Newgate prison, London. Her brothers-in-law, Sir T. Fowell Buxton and Samuel Hoare, with her well-known brother, Joseph John Gurney, and several of her personal friends, about the same time formed a society for the improvement of prison discipline and the reformation of the juvenile depredators who then "infested London in gangs." They became particularly impressed with the importance of "taking from the streets boys who were under no parental control, exposed to every temptation, addicted to every vice, ignorant of all that was good, and trained by their associates to the perpetration of every crime." This organization, called "The London Philanthropic Society," soon found, in their examination of the prisons, that nearly every youthful inmate was effectually ruined, and introduced into the permanent criminal class, by the taint of the jail. To prevent this inevitable result they provided in London the first house of refuge, to receive, reform, educate, and train in a useful trade delinquent children, over eight and under twelve years of age at the time of their reception. In 1849 this institution, which had accomplished a great amount of good in the city, was removed into its present rural quarters at Red Hill, Surrey. In its reconstruction it followed the model of the French agricultural colony at Mettray; it has no surrounding walls, and is broken up into separate families. It is here, as it has been doing for the last fifty years, working out very successful and benign results.

On the continent of Europe, the German and Napoleonic wars creating so many orphans and engendering so much poverty and vice, institutions had been formed previous to the English experiment for the rescue of unprotected and wretched children from lives of crime. In 1695, August Herman Francke opened his institution at Halle, Germany, the immense quadrangle of buildings which he ultimately erected still remaining as a monument of his faith and piety. The history of his remarkable success, as preserved in his biography, is full of encouragement to those engaged in the work of juvenile reform. John Falk followed him; and at about the same date that the first English house of refuge was established he organized in Weimar "The Society of Friends in Need," and founded an institution "for the children of criminals and criminal children." His expressive coat of arms was a representation of a band of children converting, on an anvil, their chains into useful tools. It is recorded of the success of his refuge that hundreds of respectable tradesmen, clergymen, lawyers, and doctors, schoolmasters, merchants, and artists, dated the commencement of a life of usefulness and honor from their entrance into the reformatory at Weimar.

About the same date (1818) of the English efforts to rescue exposed children, and of the German movement under Falk, a corresponding interest was awakened in the U. S.,



chiefly, at first, in the city of New York, under the auspices of the Society of Friends, through visits and correspondence with their English fellow Christians. Such men as John Griseom, Thomas Eddy, Mayor Cadwallader Colden, Hon. Hugh Maxwell, and James W. Gerard\* were ultimately led to unite themselves in an association for the "prevention of pauperism." As early as 1803, Edward Livingston, the father of penitentiary reform in this country, while mayor of New York City, felt the necessity for some effectual measures to redeem young criminals upon their first arrest from a life of crime, and made in his annual messages suggestions which afterwards were fully developed (1821, in the well-known code which he prepared for the State of Louisiana. In this a house of refuge and industry and a school of reform have conspicuous positions. The Society for the Prevention of Pauperism soon found that the rescue of children from a life of crime and from the poison of the prison was one of the most important and promising features of its work. In 1823, therefore, the society changed its name, and secured an act of incorporation from the State as "The Society for the Reformation of Juvenile Delinquents." Their first school of reform was opened in the old government arsenal, on what is now Madison Square, New York, and has grown during the half century to the immense structures that now raise their fine architectural proportions on Randall's Island. The early superintendents, Curtis and Hart, obtained a very wide reputation for the successful management of their delicate and difficult charge. The first American institutions were patterned after this model. Many changes have been made in the modes and discipline of reformatories during the last twenty-five years, but it has always been found that more depends upon securing reformatory men and women of the right character than upon any particular system of training.

Boston opened her school, under the care of Rev. Mr. Wells, also a man of remarkable reformatory ability, in 1826; Philadelphia in 1828. It was nearly ten years before the next institution, a farm-school, purely a private charity, was opened in the former city, and ultimately located, where it is still accomplishing its benign work, on Thompson's Island in the harbor. Nearly ten years later still (1847) a fresh impulse was given to juvenile reform by the very generous donation of Mr. Theodore Lyman, who was a trustee of the farm-school, to the State of Massachusetts of a large sum of money for a reform school for boys. The well-known institution at Westborough was the result. This was the first purely State institution established in this country; heretofore they had been founded by charitable associations, which held their control, while the State, in most instances, granted annual supplies. The experiment has proved that the latter institutions, as a general rule, are more successful, more economical, better managed, and less liable to frequent and disastrous changes of officers. As it is better for the State and for the individuals interested to develop the benevolence and piety of the citizens, the policy now pursued in Great Britain seems to be the wisest on the whole—by a general law a reasonable sum per capita is allowed by the government to all reformatory institutions for clearly specified juvenile subjects lawfully committed to such custody in establishments accepted by, and open to the supervision of, a state inspector. Smaller schools, other things being equal, give better promise of reforming their inmates than those aggregating large numbers of delinquent or defective youth. These voluntary schools will secure not only better supervision over their subjects in the institution, but a more careful oversight after their discharge, which is an element of reform of almost equal importance with the former. In 1833, Dr. John Henry Wichern, then a young theological student just ordained for the ministry, and engaged in voluntary city missionary services in the city of Hamburg, Germany, opened at the Horn, a short distance from town, in a memorable old cottage, into which he removed with his mother, a school of reform for the worst boys of the city streets. The cottage, which has given a name to what is now a village of plain dwellings in the midst of gardens, with workshops, chapel, and schools, was called very significantly, "The Rauhe Haus." Wichern admitted but twelve boys, who became members of his family, and were in every respect treated as his children. Afterwards he successively built other cottages, each for the same number of boys or girls, and established workshops, calling to his aid a body of theological students, whom he trained, while they became the elder brothers and tutors, as well as instructors in various mechanical and agricultural industries, of his remarkable families of street Arabs.

These elder brothers were trained for the "inner" or home missionary work of Germany, and have made admirable superintendents of reformatory institutions throughout Europe and in this country. This experiment proved remarkably successful in its reforming influence over its subjects. In 1837, M. de Metz, a judge of the court of assize of Paris, visited the U. S. as a commissioner to examine and report upon the prison system of this country. He was strongly impressed with the good work done for juvenile offenders in the houses of refuge at New York and Philadelphia, and made to his government a full report of their discipline and efficiency. Immediately upon his return he commenced what, in the end, proved to be his own great life-work—the organization of a general movement for the rescue and reform of young criminals in France. He visited the institution of Wichern in Hamburg, and finally upon the Loire, just out of the city of Tours, he established the great model French reform school, which bears the name of the estate upon which it stands—the "Agricultural Colony of Mettray." It combines the American and German systems. It forms a little village by itself of small, three-story dwellings, each one capable of accommodating forty boys with their instructors, with a church, workshops, and farm-buildings. These institutions are constructed without walls around them or bars upon the doors to retain the *détenus*. The accounts of these institutions, published in this country by Horace Mann, secretary of the Massachusetts board of education, by Dr. Calvin E. Stowe, who visited and carefully examined them, and by Dr. Henry Barnard, secretary of the Connecticut board of education, awakened great interest among philanthropic men. A series of prize essays also, three of which were published, on the subject of juvenile reform, secured by an offer of \$100 for the best by the board of managers of the Philadelphia house of refuge (which was awarded to Rev. Edward Everett Hale of Massachusetts, forty having been sent in), tended to add to the growing interest. In 1855, Massachusetts established her Industrial School for girls at Lancaster, following quite closely the French system of M. de Metz, and allotting but thirty girls to a separate house, each home under the care of three matrons. Ohio but a short time after opened her farm-school for boys on the same plan in a town of the same name. Since this time nearly all the later institutions, which have been quite rapidly organized throughout the country, chiefly State establishments, have followed, with more or less closeness, the farm-school system as distinguished from the "congregate" or penitentiary form of discipline.

Many private and voluntary institutions, meeting the wants of special classes, have been established during the last twenty-five years in this country and Great Britain. The most efficient of these is the Children's Aid Society of New York City, of which Mr. Charles L. Brace is the originator and chief manager. It was incorporated in 1853. Its object is to save the vagrant children of the street from becoming even juvenile criminals. By inexpensive night lodgings for little street-merchants and for girls without homes, by encouraging small savings, by establishing industrial schools where sewing as well as the rudiments of knowledge is taught, and where Sunday services for religious training are held, and chiefly by deporting homeless and worse than homeless children from the miserable haunts of poverty and vice in the city to good homes in the country, an inestimable amount of good is done, and an effective preventive agency against crime secured. The State of Massachusetts has connected one feature of this plan with the bureau of her State board of charities. An agency under it assumes the work of finding homes in the State for unprotected children. The multiplication of these voluntary and State preventive agencies in many portions of the country has perceptibly reduced the amount of juvenile crime, and the effect would also soon be made manifest in the decrease of adult criminals, were it not for the large importation from Europe of this class. Several of the great religious sects, particularly the Roman Catholic, have turned their attention and practical energies in this direction. The largest portion of the most exposed and vicious children in our cities has been of foreign parentage, and by birth connected with the Catholic fold. The very vigorous establishment in later years of reformatories, industrial schools, and orphanages by the Catholic clergy has made itself apparent in most beneficial results in some of our cities. Voluntary religious movements, like the ragged schools instituted by John Pounds in England; like the industrial and christianizing scheme of Dr. Chalmers, introduced into the most abandoned parts of the city of Glasgow, Scotland, in 1820, and into the lowest wynds of Edinburgh in 1845; like those of the Methodist Ladies and Rev. Mr. Pease in the Five Points of New York, and of their successful imitators in Philadelphia and Boston, have produced marvellous results. The inauguration of com-

\*He was the last survivor of the first board of managers of the New York House of Refuge, dying while this article was in preparation (Feb., 1874).

pulsory education, providing for such neglected classes as the young street merchants and children employed in factories, and the vigorous use of the facilities offered by the public and private schools of reform, promise very certain and efficient results in the direction of the prevention and cure of juvenile offences. Particular interest at the present hour is drawn to the mature class of young criminals, from sixteen to twenty years of age. It is very evident that they should not be trained in the same institutions as children. They are just now the most dangerous members of our criminal class, our most violent crimes being perpetrated by them; but they are still amenable to reformatory influences, as has been proved by an interesting experiment of a few late years in the New York house of refuge. They require more restraint than youths, and a broader educational and industrial discipline. They need to be taught a full trade. A portion of their earnings while restrained of their liberty should be credited to them if obedient and diligent. They should be discharged before the limitation of their sentence if there is a good promise of reformation, with power on the part of the managers of the institution with which they have been connected, in their failure upon trial, to return them for further restraint until they show themselves capable of living (and ready to do so) honest and industrious lives in the community. The suspicion that all persons rest under who have been *détenués* renders it necessary that there should be an industrial refuge for them when work cannot be elsewhere obtained. This was really the problem—how to find work for discharged young criminals—that first arrested the attention of Edward Livingston, and turned his thoughts in the direction of the causes and the cure of crime.

It is estimated that there are in this country (1875) some 40 schools of reform, not including those of an educational and preventive character. These institutions have an annual average of about 12,000 children, 1000 of whom are girls. This estimate is rather below than above the actual census. The smaller and purely voluntary institutions would present much larger statistics. In Great Britain there are 65 officially recognized schools of reform, and 95 industrial schools, embracing about 3000 inmates. In the German-speaking countries of Europe there are over 400 establishments for the succor of exposed and criminal youths, with an annual average of 12,000 inmates. Between 40 and 50 have been organized in France. Italy has 33, of which 22 are for boys—all private institutions.

The estimates as to the reforms accomplished in these houses of refuge vary from 60 to 75 per cent. of the whole number received. Many of these young children are not vicious, simply homeless and exposed; so that the actual reformatory power of an institution cannot be measured by the number of inmates that ultimately turn out well. In several instances, however, very thorough and encouraging inquiries have been made, extending over a period of ten and twenty years, and embracing some of the most unpromising subjects when received. Without doubt, every year the class that now enters purely reformatory institutions becomes, in some degree, less promising. They are now the residuum of the streets after orphanages and industrial schools have selected and sifted out their subjects. More care and thoroughness of discipline will be required in their instance, and less pronounced results may be expected.

As disciplinary agencies, education, the cultivation of industrial habits, the learning a full trade if possible, the assimilating and transforming power of a strong, loving, magnetic mind, and positive religious instruction and training, are relied upon. Small institutions bring the children nearer to their officers. It will be seen at once that both the heads and subordinates of these schools must be persons of peculiar adaptation; they must be specially intelligent, unselfish, devoted, fond of children, and of an earnest religious character. These institutions must train their inmates to a plan form of life and to ordinary expectations. Much disappointment and failure results from inattention to this. But few of these youths will be received into families in the position of children; they are to go out into life to earn their livelihood by the sweat of their brows. As farm labor at the East offers such limited pecuniary returns, boys in these schools, as far as possible, should be taught trades, and placed in a position to earn their living by their work upon their discharge. It is not wise to retain them too long in schools of reform; all institution life is unnatural, irksome, and in some degree unwholesome. They should be placed in homes and in industrial positions in the country at as early a day as practicable. It is better to have them returned often, and new homes found for them, than to keep them too long under restraint. The great want of the hour is a body of well-trained instructors and officers. The best systems fail for lack of devoted and intelligent trainers. The irreligious and careless temper

and habits of subordinate officers, who, after all, come nearest to the children, will utterly destroy the reformatory influence of the school, the chapel, and an admirable superintendent. European institutions, which have been models of success, have been in the hands of the most devoted and self-sacrificing missionary spirits, men and women who have made the rescue of childhood a life-work of faith and love, as will be seen in reading De Liefde's volumes.

The literature of this question has become very extensive. In addition to the collected reports of the older institutions, like the New York, Philadelphia, Westboro', and Lancaster schools, and the Ohio State Farm, we mention *Juvenile Delinquents*, Eng., by Mary Carpenter; *The Criminology of Europe*, Eng., by De Laeide; *Report of Mass. State Board of Charities*, 11 vols., very valuable; *Half-Century with Juvenile Delinquents*, by B. K. Peirce; *National Education in Europe*, by Henry Barnard, L.L.D.; *Reformation of Juvenile Delinquents*, by L. Bonnevillie de Marsangy, 1 vol. 8vo, Paris; *Punishment and Prevention*, by Alex. Thomson, 1 vol. 12mo, London; *Social Evils, their Cause and Cure*, by the same author; *Prison and Working*, by Stevenson; *The Complete Works of Edward Livingston*, 2 vols., new ed., New York, 1873. The English Parliamentary reports upon reformatory institutions are very full and of great value, covering every detail of their management. The reports of Wierheim's *Rauhe Haus* and the agricultural colony at Mettray. The published *Proceedings of the National Prison Congress* held at Cincinnati in 1870, and of the *International Congress* held in London in 1872, contain particularly valuable papers upon preventive and reformatory agencies. B. K. PEIRCE.

**Juvenis** (RAYMOND), b. at Gap, the capital of the department of Hautes-Alpes, France, in the first half of the seventeenth century; held some subordinate position in the civil service of his native city, and d. there Jan. 7, 1705. His leisure hours he used for historical researches, and from old state papers and official documents he compiled a *Histoire civile et ecclésiastique du Dauphiné et des dépendances*. The work was never printed. The manuscript was presented to the library of Carpentras in the department of Vaucluse, where it is still kept. But it is often quoted on account of the curious and generally reliable information it gives concerning life and characters in the French provinces in the sixteenth and seventeenth centuries.

**Juven-tas**, in the mythology of the Romans, the goddess of youth, corresponding to the Greek Hebe. She was worshipped in Rome at a very early period; her chapel on the Capitol was built before the temple of Jupiter. After the defeat of Hasdrubal, in 207 B. C., the consul, M. Livius, vowed a temple to Juventas, which was consecrated in the Circus Maximus sixteen years afterward.

**Juven-tia gens** in ancient Rome was a plebeian *gens*, which came from Tusculum, and settled in Rome in the fourth century B. C. The families belonging to this gens were the Celsus, Laterensis, Peto, and Thalna.

**Juven-tinus Al-bius Ovid-i-us**, the name of the author of thirty-five Latin distichs which have come down to us under the title of *Elogia de Phœnomenis*, and which contain a collection of words expressive of the respective sounds uttered by birds, quadrupeds, and other animals. Of the author nothing is known, but the distichs themselves have some interest as a curiosity.

**Jux'on** (WILLIAM), D. D., b. at Chichester, England, in 1582; was educated at St. John's College, Oxford, of which he became president in 1621, and vice-chancellor of the university in 1626. He was made dean of Worcester in 1628, bishop of Hereford in 1633, and of London in the same year, and high treasurer of England in 1635. Bishop Juxon suffered deprivation during the great rebellion and the Commonwealth, but remained faithful to King Charles, whom he attended in his imprisonment, at his trial, and on the scaffold. After the Restoration he was made archbishop of Canterbury (Sept. 20, 1660), and d. at Lambeth Palace June 1, 1665.

**Jyn'teah**, the name of a district of British India, beyond the Brahmaputra, belonging to the province of Bengal, situated between lat. 25° and 26° N. and 90° E., and bounded N. by Assam and S. by Sylhet, with which it was incorporated during the Burmese war. The district is mountainous, and rich in iron and coal. Cap. Jynteah.

**Jynx**, in Grecian mythology, the name of the bird which Aphrodite gave Jason as a symbol of passionate and restless love, and by which he won the love of Medea. According to one version of the myth, Jynx was the daughter of Poseidon and Pan, and was transformed into a bird because she undertook, by means of magic, to do Zeus' bidding with Io. According to another, she was a daughter of Poseidon, and when she and her father promised to give her a mortal contest with the Muse, she was changed into a bird.



## K.

**K**, a palatal mute, the eleventh letter in our alphabet. It is the Greek *kappa* (Κ, κ), but is very seldom seen in Latin, *C* taking its place. It has but one sound in English, the same as that of *C* hard. As an abbreviation it stands for *kilo*; in chemistry it is the symbol of potassium (kalium).

**Kaa'ba** [Arab. *Al Kaabah*, "square house"], an oblong stone building enclosed in the great mosque at Mecca. At the north-eastern corner of the building, four or five feet from the ground, is a celebrated black stone, of an irregular oval shape, about seven inches in diameter, which received idolatrous worship from the Arabians before the time of Mohammed, and it is still the most sacred object of veneration to his followers. The Sabæans and Guebres also worshipped this stone, which is thought to be of meteoric origin, and to have been first connected with the worship of Saturn. None but Mohammedans are now admitted within the Kaaba, but Burekhardt and Burton succeeded in entering under the disguise of pilgrims. Every follower of Islam is bound, if possible, to visit this sacred spot at least once during his life, and scores of thousands make the pilgrimage each year.

**Kaama.** See HARTBEEST.

**Ka'ba**, town of Hungary, in the county of Bihar, has 5630 inhabitants, who are extensively engaged in the rearing of bees.

**Kabbala.** See CABBALA.

**Kabul.** See CAROOL.

**Kabyles.** See ALGERIA.

**Ka'desh** [Heb., "holy"], or **Kadesh-barnea**, city and encampment of the Israelites during their journeys in the wilderness, at the S. E. border of Palestine, near Edom. To this point they had penetrated when they were turned back by the hostility of the Edomites, and compelled to seek the circuitous route E. of Edom and Moab. By some biblical geographers Kadesh is distinguished from Kadesh-barnea, and it is held that the people of Israel were twice turned back, once from each place; others consider the two accounts a duplicate narrative of the same event. Dr. Robinson in his *Biblical Researches* identifies Kadesh with the modern *Ainet-Weh*.

**Kad'monites** [Heb. *Kadmoni*, "eastern"], the name of a Canaanite tribe which in the time of Abraham inhabited the N. E. of Palestine, near Mount Hermon. The name is thought to be a general one for the dwellers in Eastern countries, and that they are identical with the "children of the East," elsewhere mentioned in the books of Genesis and Job.

**Kadom'**, town of Russia, in the government of Tambov, on the Moksha, has 7173 inhabitants and some trade.

**Kaffa**, or **Kafa**, country of Eastern Africa, S. of Abyssinia, consists of an extensive table-land rising about 5000 feet above the sea and covered with immense forests of coffee trees. Coffee is indigenous here, and is said to have received its name from this country. It is largely cultivated, and great quantities are exported to Mocha. The *enaset*, a plant resembling the banana, furnishes the chief article of food. Cereals are not cultivated, and "grain-eater" is used as an expression of contempt. The inhabitants belong to the Abyssinian type, and speak a language classified under the Hamitic group. They profess to be Christians, and are governed despotically by a king. Bonga, situated in 7° 12' 30" N. lat., 36° 41' E. lon., on the Gojeb, is the principal town, but is a poor place, consisting of straggling huts, and comprising only between 6000 and 7000 inhabitants.

**Kaffa**, or **Feodo'sia**, town of Russia, in the government of Taurida, is beautifully situated on the eastern coast of the Crimean peninsula; it has a good fortified harbor, and was, while in the possession of Genoa, a commercial port of consequence, but lost its importance under Turkish dominion. It is now rising again, and is much visited as a watering-place. Pop. 8435.

**Kaffirs**, or **Caffres** [Arab. *kafir*, "unbeliever" or "heathen"], first applied by the Arab slave-dealers of the eastern coast of Africa to all the natives. In after years the term was limited to the tribes inhabiting the coast-country on the E. side of S. E. Africa, and recent events have narrowed the designation in a popular sense as applying to the tribes living in the country between the Cape Colony and

Natal. The Kaffirs form a very large family of the human race, extending beyond the equator, and are closely allied to a great part of the Central and North African tribes. They are a *modified* negro, being distinct from the negro proper, the Hottentot, and Bushman; for, though their hair is woolly, their color is as a rule deep sepia-brown. They are often intensely black, but many, on the other hand, are coffee-colored, so that these are merely variations from the original complexion. Many are reddish, like the American Indians. In their own language they call themselves *A-bantu*, meaning "people" or "men." Their features are often regular, and instances occur in which but for its color the countenance might be taken for that of a European. Several writers describe their figures as admirable and their movements as graceful and dignified. Their skulls are dolichocephalous and high, or, according to Welcker, hypsistenocephalous. Their language belongs to the so-called prefix-pronominal. The Kaffirs of South Africa are divided into four species—the Kafir proper, the Sichuana, Tazeza, and Ojjiherero. The first speak the real Kafir language; the second, the Se-rolong, Se-suto, and Setlapi; the third, the Mancolosi, Ma-tonga, and Ma-ploenga dialects. The general disposition of the Zulu races, called Kaffirs by the English, is (1) the tribes N. of Natal, Amatabela, Amazulu, etc., and the Amaxoso and Amampondo, in the E., speaking Zulu; (2) Makololo, N., and Bakuku, N. W., speaking Sichuana, and generally known as Bechuana or Beljuana; and (3) the Ovampas and Ojjiherero or O-va-berero. For practical study G. Fritsch reduces all these to the Ama-xosa, the Ama-Zulu, the Bechuana, and the O-va-herero.

The Kaffirs were first made known in 1497, when Vasco da Gama was wounded by them in Helena Bay. Succeeding notices of the country and of the natives occur in Santo's work on East Africa (1506) and that of Lopez (1591). In 1626 the traveller Herbert described them. From 1652, when the Cape of Good Hope was settled by the Dutch, until 1795, when it was passed to the English, and with little intermission almost to the present day, the history of the Kaffirs is that of continual savage warfare with the Europeans, varied by bloody feuds among themselves. Chaka or Tshaka, "the Napoleon of South Africa," b. in 1787, killed 1829, founded the Zulu dynasty. When his mother died this king, to terrify his subjects, caused 7000 of them to be murdered in one day, and continued these sacrifices for three months. The Kaffirs, though not religious, are extremely superstitious. Much has been written in their favor, but even from the testimony of their European friends it is evident that they are greedy, cruel, and expert in poisoning. Owing to the insecurity of life and property among themselves, about 300,000 Kaffirs, or one half the nation, have taken refuge in the British colony. As wives are the most profitable of their possessions, polygamy is so deeply rooted that Christianity makes but little progress among them. The old, the poor, and the sick are treated with incredible barbarity. When a chief's hair turns gray he is often put to death, and Tshaka once entered into a treaty with the English, the secret object of which was to obtain a bottle of hair-dye. The language of the Kaffirs, in common with those of the Bechuana, Damaras of the Plain, the people of Congo, Suaheli, and many other regions, is what is called aliteral, as contrasted with the tongues characterized by "clicks," such as are spoken by the Hottentots and Bushmen. The Kaffirs are ferocious and passionately fond of warfare, but unless driven to despair are only to be dreaded in ambush or night-attacks. Among the numerous works relating to the Kaffirs may be named *The Kaffirs of Natal, etc.*, by Rev. J. Shooter (1857); *The Record Relative to the Native Tribes of South Africa*, by Lieut. D. Moodie (Cape Town, 1838); *Reports, etc.*, by Col. R. Collins (ib. 1841); *Proceedings of the Commission Relative to the Kaffirs, etc.* (Piet. Maritzburg, 1852); *South African Annals*, by D. Moodie (ib. 1855); *Narrative of the Kaffir War of 1850-52*, by R. Godlonton (Graham's Town, 1852); *Kaffir Laws and Customs*, by Maclean (Mount Cape, 1858); *Past and Future of the Kaffir Tribes*, by Rev. W. C. Holden (London, 1855); *The Orange River*, by C. J. Anderson; *Lake Ngami*, by the same; *The Zambesi, etc.*, by D. Livingstone (London, 1865); *Journal of a Residence at the Cape of Good Hope*, by Chas. J. F. Bunbury (London, 1848); *Travels, etc. in South Africa*, by G. Thompson (London, 1872); *Zulu Legends, etc.*, by Dr. Bleek (an interesting work, indicating great imagina-

tion and even poetic power in the Kaffirs: *Requard the Fox in South Africa*, by the same. See also other works by Bleek. The titles of nearly fifty works referring to the languages, ethnography, and anatomy of the Zulus and other South African tribes are given in *Die Koonstboren Sud-Afrika*, by G. Fritsch. C. G. LELAND.

**Kaffra'ria** (*Pepper or Independent*), the name of the eastern coast region of South Africa, extending N. to the river Umzimkulu, in lat.  $20^{\circ} 26'$  S., and S. to the Great Kei or Keiskamma, which separates it from the Cape Colony, to which in 1866 the so-called British Kaffra'ria was annexed. The distance from N. to S. is about 250 miles, and from E. to W.—that is, from the Indian Ocean to the Kalambi Mountains—about 120 miles; the area of the whole territory about 20,000 square miles. Besides the Great Kei and the Umzimkulu, many other rivers—as, for instance, the Umzimvubu, the Umata, and the Umbashee—flow through these regions, rising in the Kalambi or Quathlamba mountains at an elevation of about 3000 feet. None of them is navigable, however. They flow in deep beds, and their shores are, like the coast, rocky and irregular. When sufficiently watered, the soil is very productive. Cotton has been grown with success in many places; maize and wheat are easily raised; large trees and watermelons abound. The inhabitants, whose number is estimated to be about 300,000, are Kaffirs, and live as nomades in tribes which bear the names of the chiefs. Their religious and moral ideas are often very low; one Zulu tribe believes that their present chief has created the world. But the Wesleyan Missionary Society has had great success among them, and the whole population is gradually coming under the influence of the Cape Colony.

**Kafiristan'**, a country of Central Asia, between  $35^{\circ}$  and  $36^{\circ}$  N. lat., and between  $69^{\circ} 20'$  and  $71^{\circ} 20'$  E. lon. It received its name, "the land of the infidels," from the surrounding Mohammedan people, who entertain an inveterate hatred against its inhabitants. As the country is an isolated alpine tract of land, on the declivity of Hindu-Kush, which never was conquered, though often invaded by foreigners, and about which we know very little, the inhabitants form an isolated race, entirely different from their neighbors. They resemble Europeans in their features, and have blue eyes and light brown hair; in their language, which is of Sanskrit root, and in many of their habits, sitting on raised seats. They are said to be very proud of this resemblance to Europeans, while they consider it the first and most essential part of a man's honor to have slain a Mussulman. We know, however, as little of the inhabitants as of the country.

**Kagoshi'ma**, or **Kagosima**, town of Japan, situated on the south-western coast of the island of Kiusiu, is the capital of the feudal prince Satsuma. It was bombarded in 1863 by the English, who thus compelled Satsuma to execute the murderers of Mr. Richardson, an English subject, and to pay £20,000 in indemnification.

**Ka'hanu**, or **Proboscis Monkey**, the *Simopithecus naulua*, a most grotesque and hideous monkey of Borneo. It is of gregarious habits, and is extremely active, noisy, mischievous, and even savage in character. The native name is derived from the cry of the beast. Its nose is six inches long, and perfectly black.

**Kah'lenberg**, the last outpost of the Wienerwald, the northernmost spur of the Noric Alps, rises just opposite Vienna, on the Danube. From its southern side Sobieski attacked in 1683 the Turks besieging Vienna. On its top, which rises 1160 feet above the river, are some places of amusement, much visited during summer by the inhabitants of Vienna.

**Kai'eteur**, a celebrated waterfall in British Guiana, on the Potaro River, a tributary of the Essequibo, 822 feet in height. The river is here nearly 100 feet wide, and is 15 feet deep.

**Kairwan'**, town of Tunis, Northern Africa. It has several magnificent mosques and other monuments of a splendor which has gone. It stands on a sandy plain, has no manufactures and no trade. Pop. estimated at from 10,000 to 50,000.

**Kaisari'jeh**, town of Asia Minor, situated in lat.  $28^{\circ} 42'$  N., and lon.  $35^{\circ} 20'$  E., and not to be confounded with Kaisari'jeh in the province of Syria, which was built by Herod, bore the name of Caesarea Palestine, and was in the first century one of the most splendid Greek towns in Asia, but which now is wholly in ruins. Kaisari'jeh in Asia Minor is decaying too, surrounded on all sides by ruins, but it has still 10,000 inhabited houses, and carries on a very important trade in European and Asiatic products.

**Kai'ser'** [from Lat. *Cæsar*], the German word for emperor, which has been so extensively known and used in every language since the year 1871, when William, king of Prussia,

was crowned at Versailles, France, as emperor of Germany. Thus was revived the old Teutonic appellation of kaiser, which applied formerly, and especially in the Middle Ages, to the German emperors, who inherited this title from the Roman Cæsars, themselves succeeded by Charlemagne, who is considered by Germans as the first emperor of the Vaterland, as William is the latest one. FÉLIX AUCAIGNE.

**Kai'serslautern**, town of Rhenish Bavaria, on the Lauter. It has some manufactures of iron, cotton, and tobacco, and a lively trade in fruit. Pop. 12,029.

**Kai'serswerth**, small town of Rhenish Prussia, on the Rhine, is noted for the school of evangelical deaconesses which was founded here in 1835 (see FLENNER), and which now has branches in most Protestant countries. Pop. 2223.

**Kak'odyle** (syn. *CACODYLE*, which see); also **Kakodylic Oxide**. Correctly speaking, the synonym given in the former note under *CACODYLE*, "*Turning Liquor of Cadet*," belongs, as it was originally applied by Bunsen, the discoverer of this baneful series of bodies, to the latter compound, which is also called *alcarsine* (arsenical alcohol), though it is now known that the liquor of Cadet is always mixed with kakodylic itself. Cadet's liquor is obtained by distilling together white arsenic and potassic acetate. The mixed product is treated with hydrochloric acid, which gives kakodylic chloride, and this, treated in an atmosphere of  $\text{CO}_2$ , with metallic Zn, gives pure kakodylic. The formula  $\text{C}_4\text{H}_6\text{As}$  also, which was given before, becomes, in the prevailing notation adopted in this *Cyclopædia*,  $\text{C}_4\text{H}_6\text{As}_2$ . Under the view that it is *arsenedimethyle*, the rational formula attributed to kakodylic by Wöehler is:  $(\text{CH}_3)_2\text{As}$ ; and to kakodylic oxide (*alcarsine*) he assigns the formula  $[\text{CH}_3]_2\text{As}_2\text{O}$ . The latter is formed, with *kakodylic acid*  $(\text{CH}_3)_2\text{As}_2\text{OH}$ , by the slow oxidation of kakodylic. It is only kakodylic itself which fumes and inflames spontaneously in the air, and it confers these properties on the mixture called "*liquor of Cadet*."

Humanity revolts from the use of this agent, kakodylic, in human warfare, and it never will be thus employed, as its employers would place themselves without the pale of humanity. The power to prepare such terrific agents has doubtless been conferred upon man to enable him to cope successfully with beasts of prey and deadly reptiles and serpents, which in some countries prove too powerful for the untaught natives, and actually have been known to depopulate large districts of the earth, and render them impenetrable by civilized man under ordinary conditions.

H. WERTZ.

**Kalafat'**, town of Roumania, in Little Wallachia, in a plain on the left bank of the Danube, nearly opposite to Widin. Partly by its natural position, and partly by its artificial fortifications, it commands entirely the approach to the Danube here, and was the scene of very severe contests between the Russians and the Turks in 1829 and in 1834. Pop. about 2500.

**Kalakau'a** (DAVID), b. at Honolulu Nov. 16, 1836, and descended from an ancient king of the islands of Hawaii. Together with Lunalilo and other hereditary chiefs, he was educated in the royal school of Honolulu, a thoroughly English institution, and in 1860 he visited California. When Lunalilo died (Feb. 3, 1874) without having proclaimed a successor, Kalakau'a was elected king (Feb. 12, by the legislature, 39 votes being given to him, and only 6 to the queen-dowager, Emma, his rival to the throne. A riot took place in favor of Emma, but was speedily put down by aid from the British and American ships of war present, and Kalakau'a was installed on the same day as the seventh king of the Hawaiian Islands.

**Kal'ama**, city and tp., cap. of Cowlitz co., Wash. Ter., on the right bank of Columbia River, 45 miles from Portland, Or., and 65 miles S. E. of Astoria, southern terminus of the Pacific division of the Northern Pacific R. R.; now completed 105 miles northward to Tacoma. Kalama was first laid out in Feb., 1871, and was incorporated as a city in the same year, in consequence of its selection as the head-quarters of the above-mentioned railroad co., which erected buildings for offices, car and machine shops, a warehouse, and a wharf 700 feet long. It has several high schools, 2 churches, 1 newspaper, 1 public school, 1 hotel, and a fire department; and is the highest point on Columbia River to which deep-sea vessels can ascend without lightering cargo. Within a few miles northward are extensive coal mines, and on every side the timber of the timber. Kalama Creek, rising at the Lake of Mount St. Helen, supplies unlimited water power. Salmon fishing, in the Columbia River, for summer and export, is a profitable industry. U. S. mails received daily from Puget Sound by rail, and twice a day by steamer, connecting with overland mail from California.

M. H. & M. L. MOSEY, Pbs. "BEACON."



**Kalama'ta**, rising town of Greece, at the head of the Gulf of Koron, and carries on a brisk trade in oil, figs, and cocoons. Pop. 6200.

**Kalamazoo'**, county of S. W. Michigan. Area, 576 square miles. It is very fertile, and diversified with prairies, oak openings, and forests. It is traversed by numerous rivers, and by five lines of railroad. Cattle, grain, wool, butter, and hay are staple products. The manufactures include carriages, wagons, lumber, cooperage, flour, saddlery, etc. Cap. Kalamazoo. Pop. 32,054.

**Kalamazoo**, post-v. and tp., cap. of Kalamazoo co., Mich., on the Michigan Central, the Kalamazoo division of the Lake Shore and Michigan Southern, the Grand Rapids and Indiana, and the Kalamazoo and South Haven R. R's., 10 miles from Lake Michigan and 143 miles from Detroit. Situated on the river of the same name, with a fine location and splendid water-power, Kalamazoo is a beautiful and wealthy place, having 12 churches, 2 fine libraries (one of 5000 vols.), a gallery of art, 2 national and 1 savings bank, 1 college, 2 female seminaries, a fine system of public schools, and several private schools, 1 daily, 2 weekly, and 2 monthly periodicals. Water is supplied on the Holly system by 10 miles of pipes and 100 hydrants. There is an effective fire department with a fire-alarm telegraph; the manufactures are extensive, embracing iron machinery, steel springs, carriages, pianos, billiard-tables, elevators, clothes-pins, woodwork of various kinds, and paper. There is a public park, and a driving-park with a superior track. The Michigan asylum for the insane is located here, accommodating 400 to 600 patients. Kalamazoo is the fourth town of the State in size. Pop. of v. 9181; of tp. 10,147. GEO. TORREY, FOR "TELEGRAPH."

**Kalamazoo College**, Mich., was incorporated as a college in 1835. It had previously been a branch of the University of Michigan. Its founders were Baptists, and a majority of its board of trustees are of the same body of Christians. But other denominations have always been represented in its board of trustees, and generally in its faculty. It admits both sexes to an equal share in its instruction and to the same courses of study. The buildings are very finely situated, and the campus includes about 25 acres. Rev. Kendall Brooks, D. D., has been since 1868 the president of the college, which embraces (1872) 6 male, 4 female instructors; 98 male, 71 female students.

**Kalamazoo River** rises in Hillsdale co., Mich., flows generally W. N. W. to Kalamazoo, and thence N. W. to Lake Michigan. It is 200 miles long, 350 feet wide at its mouth, and is navigable 40 miles for boats. It flows through a level and fertile region.

**Kal'amo**, post-tp. of Eaton co., Mich. Pop. 1363.

**Kalb** (JOHN, BARON DE. See DE KALB.

**Kal'be**, town of Prussia, in the province of Saxony, on the Saale. It has considerable manufactures of cotton and paper. Pop. 7386.

**Kalb-fleisch** (MARTIN), b. at Flushing, in the Netherlands, Feb. 8, 1804; was well educated, and in youth paid special attention to chemistry; went as a supercargo to Sumatra, and afterwards became a merchant in France; in 1826 came to the U. S., where he acquired great wealth as a manufacturer of colors and chemicals, at first at Harlem, N. Y., and later in Connecticut; in 1841 established the same business at Green Point, L. I.; took a prominent place as a Democratic politician, was sent to Congress in 1862, and chosen mayor of Brooklyn, N. Y., in 1867. He was distinguished for mercantile integrity, good judgment in business, and public spirit. D. Feb. 12, 1873.

**Kale**, a variety of *Brassica oleracea*, the species of cruciferous plant to which the cabbage, turnip, etc. belong. There are many sub-varieties—some biennial, others with a perennial root. Kale is grown in kitchen-gardens for its leaves, which are boiled as potherbs. The plant is often called borecole. In Great Britain the sea-kale (*Crambe maritima*), a plant allied to the above, is extensively raised in gardens. Its leaves are not palatable until after blanching, when they are highly prized as food.

**Kalei'doscope** [Gr. καλός, "beautiful," εἶδος, "form," and σκοπεῖν, "to see"], an instrument invented in 1817 by Brewster, consists of a tube containing two or more longitudinal stripes of glass mirror, whose reflecting surfaces are inclined to each other at an even-numbered aliquot part of four right angles; that is, at 60°, 45°, 36°, etc., which are respectively one-sixth, one-eighth, and one-tenth of a circle. At one end of the tube is an eye-piece; at the other, two plain glasses, the outer one ground. Between these glasses are bits of bright-colored glass, diaphanous beads, and the like. The reflection of these objects is multiplied by the mirrors, and constitutes an asymmetrical image often of great beauty. It is of considerable use in the arts as an aid in

devising new patterns for calico-printers and other decorative purposes.

**Kaler'gis** (DEMETRIUS), b. in the island of Candia in 1803, and educated at St. Petersburg by an uncle. In the war of independence he fought with great valor, but was taken prisoner by the Turks, who cut off one of his ears. Later on he partook with great passion in all political movements in his native country, and from 1843 to 1845 held the office of minister of war; but his influence was nevertheless not great, as he was suspected of receiving pay from Russia. After 1846 he lived partly in London, where he became intimately acquainted with Prince Louis Napoleon, partly in different places in Greece, until he was sent in 1861 as ambassador to Paris. D. at Athens Apr. 24, 1867.

**Kalevala**. See FINNISH LANGUAGE AND LITERATURE.

**Kalgan'**, an ill-built but large and populous town of China, on the route from Peking to Kiakhta, on the Yang-ho, near the Great Wall, in lat. 40° 50' N., lon. 115° 3', and is of great importance for the overland trade between China and Russia.

**Kalguev'**, or **Kolguev**, an island in the Arctic Ocean, belonging to the government of Archangel, Russia. It is inhabited only by a few Samoyed families, but visited each summer by a great number of fowlers on account of the multitude of eider-ducks, swans, and geese which brood here, and whose feathers and eggs are very valuable.

**Kali'da**, post-v., Union tp., Putnam co., O. Pop. 290.

**Kalida'sa**, an Indian poet, author of the drama *Sakuntalā*, translated by Sir William Jones in 1789, and into German by Forster in 1790. Many other poems are attributed to him, but with less certainty. The date assigned to Kalidasa by different scholars ranges from the first to the eleventh century A. D.

**Kaliha'ri Desert**, the name of a large territory of Southern Africa, of undefined boundaries, but mostly extending between lon. 20° and 30° E., and between lat. 21° and 28° S. It consists of an almost level plain, without springs or streams. The surface is mostly covered with fine sand, resting on a bed of red sandstone, and in many places presenting a striking resemblance to Sahara. Rain is very rare. Grass-plains and groups of acacia trees form the transition from the desert to the fertile tracts. Ostriches, giraffes, and antelopes are met with.

**Ka'tisch** (DAVID), b. of Jewish parentage at Breslau Feb. 23, 1820; lived, engaged in literary pursuits, first in Paris, then in Leipzig, and at last in Berlin, where he founded *Kladderadatsch* in 1848, and d. Aug. 21, 1872. He also wrote a number of local farces, which were performed with great success on all the stages of Northern Germany. The songs of these farces and from *Kladderadatsch* have been collected under the title *Berliner Liederkasten*.

**Ka'tispels**, or **Pends d'Oreilles**, a tribe of Indians belonging to the Selish group, living in the Territories of Washington, Idaho, and Montana, and in British Columbia. They have been partially civilized by Catholic missionaries. The Montana band is the largest, numbering 1000; that in Idaho numbers 700, and that in Washington Territory, 400. The latter inhabits the valley of Kalispel, E. of Cascade range, which gives name to the tribe.

**Ka'lisz**, town of Russia, in the government of Warsaw, on the Prosna. It is one of the oldest Polish towns, situated in a fertile and well-cultivated region, and carrying on quite an extensive trade. Pop. 11,778.

**Kalkas'ka**, county of the southern peninsula of Michigan. Area, 540 square miles. It is traversed by the Manistee River and covered by dense forests. Pop. 424.

**Kalkaska**, post-v., cap. of Kalkaska co., Mich., on the Grand Rapids and Indiana R. R., 137 miles N. of Grand Rapids and 58 miles S. of Little Traverse Bay, in the midst of a vast lumber-region; has 1 newspaper and a fair provision of churches, schools, stores, and business accommodations. The streams are noted for a plentiful supply of brook-trout. The county was recently organized, and had but 424 inhabitants in 1870, since which time the village of Kalkaska has sprung up with a present (1874) pop. of about 1700. C. P. SWEET, ED. "KALKASKIAN."

**Kalm** (PETER), a Swedish botanist, b. in East Bothnia in 1715; was educated at Åbo and Upsal; travelled extensively in Europe; was sent by the Swedish government, at the instance of his friend Linnæus, to North America, where he travelled 1748-51; returned to Åbo, where he was botanical professor, and published (1753-61; in English 1772) an account of his American travels. He also published a large number of works on natural science and other subjects. D. Nov. 16, 1779.

**Kal'mar**, or **Calmar**, an old but interesting and well-built town of Sweden, is situated on an island in Kalmar

Sound, and communicates with its suburbs on the mainland by a long stone bridge. It has a good harbor, considerable trade, and some manufactures. In its old castle, now decayed, the treaty was signed in 1397 by which Queen Margrethe of Denmark united the three Scandinavian kingdoms, Sweden, Norway, and Denmark, under one crown. The instrument was poorly digested, making minute stipulations for petty affairs, and no provisions for great events. Thus it became a source of calamities to all the three kingdoms. In modern times, however, since the idea of a Scandinavian union has taken hold once more of the minds of the Scandinavian people, the failure of the first attempt has been forgotten, and the old city where it took place has become quite an object of enthusiasm. Louis XVIII. and Charles X. of France lived here during their exile. P. 8845.

**Kalmia** [named in honor of Peter Kalm], a genus of shrubs of the order Ericaceæ, evergreens and natives of North America. The U. S. have at least six species, of which the mountain laurel, spoon-wood, or calico-bush (*K. latifolia*) is the best known. It is a large, handsome shrub, with beautiful flowers, highly ornamental in cultivation. The leaves of *K. angustifolia* are very poisonous when eaten by sheep. They have been employed in medicine.

**Kaloc'sa**, town of Hungary, on the Danube, 70 miles S. of Pesth. It is the see of an archbishop. In its immediate vicinity is Lake Kolon, famous for its delicate fish. Pop. 12,868.

**Kalong**. See FLYING FOX.

**Kalu'ga**, government of European Russia, bounded by Smolensk, Moscow, and Tula. Area, 12,176 square miles. Pop. 954,256. The ground is low, the surface flat, the soil stony and not very fertile. The largest part of the country is covered with forests. Rye and oats are the common crops; flax and hemp are extensively cultivated; distilling and manufactures of linen are the chief branches of industry.

**Kaluga**, town of European Russia, the capital of the government of Kaluga, on the Oka. It has very important manufactures of saricloth and leather, and an extensive trade in corn. Pop. 36,080.

**Kalw**, town of Württemberg, on the Nagold, is the principal seat of the lumber-trade in the Black Forest. Pop. 5,882.

**Kalma**, a river of European Russia, rises in the government of Viatka, and flows through Perne, Orenbourg, and Kasan, where, after a course of 1100 miles, it joins the Volga. It is navigable 10 miles from its sources, and forms a very important line of traffic.

**Kambalia**, or **Sernia**, a seaport in the Gulf of Cutch, on the W. coast of India, opened to commerce about 1870, and pronounced by the Indian coast survey to be one of the safest and most commodious harbors on the Malabar coast.

**Kambalu'**, the ancient capital of the Chinese empire under Kublai Khan, the founder of the Mongol dynasty, was visited by several Europeans in the thirteenth century, who have described its magnificence. The ruins of Kambalu have recently been found a few miles to the W. of Peking.

**Kamee'la**, or **Kama'la**, a drug consisting of a red-brown powder from the capsules of *Rottelia tinctoria*, a small euphorbiaceous tree of India, China, and Australia. It is used in medicine for killing the tapeworm, which it usually accomplishes with great promptitude. It is a smart cathartic, and is used for skin diseases. In India it is extensively used as a dyestuff, making a deep red color.

**Kamehameha I.**, the conqueror and first king of the entire group of the Hawaiian or Sandwich Islands, at the death of his uncle, Kalanipou, king of Hawaii, in 1781, inherited the head chiefship of that island. Of uncommon mental and physical quickness, strength, and courage, and with the advantage of some foreign-built vessels and the aid of firearms in the hands of a few Europeans, he soon conquered the other chiefdoms of that island, and one after another the other islands fell under his sway, so that in 1811 he was the acknowledged sovereign of the group, and had acquired the sobriquet of "the Napoleon of the Pacific." As a ruler he was violent and cruel, placing authority only in trustworthy hands, and keeping near his person and under control those conquered and rival high chiefs from whom he had the most to fear. His friends and favorite warriors were liberally rewarded, and his enemies, if spared, closely watched. He valued the superior knowledge and skill of white men, and kept several employed as mechanics, etc. On May 8, 1819, a few months before the first missionaries of the A. B. C. F. M. sailed from Boston for his country, he died. By his queen of highest rank, Keopuolani, he left two sons and one daughter. The eldest

son, Liholiho, succeeded him under the title of Kamehameha II.

CHARLES R. BISHOP.

**Kamehameha II.** (LIHOLIHO) did not inherit the best qualities of his father. He was intemperate and given to pleasure; but by abolishing idolatry and the more oppressive tabus he prepared the way for the missionaries, who received permission to land and commenced their labors in Mar., 1820. Fearing that he might not be able to retain control of his kingdom, he desired to secure the friendship and protection of the king of Great Britain. In Nov., 1823, he sailed for England with his favorite queen (Kamamalu), a few chiefs, and servants. They were well received and kindly treated by the sovereign and people, but, taking the measles soon after their arrival in London, both king and queen died in July, 1824, childless. Their remains and their suite were returned to their island home in H. B. M. ship Blonde, under command of Capt. Lord Byron.

CHARLES R. BISHOP.

**Kamehameha III.** KANIKEVULI, brother of Liholiho, b. in 1811, came to the throne in 1833 (two of the queens of Kamehameha II., Kaahumanu and Kinau, having ruled successively as regents since 1823). He was educated by the American missionaries. Bright, amiable, wild, and dissipated in his youth, and always careless in the choice of his associates, he yet listened to good advice in affairs of state, and wisely followed it. In 1837 he married much below his own rank. In 1840 he gave his people a written constitution and a simple code of laws, and in 1852 a new and very liberal constitution. The independence of his government was acknowledged by the U. S. in 1842, and by Great Britain and France in 1843. With the concurrence of the chiefs he gave in 1848 lands in fee simple to the common people, so that nearly all heads of families were landholders. Treaties were made with the U. S. and with several European countries, and great progress was made in education, civilization, agriculture, and commerce. The king adopted as his heir and successor his youngest nephew, Alexander Liholiho. On Feb. 28, 1842, Lord George Paulet forced him to cede the islands to Great Britain, but Admiral Thomas, commander-in-chief of the squadron, restored the flag and sovereignty July 31, 1843. In 1846 a new code, establishing a more systematic government, with courts of various grades, was promulgated. The more responsible offices were filled by foreigners, of whom Rev. William Richards, Dr. G. P. Judd, R. C. Wyllie, William L. Lee, and Rev. R. Armstrong were the most prominent and useful. This king, called "Kamehameha the Good," deserved the love and gratitude of his people. D. Dec. 15, 1854, at the age of forty years, childless, and his adopted nephew succeeded him. CHARLES R. BISHOP.

**Kamehameha IV.** (ALEXANDER LIHOLIHO, b. Feb. 9, 1844, succeeded his uncle in Dec., 1854. He was educated in the Young Chief's School under the care of Mr. and Mrs. Cooke. In 1849, as he and his older brother, Lot Kamehameha, visited the U. S., England, and France. June 2, 1856, he married Emma, adopted daughter of Dr. T. C. B. Rooke, and May 20, 1857, a son, the prince of Hawaii, was born, to the great joy of the whole nation. Kamehameha IV. was a brilliant and agreeable gentleman, in accomplishments and talents superior to any other of his race; handsome in form, graceful, fond of military and civic parade, of sports and society, and generous to a fault. When excited with wine he was passionate and reckless. His love for his country and people was intense; his prospects for a long and prosperous reign seemed fair, and through his son he hoped for the perpetuity of his dynasty; but in Aug., 1862, the young prince died after a short illness. The king never recovered from the effect of the grief and disappointment caused by that loss, and it undoubtedly shortened his life. He took an active interest in the introduction and progress of the "Reformed Catholic Mission." The Queen's Hospital in Honolulu was established in 1860 by the aid of subscriptions solicited by him in person, and he kept up a deep interest in it to the end of his life. The rapid and constant decrease of his people was to him, as it also was to his brother and successor, a deep grief, and his comforting fact. D. Nov. 30, 1863. CHARLES R. BISHOP.

**Kamehameha V.** LOT KAMEHAMEHA, b. Dec. 11, 1830, succeeded his younger brother in Nov., 1863. He had been minister of the interior and commander-in-chief of the forces. Like his predecessor, he was a very agreeable and agreeable gentleman, though less accomplished and more retiring. His experience in public affairs, high rank, firmness, and commanding presence made him eminently fitted to be the ruler of his people. He was even more popular with his native subjects than his brother had been. While prince he had been educated, but before he became king he lost interest in the school, and was permanent. On coming to the throne he felt it his duty to take the oath to the constitution of 1852, considering it not



binding upon him to do so, and that the constitution was too democratic for the good of his people. In 1864 he called a convention of the nobles and delegates of the people to make a new constitution, but disagreeing with the third estate, and believing the opposition to be factious and unreasonable, he dissolved the convention, granted the present constitution, and took the oath to support it. While the masses seemed to be quite satisfied with the change, by many he was severely censured for this step; but those who knew him the best, though disapproving of the manner in which the change was made, had, and now have, no doubt that patriotism and a determination to promote the interests of his government and people controlled his action. He was too proud to take much pains to disabuse the minds of those who misjudged and blamed him. Want of sympathy between the king and that part of the foreign community who were of radical, democratic, and progressive tendencies had the effect to make him suspicious and exclusive, and to strengthen the influence of those who for various reasons took more pains to agree with and please him—an influence not always wholesome or honorable. His energy and his disposition to engage in trade and speculation, for which he had not been trained, did not increase his estate, and in the latter part of his life he got the reputation of being avaricious and grasping. His character was a strange one. He was strong-minded, fearless, and firm, and yet superstitious; generous even to wastefulness with some, and with others close even to injustice; affectionate and confiding towards those who won his respect, and suspicious and reticent towards others equally worthy. Partly out of regard for the memory of his brother, and also from a real interest in good morals and education, he gave liberal aid to the Reformed Catholic Mission and its schools. He was never married, and left no heir to the throne. On his deathbed he requested his kinswoman, Mrs. Bernice Panahi Bishop, to become his successor, but she declined, and he expired soon after without making any appointment according to law. D. Dec. 11, 1872, that being his forty-second birthday. CHARLES R. BISHOP.

**Ka'meke, von** (GEORG ARNOLD CARL), b. June 14, 1817; entered the military service in 1834; in 1850 was made a captain in the staff, and from 1856 to 1858 was military attaché to the Prussian ambassador at Vienna. He was then created a lieutenant-colonel, and appointed chief of the engineering department of the ministry of war. In 1861 he received the command of a regiment of infantry, in 1863 became chief of staff of the 8th army corps, and in 1865 major-general and chief of staff of the 2d army corps. In this position he took part in the war of 1866 against Austria, and received the decoration *pour le mérite*. In 1867 he was made inspector-general of the engineering corps and the fortresses, and in 1868 lieutenant-general. In the war of 1870-71 with France he first commanded the 14th infantry division, occasioned the battle of Saarbrücken (Aug. 6, 1870), and took part in the battles of Aug. 11, 16, and 18. After the surrender of Metz he was ordered to take Thionville and lay siege to Mézières and Longwy. Hence he was called to Paris to superintend the works during the siege. After the war he occupied his old position as inspector-general of the fortresses and the engineering corps, and in 1874, when Gen. von Roon retired, he was made minister of war. AUGUST NIEMANN.

**Kames** (HENRY HOME), LORD, b. at Kames, Berwickshire, in 1696; was educated at Edinburgh, and passed advocate in 1724; became a judge of the court of session, with the title of Lord Kames, 1752, and in 1763 became a lord of justiciary. He published several legal works, chiefly volumes of decisions and the like, but his fame mainly rests upon the *Principles of Morality and Natural Religion* (1751), and especially on the *Elements of Criticism* (1762), a work which once had a wide influence. As a jurist he was just and able. D. Dec. 27, 1782.

**Kamin'etz Podolsk**, town of Russia, in the government of Podolia, on the Smotritza, near the Austrian frontier. It is beautifully situated, fortified, and has a Gothic cathedral. Pop. 17,109.

**Kamischin'**, town of European Russia, in the government of Saratov, at the influx of the Kamishinka in the Volga. It has some manufactures. Pop. 7651.

**Kamouras'ka**, county of Quebec, Canada, extending from the St. Lawrence to the State of Maine. It is traversed by the Grand Trunk Railway. Pop. 21,254.

**Kamouraska**, post-v. of Kamouraska co., Quebec, Canada, 80 miles below Quebec, on the S. shore of the St. Lawrence. It is a summer resort, and has a nunnery and academy. Pop. of v. 797; of parish, additional, 1484.

**Kam'pen**, town of the Netherlands, in the province of Overysse, on the Yssel, near its outlet in the Zuyder-Zee. It was formerly a town of greater importance, but has still

considerable manufactures of paper, ropes, bricks, and spirits. Pop. 13,902.

**Kampen, van** (NIKOLAAS GODFRIED), b. at Haarlem May 15, 1776; was apprenticed in a bookstore, but devoted himself with great zeal to the study of languages and history, and became professor at the University of Leyden in the Dutch language, literature, and history in 1816. He was a very prolific writer, but his principal work is *Geschiedenis der Nederlanden buiten Europa* (Haarlem, 1851-33). D. at Amsterdam Mar. 14, 1839.

**Kämp'fer** (ENGELBRECHT), b. Nov. 16, 1651, at Lemgo, in the principality of Lippe, Germany; studied medicine at Königsberg; accompanied in 1668 a Swedish embassy to Persia as secretary; went then with a Dutch fleet as physician to the East Indies and Japan; returned in 1692, and d. in his native town Nov. 2, 1716. Of his voluminous writings on the countries he visited, the *History of Japan and Siam* was published in London in 1727, in 2 vols., but most of the rest remain unpublished in the British Museum.

**Kamptu'licon**, a sort of floor-covering composed of gutta-percha and caoutchouc (or linseed oil), mixed with naphtha and powdered cork, and rolled into sheets, which are calcined, dried, and painted or printed in imitation of floor-cloths. It is expensive, but warm, noiseless, and waterproof. It is, however, not durable.

**Kamptz, von** (KARL ALBERT CHRISTOPH HEINRICH), b. at Schwerin Sept. 16, 1769; studied jurisprudence at Göttingen, and held from 1790 to 1830 different judicial positions in Mecklenburg and Prussia. From 1830 to 1842 he was Prussian minister of justice, and contributed very much, both by his writings and by his practical measures, to harmonize the different legislation of the several divisions of the Prussian state; but his bearing towards the liberal movements of his time was arbitrary and odious; the students burnt his *Coder der Gendarmen* at Wartburg in 1815. D. at Berlin Nov. 3, 1849.

**Kamtschat'ka**, a large peninsula of South-eastern Siberia, 850 miles long, and at its greatest width 250 miles broad, extending between the Sea of Kamtschatka and the Sea of Okhotsk, and terminating in a long, narrow tongue forming Cape Lopatka. It is traversed from N. to S. by a range of volcanic mountains, whose craters mostly are extinct, though Klintchewskaja, 16,152 feet high, was seen in full activity in 1829. The soil is generally stony, though there are fertile valleys, especially that along the river Kamtschatka. But even here the land is unfit for agriculture on account of the severity of the climate. The winter lasts nine months, and frost is not rare in the summer; forests of birch and pine trees grow. The inhabitants, numbering from 5000 to 6000, are mostly Kamtschadales, who live by hunting and fishing. Bears, sable, foxes, otters, beavers, seals, and salmon abound. The only domestic animal is the dog, a peculiar species, large, strongly built, silver-gray or yellowish-brown. These dogs do not bark or howl, and, like the wolves, they see better during the night than in the daylight. They are savage and docile; when harnessed, ten or twelve couples, to a sleigh, they are governed by the voice and the whip, without reins. But they are exceedingly wild, attacking every animal they meet, and sometimes even children. They live on fish. The principal town is Petropaulovski, on the E. coast, in lat. 53° N.

**Kanabec'**, county of E. Minnesota. Area, 510 square miles. It is traversed by Snake River, and is largely covered with forests of pine and larch. The surface is uneven. Cap. Brunswick. Pop. 93.

**Kanaga'wa**, town of Japan, on the Bay of Yedo, 16 miles from the city of that name. In 1859, Kanagawa was opened to foreigners, and very soon it developed a considerable trade.

**Ka'naris** (CONSTANTINE), b. in the island of Ipsara in 1790, and commanded a small merchant vessel when the war of independence broke out. But his exploits soon made his name known to the whole civilized world. June 19, 1822, he burnt a Turkish squadron in the canal of Chios; Nov. 22, another in the harbor of Tenedos; Aug. 17, 1824, a third at Cape Troglion. In 1825 he conceived the bold idea of burning the Egyptian fleet, which lay at anchor in the harbor of Alexandria ready to convey the troops of Mehemet Ali to Peloponnesus. The attempt failed, however. On Aug. 5 the fire-ships were actually launched, but at the same moment the wind turned and drove them away from the Egyptian vessels. Kanaris wished to make a new attempt the following day, but for some unknown reason the plan was not executed. In 1826 he commanded the frigate Hellas, and in 1827 a whole squadron, with which he drove the Turkish flag out of the Greek waters. Under King Otto and King George he was constantly a member of the Greek diet; and held the office of minister of war

several times, though generally only for a short time. In 1851, King Otho attempted to buy off his opposition by a pension and the title of admiral, but failed; the captain declined both offers. In 1865 he was appointed inspector-general of the Greek navy. D. 1877.

**Kana'wha**, county of S. W. Central West Virginia. Area, about 1120 square miles. It is hilly and mountainous, but fertile. Iron, coal, and salt abound. The county is traversed by the Great Kanawha River and the Chesapeake and Ohio R. R. Tobacco, cattle, grain, and wool are the chief staples. Lumber and cooperage are manufactured, and salt is made by boiling natural brines. Cap. Kanawha Court-house, or Charleston, which is also capital of the State. Pop. 22,349.

**Kanawha Court-house**, once the P. O. name of CHARLESTON (which see), the capital of Kanawha co., W. Va., and former capital of the State.

**Kanawha River**. See GREAT and LITTLE KANAWHA.

**Kandahar**. See CANDAHR.

**Kandiyo'hi**, county of S. W. Central Minnesota. Area, 864 square miles. It is traversed by the St. Paul and Pacific R. R. It contains innumerable small lakes, has an undulating surface and a good soil, well adapted for wheat. Caps. Kandiyo'hi Station and Lake Elizabeth. Pop. 1760. Since the census of 1870, Monticello co. has been united with it, so that the total pop. in 1870 was 4921.

**Kandiyo'hi**, tp. of Kandiyo'hi co., Minn. Pop. 558.

**Kandiyo'hi Station**, a post-v., one of the county-seats of Kandiyo'hi co., Minn. It is on the St. Paul and Pacific R. R., 98 miles from St. Paul.

**Kan'dy**, or **Candy**, town of Ceylon, situated nearly in the centre of the island, on an elevation 1676 feet above the sea. It is the seat of the government, has many Christian churches, Buddhist temples, and Mohammedan mosques. Close by is a beautiful artificial lake,  $1\frac{1}{2}$  miles long and from 100 to 500 yards broad. Pop. 7000.

**Kane**, county of N. E. Illinois. Area, 540 square miles. It is a rolling prairie region, with abundant limestone, some timber, and a very fertile soil. It is traversed by Fox River and numerous railroads. Live-stock, grain, hay, and dairy products are the great staples. Flour, cheese, machinery, and the celebrated Elgin watches (see ELOIN) are made in this county. Cap. Geneva. Pop. 39,091.

**Kane**, county of S. E. Utah, extending nearly across the Territory from E. to W. Area, estimated at 7550 square miles. It is traversed by the Colorado River, and contains a great variety of lands and much mineral wealth. Cap. Tropicville. Pop. 1513.

**Kane**, post-v. and tp., Greene co., Ill., situated on Jacksonville division of the Chicago Alton and St. Louis R. R., 25 miles N. of Alton, and 8 miles S. of the county-seat, Carrollton. It has 1 bank, 2 newspapers, several business-houses and 1 large school house, and is surrounded by a fine farming country. Pop. of tp. 957. Ed. "Express."

**Kane**, tp. of Benton co., Ia. Pop. 763.

**Kane**, tp. of Pottawattamie co., Ia. Pop. 1086.

**Kane**, post-v. of Wetmore tp., McKean co., Pa., on the Philadelphia and Erie R. R., 193 miles W. N. W. of Philadelphia. It is situated on the "Big Level," a fertile plain 2000 feet above the sea-level. It has grand forests of pine and other timber. Here are the repair-shops and round-houses of the railroad. Kane has a public park of 600 acres, besides several private parks and a number of schools and churches.

**Kane** **ELISHA KENT**, M. D., a distinguished explorer, b. in Philadelphia Feb. 3, 1820, was the son of Judge J. K. Kane of that city. He was educated at the universities of Virginia and Pennsylvania; took his medical degree in 1843; entered the navy; was physician to the Chinese embassy; travelled in Asia, the Levant, and Western Africa; served in the Mexican war, in which he was severely wounded; sailed in 1850 under De Haven in the first Grinnell expedition in search of Sir John Franklin; commanded the second Grinnell expedition (1853-55), and discovered an open polar sea. For this expedition he received several gold medals and other distinctions. (See ART. POLAR SEARCH, by Dr. I. I. HAYES.) His health, always delicate, was much impaired by the terrible sufferings of this expedition. He published a narrative of his first polar expedition (1853) and of his second (2 vols., 1856). D. at Havana Feb. 16, 1857. Dr. Kane was a man of active, enterprising, and courageous spirit, and of most generous impulses. A volume of his personal letters was published by his wife, Margaretta Fox. (See his *Life*, by Dr. W. Elder, 1858.)

**Kane** (Sir **ROBERT**), M. D., LL.D., F. R. S., b. at Dublin in 1810; was long professor of chemistry in Apotheca-

ries' Hall; was founder and (1832-34) editor of the *Dublin Journal of Medical Science*; was 1841-47 professor of natural history to the Royal Dublin Society; was for a time president of Queen's College, Cork; was knighted in 1846. Is a prominent member of many learned societies, and has been the recipient of many honors. Is widely known as the author of the *Elements of Chemistry* (1812) and the *Industrial Resources of Ireland* (1845).

**Kane** (THOMAS L.), b. at Philadelphia Jan. 27, 1822, brother of Dr. E. K. Kane, noticed above; was educated in Paris, where he was intimate with Auguste Comte and the democratic leaders of the day; was admitted to the bar at Philadelphia in 1846, but abandoned the law for civil engineering; visited the Mormon settlements in 1847, and acquired such influence among them that ten years later (1858) he was sent to Utah by the U. S. government as confidential agent to prevent the outbreak of hostilities. Returning to the profession of an engineer in Western Pennsylvania, raised and commanded in Apr., 1861, the famous regiment of mountaineers known as the Bucktail Rifles; was wounded at Dranesville and Harrisonburg, was taken prisoner at the latter engagement, exchanged in Aug., 1862, and appointed a brigadier-general of volunteers in September. D. 1875.

**Kane City**, post-v. of Cornplanter tp., Venango co., Pa. It has numerous oil-wells.

**Kaneville**, post-v. and tp. of Kane co., Ill. Pop. 999.

**Kangaroo**, a name given to numerous species of mar-



Kangaroo.

supial or pouched animals living exclusively in Australia, belonging to the family MACROPODÆ (which see), but more especially to the large species of the genus *Macropus*. Kangaroo is a native name. The kangaroo was first made known to the world by Capt. Cook, who on landing at New South Wales was astonished at the sight of what was at first regarded as a new and very peculiar species of greyhound. The kangaroo is characterized by a remarkable disproportion between the anterior and posterior extremities, and particularly by the presence in the region of the abdomen of a curious pouch, within which are the mammae. The male is without this development. The head is small and resembles that of the deer, having the same mild and placid expression, as well as delicate shape. The hind feet are provided with four toes, the middle one being much larger than the others, of great strength, and provided with a hoof-like claw. An examination of these stout and extremely long hind limbs shows how well adapted they are to aid the creature in its wonderful leaps. The tail, which is also very stout and strong, aids very materially in the leap. The fore legs are very short, and are provided with bent claws with which they hold food when eating. Kangaroos have no canine teeth; their incisors are six in the upper jaw, and but two in the lower. The molars are ten in number in each jaw, and are separated from the incisors by a long space. They are exclusively herbivorous in diet, associating in small herds under the guidance of older males. They vary in size greatly, some species being about the dimensions of a rat, while others are known to measure eight feet from the nose to the tip of the tail, and to weigh over 200 pounds. The young are produced in a very imperfect state, being in the largest species not more than two inches long at birth. The newborn creatures are conveyed by the mouth to the pouch, where they attach themselves to the teats, which they do not leave until able to walk. These animals are easily tamed, and are harmless



and timid, though when brought to bay in the wild state they are said to fight with great power, using their tail and hind feet. The flesh of the kangaroo is esteemed a delicacy in regions where they inhabit. J. B. HOLPER.

**Kangaroo Apple**, the *Solanum laciniatum*, a kind of tomato growing in South America, Australia, and some of the Pacific islands. It is useful as food, but not until perfectly ripe. The green fruit has sharply acrid properties.

**Ka'nizsa, Gross-Kanizsa, or Nagy-Kanizsa**, town of Hungary, inhabited partly by Germans, partly by Magyars, manufactures tiles and liquors, and carries on an import trade in corn, cattle, and wine. Pop. 11,722.

**Kankakee**, county of N. E. Illinois. Area, 500 square miles. It is bounded on the E. by Indiana, and consists chiefly of flat prairie. Its soil is productive. Live-stock, grain, wool, dairy products, and hay are the great staples. Carriages and wagons are leading articles of manufacture. The county is traversed by the Illinois Central and Chicago Danville and Vincennes R. Rs. Cap. Kankakee. Pop. 24,332.

**Kankakee**, city and tp., cap. of Kankakee co., Ill., 56 miles directly S. of Chicago, on the Illinois Central and the Cincinnati Lafayette and Chicago R. Rs., on the N. bank of Kankakee River, an affluent of the Illinois, now being improved for purposes of navigation; is situated on rolling prairie-land, with easy communication to extensive coal-fields and beds of bog-iron ore, in the midst of a rich farming and grazing country. Kankakee contains 13 churches, a public-school building costing \$60,000, 1 national and 2 private banks, 4 weekly newspapers (1 in French), 1 sock, 1 woolen, and 2 button factories, several tanneries, and wagon and carriage manufactories. Two stone-quarries furnish fine building material, so that Kankakee is one of the best built towns of the State. It has excellent water-power, which is utilized by paper, planing, oil, and flour mills. There is a public library successfully managed by an association of ladies. Pop. of tp. 5189.

ARTHUR E. HOYT, LOCAL ED. "GAZETTE."

**Kankakee**, tp. of Jasper co., Ind. Pop. 215.

**Kankakee**, tp. of La Porte co., Ind. Pop. 1185.

**Kankakee River** flows W. S. W. from St. Joseph's co., Ind., through English Lake and through a flat marshy region. Joined in Kankakee co., Ill., by the Iroquois or Des Plaines River, it flows N. W., and pours its sluggish waters into the Illinois.

**Kan'kari**, the ancient *Gangra*, town of Asiatic Turkey, in Asia Minor, on an affluent of the Halys, at an elevation of 2754 feet above the sea. It has several fine mosques, khans, bazaars, and public baths, and an important trade in salt. Pop. 18,000.

**Kano'**, town of the empire of Sokoto, in Central Africa, situated in lat. 12° 2' N. and lon. 8° 22' E. It has large manufactures of cotton goods and an extensive and growing trade. Pop. 30,000.

**Kano'na**, post v. of Bath tp., Steuben co., N. Y., on the Rochester division of the Erie R. R. Pop. 190.

**Kan'sas**, one of the central tier of Western States, and geographically the central State of the American Union, ly-

forming the line of division. Its area is stated by the general land-office as 81,318 square miles, or 52,043,520 acres. The form of the State is a nearly perfect parallelogram, only the N. E. corner being clipped, in consequence of following the course of the Missouri River instead of the meridian of 94° 38'. Its length from E. to W. ranges from 391 to 410 miles; its breadth from N. to S. is 200 miles.

**Surface, Elevation, Mountains, etc.**—The whole State slopes gently from the foot-hills of the Rocky Mountains near its western border to the Missouri River. Along its eastern border, from Wyandotte and Kansas City, the elevation above the sea ranges from 648 feet to 707 feet; at Lawrence it is between 800 and 900 feet; at Fort Riley, 1200 feet; 10 miles W. of Fort Riley, 1459 feet; at the mouth of Saline River, 1592 feet; where the Arkansas River crosses the southern border of the State, about 1800 feet; near Fort Larned, 2004 feet; near Fort Dodge, 2330 feet; near the Arkansas River, at the W. line of the State, 3047 feet; at Pond Creek, on the Kansas Pacific, 3175 feet. The State has no mountains, but, though there are extensive prairies, it is very far from being a monotonous level. There are everywhere low hills or gentle undulations divided by depressed valleys existing, or former river-bottoms, or in some instances ravines or cañons which the streams have cut through the yielding soil.

**Rivers, etc.**—The Missouri River forms a part of the eastern boundary of the State, but receives no important tributaries from Kansas above the point where it turns eastward to flow through Missouri. At that point it is joined by the Kansas River, one of its largest affluents, which, rising in Colorado, traverses the State almost centrally from W. to E. The principal branches of the Kansas are—from the N., Solomon's Fork, Republican Fork, and Big and Little Blue rivers; from the S. W., Smoky Hill and Saline Forks. The eastern and south-eastern portions of the State are drained by the Osage, an affluent of the Missouri River, and the Neosho, Verdigris, Little Verdigris, and Walnut Creek, tributaries of the Arkansas River; while the southern and south-western portions are watered by the Arkansas and its branches; the principal of these are the Cimarron and its branches; Bear Creek; the Little Arkansas and its affluents; Chiensia Creek, Ne-ne-seah or Good River, Turk or Salt Creek, and Pawnee Fork. The State is, as a whole, well watered, the eastern and middle portions better than the western, though the streams of that section are increasing in size and permanency with the progress of settlement and tree-planting. There are some marshes, but, we believe, no lakes in the State of any importance; the two or three claiming that name being only deserted river-beds.

**Geology.**—Eastern Kansas belongs to the coal-measures, which comprise in the State, in one body, a tract 208 miles in length, with an average breadth of 107 miles, and an area of 22,256 square miles. These are the lowest of the geological formations of the State, and are a continuation of the coal-field which covers North-eastern Missouri and Southern and South-western Iowa, and extends into the Indian Territory and North-western Arkansas. The thickness of the strata belonging to the coal-measures in the State varies from 403 feet to about 600 feet, the former being its extent in Leavenworth co., and gradually increasing thence southward. These strata contain two beds of bituminous coal—one of 13 feet in thickness, about 300 feet below the surface; the other, 100 feet lower, of 9½ feet thickness. Both are of good quality, but the lowest is the best. The dip of the coal-measures is very slight. There seems to be an anticlinal axis in Wyandotte co., the dip of the strata N. of it being to the N. W., and S. of it to the S. E. The Permian formation laps over the coal-measures on their western border, and in the valley of Blue River is said by Prof. Swallow to be 567 feet thick. To this succeed the Triassic, and probably the Jurassic formations, covering a triangular tract of territory, the apex of the triangle being at Fort Riley on the Kansas River, where the Republican Fork unites with it, and extending with a broad base through the Indian Territory into Northern Texas. In Kansas it extends from the point where the Arkansas River crosses the boundary into Indian Territory to the 101st meridian. It is not apparently rich in fossils, the few found being mostly ornithomites and belonging to the Lias. The Cretaceous formation, which extends over the greater part of Dakota, South-western Iowa, and Eastern Nebraska, crosses Kansas from N. E. to S. W. in a very irregular tract, pressed upon on the N. W. and on the S. by the Tertiary (Drift and Loess). It joins the Carboniferous formation at the N. E., then separates from it by the interposition of the wedge-shaped Triassic rocks, and about the central line of the State gives place to the Tertiary for a breadth of 140 miles, when it reappears in narrow belts, extending southward into New Mexico and North-western Texas. South-western and North-western



Seal of Kansas.

ing between the meridians of 94° 38' and 102° of W. lon., and between the parallels of 37° and 40° N. lat. It is bounded on the N. by Nebraska, the 40th parallel forming the line of division; E. by Missouri, the Missouri River forming the boundary from the 40th parallel to Kansas City, and the meridian of 94° 38' the remainder of the distance; on the S. by the Indian Territory, on the line of the 37th parallel; on the W. by Colorado, the 102d meridian

Kansas belong to the Drift period, the larger boulders being found as far S. as 38° 30', while the deposits of pebbles are mainly confined to South-western Kansas. There are nowhere in the State stratified or grooved rocks, or those which show marks of glacial action, and the presumption is that the drift must have been deposited in the geologic periods from icebergs. On the banks of the Missouri, and to some extent of the Kansas River, is found in large quantities the Loess or Bluff deposit, sometimes 100 feet in thickness, and rich in the later fossils, such as the *Mastodon* and the *Eophras gregarius*. The river bottoms and the high prairies in Eastern and Middle Kansas are covered with heavy deposits of alluvium in thickness varying from 3 to 50 feet.

**Economic Geology and Mineralogy.** Kansas contains, so far as is known at present, no valuable mines of the precious metals, and from its geologic formations it can hardly be expected that these will be found. But it has an ample supply of bituminous coal for all the States adjacent, and this of several qualities. Lime and hydraulic lime are abundant, salt springs exist in great numbers in different sections of the State, and salt of excellent quality is made. There are also many surface-deposits of salt of two or three inches in depth, the result of the evaporation of pools or streams flowing from salt springs. Marble and limestone suitable for building and ornamental purposes, and freestone or sandstone for building and other purposes, exist in the coal measures. Gypsum is found in numerous places; alum and native sulphur, and alum and nitrate of potassa, occur together at several points. Brown hematite and other iron ores are found in considerable deposits, but have not been much worked, the Kansas coal near the surface not being well adapted to smelting purposes. Some lead is found in connection with zinc and manganese, but not in quantities sufficient to make its working profitable. Tin is reported, but its existence in paying quantities is more than doubtful. Petroleum undoubtedly exists, but at present prices its production would be unprofitable. Kaolin or porcelain clay and fireclays are found in extensive deposits. Moss agates, selenite, and other minerals exist in large quantities in Western Kansas. Fossils are found in the Jurassic formation, in the Drift, and in the Loess, some of them of great interest.

**Vegetation and Botany.** The number of species of plants indigenous to Kansas is stated by the State botanist to be about 1200. About 600 of these are not in Gray's *Manual*, and are probably not found E. of the lower Missouri River. Kansas is not a State of large or dense forests, and much of its surface is prairie or plain. According to the agricultural report of the State, 95 per cent. is prairie and only

5 per cent. forest, but in the river-bottoms of the eastern and middle sections there is a considerable dense growth of deciduous trees, of the same class as are found in most of this region—the cottonwood, red and white elm, black walnut, some species of oak, sycamore, box-elder, hickory, and ash, hackberry, red, rock, and sugar maple, pecan, mulberry, coffee-bean, cherry, basswood, and occasionally clumps of cedar. The honey-locust, buckeye, and ailanthus have been introduced, and in some sections form considerable breadths of forest. There are few evergreens in the State except those which have been set out by settlers. In Western Kansas tree-planting has been extensively practised, and with great advantage. The Osage orange and osier are considerably used for hedges and fences. The rich prairies of Eastern Kansas are covered with tall and nutritious grasses, and in their season with beautiful flowers. In the W. the grama and buffalo grasses abound; they are well adapted to the dry but fertile soil, and furnish excellent pasturage. In the extreme W. the *Sarcobatus* (or pulpy thorn of Lewis and Clarke), the *Artemisia* or wild sage, and the *Obione* or greasewood grow in clumps.

**Zoology.**—The wild animals of Kansas are such as are common to the region known as "the Plains," extending from Dakota to Texas, and comprise among the mammals the black and brown bear, the wolf, possibly the lynx, the catamount or panther, the wild-cat, the opossum, raccoon, prairie-wolf, the buffalo in countless herds, the deer, antelope, two or three species of hare, several squirrels, field-mice, wood-rats, etc. The prairie-dog has for some cause nearly or quite disappeared from the State. Of the Reptilia, the number is not large; it includes the rattlesnake, moccasin, and one or more species of the black snake, two or three adders, and ten or twelve species of the innocuous snakes; and among batrachians, the horned frog, as well as several other species of frogs, toads, and lizards. The professor of natural history in the State University reports 290 species of birds belonging to Kansas as already described, and further research will probably increase the list to about 350. The rivers, except the Missouri, the main streams of the Kansas and Arkansas, and perhaps the Republican Fork of the former, are shallow and partly dry in the long hot summers, and are not in consequence so largely stocked with many varieties of fish as those which have a more perennial flow. There are generally the same species of fish found in the other affluents of the Missouri and Mississippi, and some experiments have been made in the way of stocking the larger streams with some of the best fish from the lakes and northern waters.

**Climate.**—The climate of Kansas is temperate and salubrious; the cold, though sometimes severe in winter, is not

TABLE I.—TEMPERATURES.

PLACES. POPULATION.	Mean annual temp.	Highest temp. of the year.	Lowest temp. of the year.	MONTHLY MEAN TEMPERATURES.											
				Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.
	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.	Deg. F.
Burlington (Osage Co.) 10° 28' 45", lon. 95° 45' alt. 1000 ft.	52.00	100	-6	32.75	33.08	45.25	49.12	64.90	72.15	77.68	74.	66.	53.75	44.85	20.95
Marion (lat. 39° 13' lon. 96° 39', alt. 1000 ft.)	52.81	98	-12	18.50	27.70	40.40	46.60	67.00	74.30	80.20	71.10	60.70	53.10	38.10	25.30
Leavenworth (lat. 39° 15' lon. 94° 52', alt. 806 ft.)	51.05	99	-29	19.	30.	42.10	48.60	63.	75.50	77.50	79.20	65.40	56.40	35.	21.
Lawrence (lat. 38° 55' lon. 96° 16', alt. 844 ft.)	54.20	108	-3	28.01	27.50	39.50	48.07	69.76	77.11	83.62	83.45	67.03	56.01	38.76	31.01

TABLE II.

STATIONS.	First, or Eastern Belt.											
	Lat.	Lon.	Alt.	Jan.	Feb.	Mar.	Apr.	May.	June.	July.	Aug.	Sept.
				° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.	° F.
Fort Leavenworth	39° 15'	94° 52'	806	10	1.75	1.94	1.30	0.65	1.30	1.29	1.94	1.41
Of the .....	1.1			9	1.7	2.18	0.5	1.1	1.1	6.5	3.06	6.97
Marion	39° 13'	96° 39'	1000	9	1.7	2.18	0.5	1.1	1.1	6.5	3.06	6.97
Lawrence	38° 55'	96° 16'	844	6	1.4	0.97	0.	1.12	1.09	1.60	1.16	1.41
Mean .....				1.35	1.75	2.01	0.15	1.85	1.94	2.00	1.40	1.98
Second, or Middle Belt.												
Fort Riley	39° 01'	96° 30'	1300	11	0.77	1.01	0.7	1.71	0	1.93	1.00	0.97
Fort Harker	38° 44'	98° 1		7	1.6		0.9	1.1	1.91	0.80	1.46	1.1
Fort Hays	38° 10'	98° 7'	14	4	0.44	0.4	0.7	1.18	0.5	1.45	1.83	1.01
Mean .....				0.73	1.05	1.12	1.15	1.8	1.60	1.70	1.40	1.4
Third, or Western Belt.												
Fort Dodge	37° 30'	100° 00'		1	0.87	0.63	0.11	1.17	0.39	1.85	0.47	0.0
Fort Assumption	37° 47'	100° 14'		1	0.4	0.43	0.96		0.4	1.45	0.9	0.90
Fort Wallace	37° 1	101° 0		1	0.1	0.14	0.05	0.6	0.60	1.00	1.1	0.3
Fort Lyon	36° 5	101° 0	1080	1	0.1	0.17	0.16	0.0	0.84	1.00	0.8	0.27
Mean .....				0.1	0.36	0.35	2.17	1.27	1.2	1.88	1.70	0.64

\* Mean of 23 years.

† Mean of 7 years, 1834-40.



protracted, and the prevalent dryness of the atmosphere renders it less trying than it would otherwise be: the heat of summer, though at times very great at midday, is always tempered by cool breezes at night. The mean temperature of the year varies with the altitude and the degree of moisture, which is greater in the eastern than in the western portion of the State. The winds are often high, especially in the winter, the southerly winds exceeding those from the N. N. W., or N. E. in the proportion of 11 to 9. The preceding tables give the temperatures at different points in the State, and the rainfall in several localities far apart, for different years and for the several seasons.

The rainfall is best shown by statistics from the three long and broad belts in Eastern, Middle, and Western Kansas, as in Table II.

**Soil and Agricultural Productions.**—The soil of Kansas, though of two kinds—the alluvium of the river bottoms and lower prairies, and the upland or plains—is all of it very fertile. Probably no State in the Union has so little waste or worthless land. The rich and fertile loam of the river-bottoms, from 3 to 50 feet deep, at first attracted the attention of the settlers; but it has been found that even the lands of the western part of the State, forming a portion of what was known as the "Great American Desert," will yield with moderate irrigation, or without it where groves of trees have been planted, from 40 to 60 bushels of wheat to the acre. Table III. gives the amount of the principal crops gathered in the State in 1874, according to the assessors' returns in Dec., 1874. These, being procured for the purpose of taxation, are generally considerably below the truth. It will be remembered that 1874 was the "locust or grasshopper" year, and that Indian corn and some other crops were greatly diminished by these pests. The corn crop of 1873 was in round numbers nearly 39,000,000 bushels, and with the increased acreage that of 1874, but for the "grasshoppers," would have amounted to not less than 46,000,000 bushels if an average crop. There are to be added to this table several other items of statistics, which are most conveniently stated in a different form. Of dairy products, there were produced in the State in 1873, 151,172 pounds of cheese made in cheese-factories, and 143,922 pounds made in families; in 1874

TABLE III.—Principal Crops grown in Kansas in 1874, with the Acreage in 1873 and 1874, the Quantity and the Value of the Crops of 1874, according to the Assessors' Returns:

PRODUCTS.	Amount of product in 1874.	Value of product in 1874.	Acreage for 1873.	No. acres cultivated in 1874.
Winter wheat, bushels.	6,870,603	\$5,794,008	252,724	438,179
Rye, bushels.	421,261	289,117	24,184	30,546
Spring wheat, bushels.	3,010,777	1,837,663	145,556	278,025
Corn on soil.			112,269	156,239
Corn on old bushels.	15,699,078	12,283,142	1,142,070	1,369,182
land.				
Barley, bushels.	414,188	329,488	22,784	24,115
Oats, bushels.	7,599,785	4,064,424	277,729	314,926
Buckwheat, bushels.	113,664	170,499	6,405	7,865
Irish potatoes, bushels.	1,072,260	1,247,817	41,653	46,164
Sweet potatoes, bush.	192,213	249,511	2,237	2,617
Sorghum, gallons.	912,125	540,338	9,908	14,103
Castor beans, bushels.	123,637	152,005	2,915	8,815
Cotton, pounds.	89,655	11,657	810	1,739
Flax, pounds.	174,698	265,704	6,462	16,844
Hemp, pounds.	2,331,126	116,560	1,643	3,136
Tobacco, pounds.	293,828	29,384	3,116	507
Broom corn, pounds.	2,677,550	123,317		4,176
Millet, tons.	67,342	483,312	19,910	40,225
Hungarian, tons.	21,069	142,469	12,659	15,101
Timothy meadow, tons.	34,067	252,817	21,616	29,601
Clover meadow, tons.	25,381	215,756	13,484	13,947
Prairie meadow under fence, tons.	322,984	1,421,746	434,190	433,968
Timothy pasture, acres.			1,679	5,046
Clover pasture, acres.			2,948	3,793
Blue-grass pasture, acres.			12,203	13,776
Prairie pasture under fence, acres.			465,793	397,142
Total.		\$29,920,734	3,037,957	3,669,769

the cheese-factories had increased so much that they manufactured 289,401 pounds, and the family product had slightly decreased, being 141,448, the total production of cheese in the State in 1874 being 430,849 pounds against 295,094 pounds in 1873. There were produced in 1873, 6,814,695 pounds of butter, and in 1874, 7,467,110 pounds. The number and value of farm animals, and the number and product of hives of bees, in 1873 and 1874, were respectively as follows:

Year.	Horses.		Mules and Asses.		Cattle.		Sheep.		Swine.		No. of hives of bees in 1874.	No. of stands of native bees in 1874.	No. of pounds of honey in 1873.	No. of lbs. of wax in 1873.
	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.	Number.	Value.				
1873.	17,134	\$10,992.10	17,816	\$1,362.71	694,991	\$13,414.44	51,166	\$119,725	80,761	\$2,093,572				
1874.	292,992	10,991.63	22,034	1,388.12	779,939	13,124.23	81,838	163,676	60,716	2,673,174	2117	9032	33,912	1340

The number of acres of nurseries, of acres and products of orchards and vineyards in 1874, was as follows: acres of nurseries, 5071.74; acres of orchards, 100,839.61; bushels of fruit produced, 124,937.61; acres of vineyards, 5658.87; gallons of wine made from crop of 1873, 13,561.12; pounds of grapes produced in 1874, 2,345,318.

**Manufacturing and Mining Industries.**—According to the census of 1870, Kansas had 1477 manufacturing and 26 mining establishments, employing together 30,987 persons, of whom 28,038 were men, 1159 women, and 1790 children. The capital employed was estimated at \$29,456,939; the wages paid, at \$9,572,624; the materials used, at \$29,504,085; and the annual product, at \$54,800,087. This includes blacksmiths' shops and a great variety of small industries not requiring much machinery or power. The returns to the county boards of assessors include none of these, nor the cigar manufactories, breweries, or machine-shops of the different railroads. The cigar-factories and breweries are, however, returned for internal revenue purposes. The county boards report for 1874, 65 saw-mills (50 steam and 15 water-power), with a capital of \$250,794; 139 flour-mills (50 water-power and 89 steam), with a capital of \$2,106,105; 27 saw and grist mills (13 water-power and 14 steam), with a capital of \$135,392; 13 furniture and cabinet factories, with a capital of \$157,820; 5 foundries and rolling-mills, with \$195,000 capital; 6 woollen-factories, with \$111,600 capital, and 50 miscellaneous factories, embracing oil, cheese, gypsum, soap, and carriage factories, having a capital of \$567,916. These returns are obviously very incomplete. There were also 72 cigar manufactories and 1 tobacco-factory reported to the assessors of internal revenue, whose annual product was estimated at about \$272,500; and 43 breweries, having an annual product of \$274,021.25. The central position of Kansas, its numerous railways, its excellent supply of coal, and its fine water-power, as well as the absence of any great mining interests, indicate that it is destined to become one of the great manufacturing States of the Union.

**Railroads.**—The entire number of miles of main track of railways completed and in operation on Jan. 1, 1874, according to the assessors' reports for 1874, was 1839 miles

and 142 feet. The valuation of this property for purposes of taxation was \$14,711,277.92, which was probably a little more than one-fifth of the cost of road, land, and equipment. On Jan. 1, 1875, according to Poor's *Railroad Manual*, there were in the State 2480.88 miles of railway, and the cost of roads, equipment, etc., was \$74,617,856. Two of these railways traverse the whole breadth of the State from E. to W.—viz. the Kansas Pacific, extending from Kansas City on the Missouri to Denver and beyond, a distance of about 672 miles; and the Atchison Topeka and Santa Fé, extending from Atchison, also on the Missouri, to Granada in Colorado, 528 miles with its branches, and destined to be speedily completed to Santa Fé. The other important railways are the Missouri Kansas and Texas, 256 miles in the State, including branches; the Leavenworth Lawrence and Galveston, 207 miles, including branches; Missouri River Fort Scott and Gulf, 159 miles; St. Joseph and Denver City, 136 miles in the State; Atchison and Nebraska, about 40 miles in the State; central branch Union Pacific, 100 miles; Kansas City St. Joseph and Council Bluffs, 71 miles in the State; Kansas Central (Leavenworth to Holton), 56 miles; St. Joseph and Topeka, 87 miles; Kansas Midland (Kansas City and Topeka), about 60 miles; St. Louis Lawrence and Western (from Pleasant Hill to Carbondale), about 69 miles in the State; some branches of the Kansas Pacific, as Leavenworth branch, 27 miles, Junction City and Clay Centre branch, 33 miles. The rapid building and completion of so many railways in the State has contributed greatly to its development and increase in population. The telegraph lines of the Western Union accompany all or nearly all of the railways, and the Atlantic and Pacific have also lines to most of the towns.

**Finances.**—The receipts into the State treasury from all sources, exclusive of balances, during the fiscal year ending Nov. 30, 1874, were \$995,102.89, and the expenditures, exclusive of transfers, were \$976,805.82. The amount received from direct taxes only was \$690,253.59; from all other sources, \$304,749.30. Of the amount received from taxes, \$461,095.59 was for general revenue purposes, \$22,988.83 for the sinking fund, \$91,715.79 for payment of interest on public debt, and \$114,453.38 for the annual

school fund. The receipts from other sources than taxes were credited, with the exception of a very small amount, to the permanent and annual school funds. The bonded indebtedness of the State was \$1,341,775, but of this amount \$705,825 is held by the sinking fund and other permanent funds in the State treasury, so that the debt of the State, except to its own funds, is only \$635,950. There is no floating debt, but there was a balance in the treasury Nov. 30, 1874, of \$222,880.65. The permanent school fund on Nov. 30, 1874, amounted to \$1,123,399.32. The valuation of all the property of the State as fixed for taxable purposes for the year 1874, was \$128,906,519.80, an increase of \$36,780,658.80 since 1870. The true valuation in 1870 was \$188,892,011, and would now be probably not less than \$260,000,000. The State tax of 1874 for all purposes was six mills on the dollar. There were in the State 16,996,746 acres of taxable lands, of which 3,669,769 acres were under cultivation, an increase of 633,000 acres over the preceding year.

**Commerce.**—As an interior State with no large navigable stream except the Missouri, which washes its N. E. border, Kansas can have no foreign commerce except that which is conducted through the ports of other States. But her internal commerce, transacted mainly by means of her railways, is very large. She ships eastward corn, wheat, and other cereals, considerable quantities of cotton, cattle in large numbers, driven from Texas and Colorado to her rich and abundant pastures, broom corn, and moderate

quantities of other products. Abilene, Junction City, Salina, Ellsworth, and some of the other southern towns are the centres of the cattle-trade. In 1872 her internal commerce had reached \$114,000,000, and since that time, in spite of drought and "grasshoppers," it has rapidly increased.

**Banks, Insurance Companies, etc.**—There were on Nov. 30, 1874, 26 national banks in the State, having an aggregate capital of \$1,983,000, and deposits amounting to \$2,991,300. There were at the same time 86 banks other than national (a considerable number being private banks), with an aggregate capital of \$1,588,006, and deposits to the amount of \$2,399,616; making an aggregate banking capital of \$3,571,006, and of deposits of \$5,390,916. There are in the State 2 life insurance companies—viz. the Missouri Valley Life Insurance Co., incorporated in 1867, having a capital of \$209,452.76, mostly invested in bond and mortgage, and the Alliance Mutual Life Association, organized in 1873, with a capital of \$105,006.25, similarly invested. The former reported in 1873 assets to the amount of \$871,888. Both are in Leavenworth. There is one fire insurance company, the Kansas, also located at Leavenworth, incorporated in 1864, and reporting in 1873 a capital of \$250,000 and assets of \$258,960. Both capital and assets consist in part of notes.

**Population.**—The following table gives the total population of Kansas, by sexes, races, and nativity, in 1860, 1870, and 1874, so far as ascertained:

Year of census.	Total population.	Males.	Females.	White.	Colored.	Indian.	Of native birth.	Of foreign birth.	Of school age, males.	Of school age, females.	Over 21 years, males.	Between 18 and 21, males.
1860.....	107,206	59,178	48,028	106,390	627	189*	94,515	12,691	18,623	18,800	31,037	27,976
1870.....	373,290	202,224	169,175	346,377	17,108	9,814	316,007	48,392	53,669	53,041	105,671	95,002
1874.....	530,367	246,939	228,575						101,872	97,138	120,087	

The density of the population of Kansas in 1870 was 4.18 persons to the square mile; in 1874, 7.37 to the square mile. The census of 1870 reported 123,852 persons engaged in all occupations, of whom 73,228 were engaged in agricultural pursuits, being 59.13 per cent. of the whole; 20,736 in personal and professional occupations—16.74 per cent.; 11,762, or 9.5 per cent., in trade and transportation; and 18,123, or 14.67 per cent., in manufacturing, mechanical, or mining pursuits.

**Education.**—The following are the statistics of the public schools for the year ending Nov. 30, 1874: number of school districts, 4395; total number of persons of school age in the State, 199,010; total number of persons enrolled in public schools, 135,598 (68,978 males and 66,620 females); average daily attendance in public schools, 77,386; average length of time school is taught, 5.5 months; number of male teachers in public schools, 2360; of female teachers, 2683. Average monthly wages paid—male teachers, \$37.24; average monthly wages of female teachers, \$28.69; amount paid for teachers' wages for the year, \$723,568.63; amount expended for repairs and incidentals, \$51,263.70; amount received from semi-annual dividends of State school money, \$261,952.62; amount raised by district tax, \$495,093.85; total amount derived from various sources for public schools, \$1,638,977.99. Number of school-houses—log, 228; frame, 2606; brick, 139; stone, 470; total, 3543, of which 539 were built during the year; total value of school-houses, \$3,989,065.87; total value of apparatus, \$40,637.06. The public school expenditure per head of the population of school age (5 to 21 years) is \$7.94, and

per head of the actual population of school age (6 to 16 years) is \$11.31. Twenty-six cities and towns have complete systems of graded schools, comprising primary, intermediate, grammar, and high schools. In these schools in 1874, 232 teachers were employed, 16,760 children were enrolled, and 9018 in daily attendance. Of these, 1064 were pupils in the high schools. There were 70 school buildings occupied by these graded schools, many of them costly buildings, ranging from \$7000 to \$55,000 each. There are 4 normal schools in the State—at Emporia, Leavenworth, Concordia, and Quindaro. The last named is for the training of colored teachers. The school at Concordia, Cloud co., in the N. W. part of the State, was opened in Sept., 1874. Emporia had 236 pupils enrolled, 194 of them normal; Leavenworth, 235, all normal; Concordia, 66, all normal; Quindaro, about 55. Teachers' institutes are held in the larger counties. The other State institutions of higher education are (1) the State Agricultural College near Manhattan, on a farm of 445 acres, having an endowment valued at \$432,506. In 1874 it had 13 professors and instructors, and 112 male and 58 female students—170 in all. The course of study is extensive, but thorough and practical. (2) The University of Kansas, at Lawrence, partially endowed with university lands (about 46,000 acres), and receiving from the legislature an appropriation varying from \$23,000 to \$30,000 to supplement the present lack of receipts from its landed endowment. In 1874 it had 10 professors and instructors and 173 students—58 in the collegiate and 115 in the preparatory department. The following are the other collegiate institutions in the State in 1874:

Name of institution.	Place.	Date of organization.	Denomination controlling.	Number of teachers.	Students		Male.	Female.	Endowment and property.	Libraries.
					In preparatory dept.	In collegiate dept.				
Baker University.....	Baldwin City.....	1857	Methodist Episcopal.....	7	82	19	61	40	30,000	1,000
College of Sisters of Bethany.....	Topeka.....	1870	Protestant Episcopal.....	9	48	27		55	60,000	1,000
St. Benedict's.....	At Leavenworth.....	1868	Roman Catholic.....	7	35	15	95		15,000	2,000
St. Mary's.....	St. Mary's.....	1869	Roman Catholic.....	9	121		121		150,000	1,500
Washburn.....	Topeka.....	1867	Constitutionalist.....	3	24	6	24	10	101,000	5,000
Highland.....	Hi Island.....	1858	Presbyterian.....	6	145	25	103	67	60,000	5,000
Lane.....	Leavenworth.....	1858	United Brethren.....	2	70	11	47	34	26,000	1,000

Ottawa University, under the control of the Baptists, at Ottawa, has suspended operations. There are 10 academies or collegiate schools—5 of them Catholic—and a considerable number of private schools of more or less merit. The institutions of special instruction in the State are—the deaf and dumb asylum at Olathe, incorporated in 1866;

it had in 1874, 6 instructors and about 70 pupils; the institution for the blind at Wyandotte, incorporated 1866, and having 6 instructors and 28 pupils in 1874. 2 orphan asylums, both at Leavenworth—the Kansas, with 28 orphans, and the St. Vincent's with 52.

Of charitable institutions the State has a State insane asylum at Osawatomie. This institution is still unfinished, but had under treatment during the year 177 patients, with an average of 110, and on Nov. 9, 1874, 110 present, of whom 58 were males and 12 females. 10 had died during the year, and 52 had been discharged, of whom five were not insane, 23 were recovered, 13 improved, and 9 un-

\*Only Indians not in tribal relations were enumerated in 1860. The number was unofficially stated as 8000.

†The enumeration of 1871 is by the township assessors and is imperfect, 5 counties being omitted as well as many townships and all the settlers in the unorganized counties. It is believed that the population of the State is nearly 600,000.



improved, while 2 eloped. The home for friendless women at Leavenworth has received aid, and during the year 1874 had 200 inmates.

The principal penal institution of this State is the State penitentiary at Leavenworth, which in 1874 had 40 officers and employes, and an average of 362 prisoners; its annual expenditure was \$130,669.86, and the total earnings \$23,000; the salaries paid to employes and officers amounted to \$77,000. There is as yet no reformatory school in the State, though preliminary steps have been taken looking to the organization of one. The county jails, especially in the new counties, are not generally well managed.

**Churches.**—We are indebted to the *Third Annual Report of the Kansas State Board of Agriculture for the year 1874* for valuable statistics in regard to the condition of the seven principal denominations in the State for that year (as well as for very much other valuable statistical matter relative to the State). The following are their aggregates: Presbyterians, 161 churches, 74 church edifices, 6604 members, value of church property, \$294,855; Congregationalists, 113 churches, 43 church edifices, 3831 members, \$238,500 of church property; Baptists, 229 churches, 53 church edifices, 9789 members, \$226,900 of church property (the *Baptist Yearbook* for 1875 gives in 1874, 242 churches and 162 ministers; the United Presbyterians reported 39 churches, 14 church edifices, 1313 members, and \$49,200 of church property; the Methodists (this probably includes the various Methodist bodies), 621 churches, 96 church edifices, 22,096 members, and \$339,400 of church property (the Methodist Episcopal conference reports for 1874 give 1603 church edifices, valued at \$395,550, and parsonages worth \$19,000; 19,162 members, of whom, however, 2458 were probationers; 108 travelling and 147 local preachers). The Protestant Episcopal Church is reported as having 34 parishes, 22 church edifices, 1136 communicants, and \$172,000 of church property. The *Church Almanac* for 1875 claims but 30 parishes, 25 clergy, and 1041 communicants. The Roman Catholics are reported as having 191 congregations, 72 church edifices, 32,311 Catholic population, and church property worth \$415,200. The *Catholic Directory* for 1875 gives the church edifices (including 7 buildings) as 62; the number of congregations as 180, of which 117 are very small missions, in most cases not attended oftener than monthly by the hard-working clergy; the whole number of priests (secular and of the religious orders) was but 48, and the Catholic population was roughly estimated at about 35,000. These statistics include also the few stations of the Catholics in the Indian Territory. These statistics show in these seven denominations 1388 churches or congregations, against 530 of all denominations reported in the census; 379 church edifices, against 301 for all denominations; and a valuation of church property of \$1,736,055 for the seven denominations, against \$1,722,700 for all denominations in 1870. We find further that the Christian Connection, as reported in the census, had in 1870, 35 churches, 16 church edifices, 4550 sittings, and \$45,300 of church property; the Evangelical Association (probably included in the Methodists above), 2 churches, 1 church edifice, 300 sittings, \$6000 of church property; the Friends, 7 meetings, 7 meeting-houses, 1600 sittings, \$13,300 of church property; the Lutherans, 9 churches, 5 church edifices, 1400 sittings, \$12,500 of church property; the German Reformed, 1 church, 1 church edifice, 275 sittings, \$3000 of church property; the Unitarians, 2 congregations, 1 church edifice, 400 sittings, \$20,000 of church property; the United Brethren in Christ (possibly included under Methodists above) in 1874 had 120 churches, 60 ministers, 2173 members, and probably \$60,000 in church property; the Universalists had 9 congregations, 10 ministers, 146 members, and probably about 1600 regular attendants. There were also a number of union churches, a few Cumberland Presbyterian, and a few Jewish synagogues.

**Newspapers.**—There were in 1874, 123 newspapers and periodicals published in Kansas, not counting the weekly editions of the daily papers. Of these, 11 were dailies, with an aggregate circulation of about 28,000, 1 tri-weekly, 118 weeklies, and 3 monthlies. The circulation of the weeklies was a little more than 100,000; that of the monthlies, about 8500. Two were in the German language, 1 was medical, 1 educational, 2 religious, 8 agricultural, and the remainder either political, literary, or miscellaneous.

**Counties.**—The following table shows the population of the 74 organized counties of the State in 1860, 1870, and 1874, and the date of organization of the counties. The names of the counties are as they appear in 1874; some have been changed since 1860. Besides these, there are 30 counties, named, but not yet organized, several of which have a population of 100 to 200, of which no account has been made in the table. The names of these unorganized counties are—Arapahoe, Buffalo, Clark, Cheyenne, Decatur, Foote, Grant, Graham, Gove, Greeley, Hodgeman, Hamil-

ton, Kansas, Kearney, Kiowa, Lane, Meade, Rush, Rawlins, Sequoyah, Stafford, Stanton, Stevens, Seward, Sherman, Sheridan, Scott, Thomas, Trego, and Wichita:

COUNTIES.	1874.	1870.	1860.	When org.
Allen	6,953	7,022	3,082	1855
Anderson	6,243	5,226	2,400	1855
Atchison	18,244	15,507	7,720	1855
Barbour *	608	.....	.....	.....
Barton	800	2	.....	1872
Bourbon	17,331	15,075	6,101	1855
Brown	8,418	6,825	2,607	1855
Buth *	9,076	3,035	437	1855
Comanche †	230	.....	.....	.....
Chase	2,903	1,977	1,046	1859
Cherokee	10,980	11,028	1,501	1856
Clay	4,689	2,942	163	1856
Cloud	7,165	2,323	.....	1856
Coffey	6,818	6,261	2,842	1859
Cowley	9,784	1,175	158	1870
Crawford	8,318	8,150	.....	1867
Davis	5,079	5,135	1,163	1855
Dickinson	6,407	3,045	378	1857
Doniphan	13,570	13,909	8,083	1855
Douglas	23,262	20,562	8,637	1855
Edwards	642	.....	.....	1874
Ellis	925	1,376	.....	1867
Ellsworth	3,273	1,185	.....	1867
Ford	333	427	.....	1873
Franklin	11,616	10,385	5,030	1855
Greenwood	6,339	3,454	1,077	1852
Harper	200	.....	.....	1873
Harvey	3,600	.....	.....	1872
Howard	13,572	2,794	19	1870
Jackson	6,83	6,053	1,936	1857
Jefferson	12,498	12,525	4,459	1855
Jewell	7,674	207	.....	1870
Johnson	13,478	13,654	4,364	1855
Kiowa	200	.....	.....	1873
Labette	13,265	9,973	.....	1867
Leavenworth †	27,935	22,441	12,606	1855
Lincoln	2,220	516	.....	1870
Linn	10,539	12,174	6,336	1855
Lyon *	12,430	8,014	3,515	1858
Marion	4,066	768	74	1855
Marshall	10,122	6,901	2,280	1855
McPherson	4,857	768	.....	1870
Miami	12,570	11,725	4,980	1856
Mitchell	5,473	485	.....	1870
Montgomery	10,946	7,564	.....	1869
Morris	4,306	2,225	770	1858
Nemaha	8,941	7,359	2,436	1855
Neosho	11,321	10,206	88	1864
Ness †	200	2	.....	1873
Norton	844	.....	.....	1872
Osage	10,837	7,648	1,113	1859
Osborne	3,890	23	.....	1871
Ottawa *	4,070	2,127	.....	1866
Pawnee	710	179	.....	1872
Phillips	2,409	.....	.....	1872
Pottawattamie	10,554	7,848	1,529	1856
Pratt	300	.....	.....	1873
Reno	6,467	.....	.....	1872
Republic	8,920	1,251	.....	1868
Rice	2,639	5	.....	1871
Riley	6,737	5,105	1,224	1855
Rooks	567	.....	.....	1872
Russell	815	156	.....	1872
Saline	8,742	4,246	.....	1859
Sedwick	7,429	1,095	.....	1870
Shawnee	20,915	13,121	3,513	1855
Smith	4,450	16	.....	1872
Sumner	5,602	22	.....	1871
Wadsworth	4,603	3,362	1,023	1859
Wallace	600	598	.....	1868
Washington	7,860	4,081	383	1860
Wilson	9,372	6,694	27	1865
Woodson	4,861	3,827	1,488	1865
Wyandotte	11,551	10,015	2,609	1859

**Principal Towns.**—Leavenworth is the largest town and city in the State, having a population in 1874 of 16,468; Atchison had about 9000 inhabitants; Topeka, the capital, and Lawrence, about 8000 each; Fort Scott and Wyandotte, between 4000 and 6000; Ottawa, Emporia, Wichita, Junction City, and Parsons, between 2000 and 4000; Olathe, Osage Mission, Paola, Hutchinson, and Manhattan, between 1500 and 2000; Troy, Wathena, Osage City, Burlington, Eldorado, La Cygne, and Humboldt, about 1200; while Baxter Springs, White Cloud, Grasshopper Falls, Pleasanton, Oswego, Independence, Council Grove, Seneca, Salina, and Fredonia all exceeded 1000 inhabitants. Marysville, Newton, Oskaloosa, Chetopa, Burlingame, Nodessa, and Abilene are all thriving and growing towns, and some of them incorporated as cities.

**Constitution, Courts, Representation in Congress, etc.**—The present constitution of Kansas, though the fourth in its history, is the one under which the State was admitted into the Union in 1861. It provides that male citizens of the U. S., or persons of foreign birth who have declared

\* Census of 1873; no returns for 1874.

† Estimated by county clerk at 30,714.

† Estimated.

their intention to become citizens, are entitled to vote after having resided six months in the State and thirty days in the township. No person under guardianship, *non compos mentis*, or insane, nor any person convicted of treason or felony, unless restored to civil rights, nor any soldier, seaman, or marine in the employ of the general government, is allowed to vote. The executive officers of the State are the governor, lieutenant-governor, secretary of state, auditor, treasurer, superintendent of public instruction, and attorney general, all of whom are chosen by the people for a term of two years. The general election is held on the first Wednesday in November. The legislature consists of a senate of 25 members, elected for two years, and a house of representatives of 75 members, chosen annually. The legislature commences its session annually on the second Tuesday in January. Efforts have recently been made to change the constitution so as to make the sessions biennial instead of annual. The judiciary of the State consists of a supreme court having a chief-justice and two associate justices, elected by the people for six years; and of nine district courts, the State being divided into nine judicial districts, each presided over by a single judge. The district judges are elected by the people for four years. Under the appointment of 1872, Kansas is entitled to three Representatives in Congress.

*History.*—That portion of Kansas lying E. of the 100th meridian formed a part of the Louisiana purchase of 1803, and was included at different periods in Louisiana Territory and Missouri Territory. By the Missouri Compromise act of 1820, in all this region lying N. of lat. 36° 30', excepting only such part thereof as was included within the limits of the State of Missouri, slavery and involuntary servitude, otherwise than in the punishment of crime whereof the party should have been duly convicted, was for ever prohibited. As a result of the Mexican war the territory of the U. S. was extended from the 100th meridian westward to the Pacific for S. as 32° 30' N. lat. In 1843 settlers had already entered the territory in such numbers that Congress was called upon to protect them from the Indians. It soon became evident that the fertile lands of Eastern Kansas were to be the objects of contention between the friends and opponents of slavery; the latter contending that by the Missouri Compromise this region was to be exempt from slavery, while the former claimed it on the ground of the partial repeal of that compromise in 1850, and the altered circumstances arising from the accession of new territory in 1848. Both sides were terribly in earnest; in Massachusetts an emigrants' aid society was chartered with ample funds in Mar. or Apr., 1854, to assist emigrants to remove to Kansas, and to furnish them with weapons of defence against those who might attack them; in Connecticut a similar company was chartered in May or June of the same year. In May, 1854, Congress passed the Kansas and Nebraska bill, organizing these two Territories, and expressly declaring that the Missouri compromise of 1820 was inoperative and void in regard to them. As thus organized, the two Territories extended to the Rocky Mountains, taking in a considerable portion of Colorado. The emigrants forwarded by the emigrants' aid companies entered the Territory in very considerable numbers in the spring and summer of 1854, generally resolute men, able and willing to contend for their new homes; but the pro-slavery men of Missouri and Arkansas were as determined to secure the prize for themselves, and a series of raids and conflicts ensued, lasting for four years or more, in which many settlers, as well as considerable numbers of the invaders, were killed. Lawrence was twice besieged and burned, Pottawattamie, Ossawatimie, and Leavenworth were partially destroyed, the

polls invaded and broken up, legislatures disturbed, and their members and officers arrested and imprisoned, and the Territory kept in a constant condition of turmoil. Governor after governor was appointed by the Presidents (Pres. Pierce appointing Gov. Reeder, and Pres. Buchanan, Govs. Shannon, Geary, Walker, Denver, Medary, and Stanton), but each in turn became convinced of the justice of the cause of the settlers, and so incurred the displeasure of the "border ruffians," as the invading party was called, and their leader, David Atchison, formerly U. S. Senator from Missouri, had in most cases sufficient influence to cause their removal. Four successive constitutions for the Territory were voted upon between Dec. 1855, and Oct., 1859; the first, known as the Topeka constitution, prohibited slavery, and was adopted in Dec., 1855, with very little opposition, but its authority was never recognized by the pro-slavery men, very few of whom, however, were legal voters. The second, called the Lecompton constitution, was drawn up by a convention never authorized by the people, and composed almost entirely of Atchison's followers, the Free State men refusing to vote, and only 2000 out of more than 10,000 votes being cast for it. The convention met at Lecompton in the autumn of 1857, and the constitution prepared by it had four sections relating to slavery, prohibiting emancipation, conferring upon slaveholders all the immunities of the worst slave codes, and declaring these inviolable, and preventing any change in this constitution before 1864. The only alternative offered to the people was to vote for this constitution (which was otherwise objectionable) *with* the slavery sections or *without* them. The Free State men generally refused to vote, and the constitution was declared to be adopted by about 5600 majority, the greater part known to be fraudulent. On Jan. 4, 1858, the people had an opportunity of voting against it at the Territorial election, and there was a majority of 10,226 votes against it. On Aug. 3, 1858, Congress ordered another vote on this constitution, and it was rejected by over 10,000 majority. Another constitution had been made by a constitutional convention in Apr., 1858, and had been adopted by a small vote. As it was not quite satisfactory, a fourth convention met at Wyandotte July 5, 1859, and adopted the present constitution of the State. This was ratified by the people Oct. 4, 1859, by about 4000 majority. Kansas was admitted into the Union as a State Jan. 29, 1861, and its subsequent history has been one of great prosperity. During the late civil war no State of the Union sent so large a proportion of its male population into the field as Kansas. Its growth since the war has been without parallel for its rapidity. Its population, which in 1860 was but 169,000, is now not far from 600,000; without a mile of railway in 1862, it has now within its boundaries over 2500 miles; it has subdued lands which for thousands of years had lain waste, planted schools and churches all over its territory, and, though in the summer of 1874, it was severely tried by a visitation of grasshoppers or locusts, which destroyed two-thirds of the growing crop of Indian corn (the loss being estimated at 30,000,000 bushels), and reduced the settlers of sixteen or eighteen of the new counties to destitution, so great is its vitality and enterprise, that this visitation will not perceptibly check its growth.

#### Governors.—

Territorial.		Frederick P. Stanton, 1859-61	
A. H. Reeder, 1854-57	1854-57	STATE.	
John Shannon, 1857-59	1857-59	Charles Robinson, 1861-61	1861-61
John W. Geary, 1859-57	1859-57	Thomas Carney, 1861-61	1861-61
Robert J. Walker, 1857-58	1857-58	Samuel J. Crawford, 1861-61	1861-61
James W. Denver, 1858-58	1858-58	James M. Harvey, 1861-61	1861-61
Samuel Medary, 1858-59	1858-59	Thomas A. Osborn, 1861-61	1861-61

#### Popular and Electoral Votes for President.

Elect. Year.	Success full Candidates for President & V.	Pro. Elect.	Popular Vote.	Opposition Candidates for President and Vice-President.	Pro. Elect.	Popular Vote.
1864	Abraham Lincoln P., A. Johnson V.-P.	3	16,111	Geo. B. McClellan P., G. H. Pendleton V.-P.	3	12,700
1868	U. S. Grant P., Schuyler Colfax V.-P.	3	31,018	Henry S. Aaron P., F. P. Blair V.-P.	1	17,058
1872	U. S. Grant P., Henry Wilson V.-P.	5	67,918	Horace Greeley P., B. Gratz Brown V.-P.	1	10,000

L. P. P. 8111

**Kansas,** tp. of Etowah co., Ala. Pop. 181.

**Kansas,** post v. and tp. of Elizar co., Ill., on the Indianapolis and St. Louis R. R., 104 miles W. of Indianapolis and 156 N. E. of St. Louis. It has 1 national bank, 1 weekly newspaper, 1 churches, 1 school, 2 hotels, 2 grain-warehouses, 1 agricultural implement manufactory, 3 wagon and carriage-making shops, and 17 stores; it nearly in the centre of a large prairie, 24 to 3 miles from timber. Principal industry, farming and stock raising. Pop. of tp. 1618.

W. W. Boston, Lib. "News."

**Kansas,** tp. of Woodford co., Ill. Pop. 349.

**Kansas,** a tribe of Indians in the State of the same name, numbering about 600. They belong to the same family with the Dakotas and Osages, and have decreased

rapidly in numbers during the present century, on account of wars with the Pawnees and other Indians. The Proclamation of May 8, 1869, Congress, with that intent, provided for the sale of their reservation in Kansas, and their removal to the Osage country in the Indian Territory.

**Kansas City,** city of Jackson co., Mo., on the right bank of the Missouri River, north of its mouth, on the Kansas River, and 1 mile from the junction of the latter with the Missouri and Kansas, 235 miles W. of St. Louis. It is situated at the point where the Missouri River finally bends to the E., and is the natural centre of an immense land and river traffic, having nine railroads (1875) centring in a common station, and four or five others in construction. The site was originally very rough and uneven, part of the



city being on a bluff and part on bottom-lands; much has been done, however, to remove irregularities by grading. The streets, though not uniformly laid out, are wide, well lighted with gas, and well provided with sewerage and sidewalks. The Missouri River is spanned by a bridge nearly 1400 feet in length, built at a cost of \$1,000,000. There are four lines of street railroad, which also connect with the adjoining town of Westport and with Wyandotte in Kansas. There are 6 daily papers (3 morning and 3 evening), 2 tri-weekly, 6 weekly, and 1 bi-monthly; of the weeklies, 1 is in German, 1 is agricultural, and 1 devoted exclusively to the trade in live stock. There are 12 banks, 28 churches, 14 schools, 2 medical colleges (with a medical journal), 1 seminary and 1 hospital (both Roman Catholic), a city hospital, orphan asylum, workhouse and woman's home, 2 theatres, an opera-house, an efficient fire department and police force. The surrounding region is one of extraordinary agricultural resources, and is abundant in coal, lead, iron, and other minerals. The chief importance of Kansas City consists in its being the centre of the live-stock traffic for the States W. of the Mississippi—a business which has enormously increased since the completion (in 1873) of the Missouri Kansas and Texas R. R., connecting this city through the Indian Territory with the great stock-raising regions of Texas. The pork-packing business is also rapidly assuming importance, having increased from 12,000 hogs packed in 1868 to nearly 200,000 in 1873. The receipts of cattle in 1873 were 227,669, valued at \$3,115,935; of hogs, 220,956, valued at \$2,131,178; of horses, 4202; and of sheep, 5975. The sales of merchandise at wholesale in 1873 were \$15,695,000, against \$13,844,440 in the preceding year. The receipts of grain in 1872 were 1,001,293 bushels, and in 1873, 1,718,280 bushels. Manufacturing industry is as yet small, but with the rapid development of the coal-mines at Fort Scott, may be expected soon to assume importance. The receipts of coal in 1869-70 were less than 1500 carloads; in 1871 they were 5000; in 1872, 9990; and in 1873, 11,022 carloads. Five years ago, the only fuel used in Kansas City and by the railroads centring there was wood, but now (1875) coal has generally taken its place, and the whole Missouri Valley as far N. as Omaha is supplied with coal from this market. The mines are at present mostly in Kansas, the whole E. portion of that State and the contiguous counties of Missouri being underlaid with a soft bituminous coal, which, it is claimed, has from 20 to 30 per cent. more available power for steam-engines than the average Eastern coals. Extensive water-works, combining the reservoir, the standpipe, and the Holly system, were being constructed in 1874, to cost from \$750,000 to \$1,000,000; there were to be 20 miles of supply-pipes, 300 fire-hydrants, and the 2 reservoirs were to have a capacity for holding 20,000,000 gallons of water. A metropolitan telegraph company was formed in 1873. A board of trade was organized about the beginning of 1872, and has taken important measures for the development and regulation of the commercial interests of Kansas City. It sent representatives to the convention of Congressmen at St. Louis in May, 1873, and presented to the Senate transportation committee, when sitting at St. Louis, an able memorial on transportation facilities for the West and South. It also sent delegates to the national board of trade, and secured recognition as the tenth among the great trade-centres of the country. The river-navigation has naturally decreased in comparative importance through the extension of the railroad system, but a company for barge-navigation was organized in 1873, in which year the arrivals of steamboats were 65. The valuation of real estate in 1872 was \$11,993,060; in 1873, \$12,687,875. Pop. in 1860, only 4418; in 1870, 32,260. It has increased very rapidly since the war.

W. H. MILLER, ED. "JOURNAL OF COMMERCE."

**Kansas, Congressional Legislation of 1854 in Reference to.** See DOUGLAS, STEPHEN A., by HON. A. H. STEPHENS, LL.D.

**Kansas** (or **Kaw** River, in Kansas, is formed by the union of the Smoky Hill and Solomon rivers. Its principal affluents are the Republican, the Big Blue, and the Grasshopper rivers from the N., and the Wakerusa from the S. It has innumerable smaller tributaries. Steamboats have traversed its whole course at high water, but its navigation is not of any practical value. It falls into the Missouri on the Missouri State line, near Kansas City, Mo.

**Kan'sasville**, post-v. of Racine co., Wis., on the Western Union R. R.

**Kansu'**, province of China, between Thibet in the S. and Mongolia in the N. Its area is estimated at 100,000 square miles; its pop. at 16,000,000. It is covered with mountains, and traversed by the Hoang-ho. Cap. Lan-Chow-Fee.

**Kant** (IMMANUEL), b. Apr. 22, 1724, in Königsberg, where his father, of Scottish descent, was established as a saddler. Kant was brought up in strict religious princi-

ples. From 1740 to 1746 he studied theology, philosophy, and mathematics in the Königsberg University. From 1746 to 1755 he was engaged as tutor; and subsequently entered upon his career as professor at the Königsberg University, which he kept up till 1797, when old age compelled him to retire. D. Feb. 12, 1804, in the eightieth year of his age. He never married, though he was very fond of society, genial in his manners, and a favorite with all who knew him. It is a rather singular circumstance that he never left his native city of Königsberg except for a few miles' walk out in the country. In his first lectures at the university, Kant followed pretty closely the Wolfian school of philosophy, then prevalent all over Germany. Still, even in those earlier works his dissatisfaction with the existing state of the science of philosophy, and a persistent endeavor to ascertain the source of that dissatisfaction and its remedy, are clearly discernible. The great works of the French and English skeptical writers of that time, and especially the works of Locke and Hume, completed the change that was taking place in his views. The lucidness of their style, too, forbade the employment of the extravagant jargon introduced by Wolff into the philosophical discussion of the German schools in their refutation, and forced Kant, for the satisfaction of his own mind, to enter upon a thorough investigation of all the problems of philosophy in a manner and style altogether new and his own. It was not till 1781, about ten years after he had begun his new researches, that he published their result in the *Critique of Pure Reason*, which was soon followed by the *Critique of Practical Reason* and the *Critique of the Power of Judgment*. These three critiques form, indeed, only one great work, and cannot be understood correctly except when thus studied in their unity. The distinguishing feature of the new system presented by Kant in these works is, that instead of treating philosophy as a transcendent science, it treats it from a transcendental point of view. That is to say, Kant denies that by mere reasoning or argumentation we can discover any new truth or transcend the world of common consciousness, and that hence all the efforts of previous philosophers to discover such new truths have been futile. Philosophy can only explain and prove truth; and its problem is to discover and apply the touchstone by which this proof can be made. Now, all theoretical propositions that may be made are either identical (like  $A = A$ ), and these need no proof, or synthetical ( $A$  is  $A$  and something else too; for instance, iron is not only a body, but also magnetic). Of these synthetical propositions, again, all those which are empirical can be proved only by experience; and hence pure reason is required only to prove those synthetical propositions which are not empirical—that is, which are *a priori*. For instance, if when the sun shines I observe a stone get warm, and say that the sun is the cause of that warmth, I utter an *a priori* synthetical proposition, because the conception of cause is not any quality of the sun or the stone that I perceive empirically. I perceive only a change from cold to heat in the stone, but a million of such changes would not make the conception of change a conception of cause. It is this class of conceptions which require a rule whereby their proper application can be secured, for it is only by their improper application that disputes have become possible between philosophers. When quarrels have arisen, for instance, as to whether God was the cause of the world, or whether the soul was a substance, etc., the dispute would have been settled at once if a rule had been known whereby it could have been determined whether the synthetical conception of cause could have been predicated of God, or that of substance of the soul. Kant discovered this rule, or the "supreme principle of all synthetical judgments," to be, that synthetical propositions *a priori* are valid only in so far as it can be shown that consciousness could not otherwise be possible. The whole *Critique of Pure Reason* is nothing but an application of this principle to all the various problems that have engaged philosophical speculation, and especially to the antinomies to which it has given rise. By this application, Kant rooted out the entire old science of metaphysics, and established in its place a universally valid critique of reason, or science of knowledge.

But not all the propositions of human reason are of a theoretical character, nor could they well be so, since otherwise human reason itself would remain unexplained. Theoretical reason always explains by the categories of causality, substantiality, and reciprocal relation, but all these categories explain only the *a priori* synthetical propositions or phenomena that occur within reason; not, however, reason itself. If reason itself has an explanation, therefore, it must be of an entirely different character—of an absolute character, in fact. It must be an immediate explanation, having no ground, no cause, no why or wherefore. This explanation, says Kant in his *Critique of Practical Reason*, is the Freedom, the Self-determination, or the Categorical



Imperative, which manifests itself in each individual as the Moral Law. No one can demonstrate to another by argumentation that there occurs within him a phenomenon which tells him at every moment of his life what he ought to do or ought not to do, and impels him to do it or not to do it, no matter what his natural inclinations may be; each one can discover that this phenomenon does occur only in his own consciousness. Freedom, therefore, which is nothing but this categorical imperative or moral impulse, can never be proved by something else, as theoretical cognitions can be proved, but only by practical experience. If, however, this categorical imperative is once admitted, if any individual confesses that he has ever done a moral act, then it can be shown that he also admits a Supreme God and immortality. For no one could rationally perform one moral act if he did not presuppose that he could rise to such a perfection as to make all the acts of his life moral—a perfection to which finite beings can attain only in an infinite life. Nor could he rationally perform such an act did he not presuppose that his act would accord with all the other acts performed by moral beings—an accord which can be realized only by a God. (Compare Leibnitz's *Pre-established Harmony*.) These propositions Kant has further demonstrated in his *Critique of Pure Religion*, published in 1794.

The remaining problem now was: How can reason become conscious of its free acts—i. e. of itself as practical reason operating upon an outside world—if that outside world can be cognized only by its theoretical faculty; that is to say, under the categories. This question Kant solved in his *Critique of the Power of Judgment* by showing that we do view the outside world under other forms than those of theoretical reason—namely, under the forms of purposes or designs—forms which can be referred either to the outside world itself, in which case we arrive at teleological views of the world, or to our own reason, in which case we pass æsthetical judgments upon outside objects. In either case, we posit ourselves as free judges; and thus the *Critique of the Power of Judgment* substantiates the immediate fact postulated by the *Critique of Practical Reason*, and completes the whole system of reason.

Having thus finished the work of his lifetime, Kant devoted the remaining years of his life to applying its principles more in detail to the sciences of law, morals, theology, and to natural science. Thus, in 1786 he published his *Metaphysical-Practical Principles of the Science of Physics*; in 1795 to 1797, two works, *Eternal Peace* and *Metaphysical-Practical Principles of a Science of Law and a Science of Morals*; and in 1798 he concluded his literary labors by his *Anthropology*, a book full of rare knowledge, shrewd observations on men, races, nations, and the sexes, which every one should read who wishes to become thoroughly acquainted with the author of the *Critique of Pure Reason*. It is, moreover, an excellent example of the exquisite clearness of style which distinguishes nearly all of Kant's writings. As an introduction to the *Critique of Pure Reason* scholars might be recommended to read Kant's *Prolegomena*, which is also a marvel of symmetrical arrangement and lucidity of style. Of Kant's many followers, Fichte alone adopted fully, and carried out in his own way, the great discovery of Kant's transcendentalism. At present, however, the study of Kant is again becoming quite general in Germany, and several new editions of his complete works have appeared within the last few years.

A. E. KRÖGER.

**Kanwaka**, tp. of Douglas co., Kan. Pop. 913.

**Ka'olin** (Chin. *Kao-ling*, the name of a hill of porcelain clay), the common name of a hydrated silicate of alumina,  $Al_2O_3 \cdot 2SiO_2 \cdot 2H_2O$ , or clay used for the manufacture of porcelain. Kaolin is supposed to be derived from potash feldspar by the loss of all the potash and two-thirds of the silica, which ingredients are replaced by 2 equivalents of water. The proportions of silica to alumina vary largely in different countries, the kaolins of China and Japan containing twice as much silica as those of Prussia and Gutenberg in Germany. Large beds of kaolin are found at St. Austell in Cornwall, England, where it is derived from pure feldspar, in Limoges, France, at Brandon, Vt., Perth Amboy, N. J., Richmond, Va., Aiken co., S. C., near Augusta, Ga., and many other parts of the U. S.

**Kaolin**, post tp. of Iron co., Mo., 20 miles from Pilot Knob. Pop. 663.

**Kapio'ne**, tp. of Atchison co., Kan. Pop. 775.

**Kapp** (Finnish), b. at Hamm, Westphalia, Apr. 13, 1824; studied law; came in 1840 to New York; practised here as a lawyer; was a Presidential elector in 1860; then commissioner of emigration; returned to Germany in 1870, and was elected a member of the German diet in 1872. He wrote *Die Sklaverei in den Vereinigten Staaten* (1844), *Geschichte der Sklaverei in den Vereinigten Staaten*

(1860), *Geschichte der deutschen Auswanderung in Amerika* (1868).

**Kap'pel**, village of Switzerland, in the canton of Zurich, noted for the encounter which took place here (Oct. 11, 1531) between the Protestants and Roman Catholics, and in which Zwingli was killed. In 1838 a monument was raised to him on the spot where he fell.

**Kara** (Georgian). See CZERNY (Georgian).

**Karahissar**. See AFUM OF AFUM KARA-HISSAR.

**Ka'raites**, a Jewish sect. In the early part of the Middle Ages congregations of this name were settled in the region known in Jewish history as Babylonia, in Palestine, Egypt, Syria, in the Crimea, and in Lithuania. It has, however, hitherto been impossible to fix the exact date of their first settlement in these various localities. In 1110 A. D. they appeared in Spain, but soon after (1130) suffer persecution at the hands of their coreligionists, who in contradistinction to them are known as Rabbinites. With the help of the temporal power they were driven from the cities, and thereafter confined to a single insignificant town. In 1150 they endured a second persecution, and after this period we lose sight of them completely so far as Spain is concerned. In 1668, King John III. Sobieski succeeded in drawing a body of Karaites from Lithuania and the Crimea to the neighborhood of Lemberg by granting them special privileges of great value. In proportion to the rest of the Jews, the number of the Karaite settlers was inconsiderable, and since then it has kept on diminishing. At the present day a few feeble congregations in the East, in Poland, and Russia are all that remain of them. Their chief settlement is in the Crimea, in a village among the mountains called Tshufut Kale, where they enjoy the protection of the Russian government. The many excellent traits of character for which they are distinguished have procured their exemption from special enactments of a hostile nature which have been at different times directed against the Jews of Russia.

The name Karaite, or, as they also style themselves, Bene Mikra ("sons of Scripture"), is derived from the fundamental doctrine that marks their peculiarity as a sect. It consists in their acknowledging Scripture, and nothing but Scripture, to the exclusion of the Talmud and the traditions of the rabbins, as the source of their religion. The rise of this sect is wrapped in obscurity. Concerning the time and the occasion of their origin the opinions of scholars—nay, even the accounts of the chronicles—are widely divergent. Rabbi Jehuda ha Levi (1140), in his philosophical work the *Cussari* (3, 65), thinks proper to assign their origin to the age of John Hyrcanus (135 B. C.). The rabbins, he thinks, having incurred the displeasure of the king, his friends seized the opportunity to stir up opposition against them, and a new sect was thus formed. Other authorities, at their head the Gaon Saadia (in his polemical work against Anan), and, following his lead, Sherira (950 A. D.), in his well-known *Iggereth* (a historical document of the highest value), consider Anan, whom the Karaites only regard as the first leader of their sect, as its founder. Anan flourished about 760 A. D., as Rapoport has shown in the Hebrew periodical *Keren Chemed* (5, p. 203). The chronology of the Karaites inaccurately assigns him a date fully a century too early. A second time the motive of revenge is called in to explain the rise of the sect. Anan, it is said, aspired to the office of *resh galutha* ("Prince of the Captivity"), but another having been preferred in his stead, jealousy provoked him to institute a division. It is evident, however, that this account is colored by the rancor of enemies. Jealousy may explain the secession of an individual from his party or creed, but it can never bring about a new religious movement; least of all, such a one as gave rise to the sect of the Karaites—a sect whose existence is measured by at least twelve centuries, whose members have ever displayed profound religious conviction and zeal, and have preserved a degree of moral energy and purity which excite universal admiration. A third view concerning the origin of the Karaites current among the mediæval rabbins, and represented by such great names as those of Maimonides and Aaron Ezra, identified them with the ancient sect of the Zedukim (Saducees), and writers of the class who have not been commonly apply the name of Sadducees to them without hesitation or reserve. This view derives its sole support from the fact that the Karaites agree with the Sadducees in certain questions of religious theory and practice, as, for instance, in celebrating the feast of Pentecost on a Sunday. But on the other hand, we should consider that they hold the most important articles of faith, such as the doctrine of reward and punishment, of the resurrection of the dead, etc., in common with the rabbins, and reject the opinions of the Sadducees. If Geiger's view is held to be true in his *Urschrift* and elsewhere he admitted, and it is true, as he affirms, that



the Sadducees accepted tradition in its earliest form, and rejected only its later development by the Pharisees, then the futility of every attempt to identify both sects must be at once apparent. For the Karaites were consistent in discarding tradition in *all* its forms, earlier and later.

The accounts of the Karaites themselves concerning their origin appear to be, so far as their writings have become known, no less untrustworthy. At one time, they acknowledge Jehuda ben Tabbai, an ancient teacher mentioned in the Mishna, as the founder of their sect; again, this honor is reserved for Anan b. David, whom we have already mentioned above; while at the same time they claim that their doctrine is as old as Judaism itself; that the principles they advocate were those of Moses and the prophets; and, furthermore, that they had remained unquestioned until the days of Simon b. Shetach. He, the brother-in-law of King Hyrcanus and president of the Sanhedrin, began to introduce innovations of an arbitrary character and contrary to the established customs of Israel, and by so doing laid the foundations of rabbinism. His measures were resisted by his colleague in the presidency of the Sanhedrin, Jehuda b. Tabbai, who remained true to the ancient law, and who is for this reason called the father of the Karaites. (*Dod Mardchai*, chap. ii.)

Though these different accounts are unclear, contradictory, and without adequate historical basis, they all contain an essential element of truth, or at least indicate the direction in which the truth is to be found. The correct view of things seems to be the following: As compared with the Bible, it cannot be denied that the rabbinic system marks a new departure. Like every innovation, it encountered opposition at the very outset. This opposition was gradually silenced, but could not be completely destroyed. It continued to exist as a strong undercurrent, and when the occasion was presented rose with new energy to the surface. In order thoroughly to understand this process, it will be necessary to define the exact position of rabbinism, and briefly to trace the successive stages of its development.

In the age when rabbinism struck root, shortly after the return of the people from captivity in Babylon, the conditions, both external and internal, amid which the code of the Pentateuch had arisen had materially changed. The demands of life in favor of new laws were pressing, and the leading spirits of the time, recognizing their justice, felt themselves called upon—nay, in duty bound—so to modify the teachings and commands of religion that they should conform to the altered state of affairs. But, holding their own authority to be insufficient to ensure obedience to those new enactments, which, though urgently demanded by the exigencies of life, were contrary to the prescriptions of the Bible and the traditions of the fathers, they resorted to a measure at once thoroughly effective and dangerous. By the aid of a highly artificial and tortuous system of exegesis they assumed the appearance of deducing whatever laws they intended to pass from the very words of Scripture—a measure which they justified on the ground of necessity, and because the means in this case seemed authorized by the good end they desired to reach. A wide field for controversy was thus opened. The Sadducees made excellent use of the opportunity afforded them, and employed as the keenest weapons of attack the revealed word of God himself and the sacred customs of antiquity. But their efforts were vain. In struggling against the innovations of the rabbins they resisted the tendency of the age, and they were at last forced to succumb. But the very success of rabbinism encouraged an altogether unprecedented extension of that vicious method of exegesis by which its triumph had been secured, and became instrumental in rallying anew its defeated and scattered adversaries and arming them for the attack. The new method of the rabbins was too fruitful, and, breaking through all restraints, soon became corrupt. Though at first regarded as a mere makeshift to ensure the acceptance of measures otherwise wholesome and wise, it came to be considered in the later schools of the Talmudists true and valuable on its own account. It was cultivated with exaggerated zeal and dialectical acuteness, and thus became the source of a multitude of legal provisions equally unmeaning and uncalled for. In such a condition of affairs it could not but come about that men of sound judgment and firm will should protest against this corruption of religion. The opposition was at first carried on secretly, then with greater boldness and openness—the hostile band was small in numbers at first, then increased by a large and powerful following—until a bitter conflict ensued, and at last a new sect went forth from the struggle. Already in the Talmud we find a number of ordinances which appear to be directed against those who hold Karaite opinions, and which therefore presuppose their existence. (*Kethuboth*, 62 b.) The celebrated teacher of the Mishna, Rabbi Eliezer the Great, admonishes his disciples (*Bera-*

*choth*, 28 b) to keep their children from "Higaion," meaning, as the commentator explains, from too frequent reading of the Bible. This shows us that even in the days of R. Eliezer the rabbins saw the danger which would threaten their system if an intimate acquaintance with Scripture were to become general. And yet it was impossible to avoid this danger. Within the pale of Judaism the people could not be precluded from studying Scripture, as was done elsewhere. The reading of the "books of Moses" formed an essential element of the sabbath service, and even the Talmudists were forced to declare the study of the Bible a religious duty, though of less importance than the study of the Talmud. (*Baba Mezia*, 33 a.) Indeed, the letter of Scripture was the very foundation on which rabbinism had raised its huge edifice. It was thus forced to nourish its foe at its own breast, and, by continually recurring to the Bible for the sanctification of its encroachments, to keep alive and strengthen the spirit of opposition which these innovations tended to develop. After the close of the Talmudic epoch the spirit of opposition was still further encouraged. In Palestine (Tiberias) greater attention began to be paid to the correct preservation of the biblical text. It was supplied with vowel-signs and accents, and an organized Masoretic school devoted care and vigilance exclusively to this task. A similar school arose in Babylonia, where a different system of vocalization was introduced. The scrupulous care with which the Bible was now studied naturally directed the thoughts of many to the wide divergence existing between the real meaning of Scripture and that which passed current in the schools of the Talmudists. Thus the number of those hostile to the Talmud kept on increasing. But when in the eighth century Babylonish rabbinism began to urge new claims to supremacy, the like of which had never been heard of before, the opposition became uncontrollable. So long as the Sanhedrin had remained in existence, there had been at least a senate of seventy persons to limit the sovereignty of the nasi (first president) in matters of religion. During the Talmudic epoch proper great diversity of opinion prevailed among the individual teachers, without there being any central authority of sufficient influence to pronounce final decisions on disputed questions. This state of things continued in the succeeding (the so-called Saburaic) epoch. And it was not till the presidents of the Babylonish academies had assumed the magnificent title of *gaon* (highness) that a desire awoke for greater power than had ever been granted before. A kind of infallibility was assumed by these gaons, and the judgment of an individual was claimed to be binding on all Israel. At that time honest and enlightened men found that the burden of rabbinism had become insupportable. The time for separation was at hand. An impulse from without was all that was needed. This was given by Anan. (Fürst in his *History of Karaism* has partly recognized the true relation and succession of events as we have detailed them above; but in this he had been already anticipated by a mediæval writer of note, Rabbi Simon b. Zemach Duran. See Grätz, *Monatsschrift*, 1874, Nov., p. 506.)

Anan ben David, b. 700 A. D. in the town of Bazra, near Bagdad, of noble family, claiming descent from King David, received a thorough education in Jewish theology and in those scientific pursuits which were cherished at the time. He soon acquired a considerable reputation as a scholar, and collected a number of adherents around him, who accepted his independent views. Even thus early he did not scruple to deviate from the beaten track of rabbinic teaching. In 754 he settled in Bagdad, where his uncle, Salomo, the "prince of the Captivity," resided. When the latter died childless (760) the nearest claim to the vacant office was that of Anan, both on account of his eminent learning and high descent. The academical presidents of Sora and Anbar, however, opposed his election, because, as the rabbinical chronicles tell us, "they discovered a defect in him" (in the *Sefer ha Cabbala* ("Book of Tradition") of Abraham b. David of Toledo, 1110-80). What this defect was they do not say, and their silence on this head amply proves that it could have been no moral flaw. It was, indeed, nothing more than his heterodox opinions to which they referred. The party of Anan sought to gain the protection of the caliph Almansur, but their opponents represented them as rebels, and caused their persecution. In consequence, Anan and his adherents fled to Jerusalem, where he openly cut loose from the authority of the Talmud, and founded the first congregation of Karaites. To him and his descendants the title of nasi was applied, as it had formerly been given to the patriarchs of Palestine in the Talmudic epoch. But the "princely" office of nasi was royal only in name, and lacked the substance of power. Its incumbents continued to reside in Jerusalem until 910. Later on they removed to Cahira.

The foundation of the sect of Karaites had thus been



laid by Anan, though he was far from carrying out his principles to their last consequence. Neither he nor his followers were entirely emancipated from those religious views and practices which education and custom had so long contributed to foster. It is true he proclaimed the right of interpreting and applying the words of Scripture independently of all authority, yet, none the less, he clung to many of the ordinances prescribed by the Mishna. Especially was this the case in questions of civil law. A complete reconstruction of practical religion, which at that time included the administration of justice in its sphere, transcended the powers of an individual to accomplish. New congregations were formed, new teachers arose. Questions which Anan had never considered came up for decision. Others which he had adjudged were discussed anew, and conclusions differing from his own not unfrequently reached: for Anan had himself opposed the habit of blind reliance on the utterances of the master, and declared free exegesis his watchword. As the sect grew in numbers, and its rival teachers struggled to fix it securely, each on the basis of his own system, the confusion of conflicting opinions increased, and the new sect was in imminent danger of splitting into numberless minor sects, and thus perishing. In this way the struggle continued until 800 A. D., when Benjamin Nahawendi, from the town of Nahawend in ancient Media, succeeded in gaining universal recognition among the Karaites, and to him the sect owes its perpetuation. In his day the name Ananites was exchanged for Karaites, by which latter appellation they have since been known. His authority was sufficiently great to challenge even that of Anan. His views, laid down in commentaries to the Bible and legal compendia, spread to the East and West, to the congregations of Babylon and Palestine, and were the more readily accepted because they tended on the whole to lighten the load of religious duties. Anan had interdicted the use of fowl at table; Benjamin permitted it. Anan had extended the obligation of the levitical marriage to all male relatives of the deceased; Benjamin confined it to the brother. Anan had jealously guarded the rigid sanctification of the sabbath. On the sabbath day he prohibited conjugal intercourse, forbade circumcision, and demanded the literal application of the words of Scripture, "No one shall leave his place," thus locking up his people in their houses. Benjamin abrogated all these provisions.

The main principle of Anan, that of free exegesis, remained undisputed, and Benjamin Nahawendi could not check the further development of Karaism, even had he been disposed to do so. And, indeed, after his death we find differences of theory continuing to exist among scholars, and practical differences arising in various congregations concerning important questions of religious law. Thus, for instance, some held with the rabbins that it is permissible to keep a light burning on Friday evening, provided it had been lit before the opening of the sabbath, while others considered it wrong to do so, and were forced to pass the whole night in darkness. In the main, however, the danger of dismemberment was averted by Benjamin, and the unity of Karaism secured.

The essential difference between themselves and the rabbinist Jews had meantime come thoroughly home to the Karaites, and was continually strengthened by the habits of their daily life. Though there was no dogmatic conflict between them, though the same basis of faith was common to both, yet their disagreements in other matters were too important and far-reaching to admit the hope of reconciliation. The common celebration of feast days is at all times a strong bond of union between churchmen. This bond Anan had already severed. Ever since his time the Karaites have determined the day of the new moon by direct observation, while the rabbinites continue to guide themselves by the calculations of their received calendar. The Karaites celebrated, and still celebrate, the Pentecost on the fifth day counting from the Sunday of Passover Week; the rabbinites, on the fifth day counting from the second day of the feast. Also, the rite of circumcision is practised by the Karaites in a way not recognized as valid by the rabbinic law. In respect to dietary laws, the Karaites abandoned numberless restrictions held sacred by the rabbinites. The latter naturally broke off connection with those who habitually transgressed their laws. On the other hand, the Karaites aspired to the most austere purity in the social relations. As early as the days of Anan they, with the help of their peculiar method of exegesis, extended the number of forbidden marriages to such a degree that many matrimonial alliances which passed unchallenged among the rabbinites were by them regarded in the light of crimes. The offspring of such alliances were considered to have sprung from an incestuous intercourse, and intermarriage with them was of course impossible.

The gulf between Karaites and rabbinites could no more

be bridged over. The peculiarities of both parties were strongly marked. Both were firmly resolved to preserve their own opinions and institutions intact, and they might have pursued their several ways side by side without interfering one with the other. But this was not to be. It is in the nature of every new sect to seek an extension of its influence by drawing converts from the outside world into its ranks. The leading men of the Karaites being thoroughly familiar with the Bible, admirably skilled in scholarly research, and impelled by holy zeal for their cause, produced a great and varied literature in its interest, and in every way labored strenuously to gain adherents for their doctrines. In the course of the ninth century they sent out missionaries in all directions, and succeeded in founding congregations in Iran, Persia, Media, Armenia, Syria, Palestine, Egypt, and the N. of Africa. Rabbinism witnessed the triumph of its opponent with terror and dismay, but was too feeble effectually to resist it. Its representative men were equally lacking in power of thought and of expression. Even the gaons of the academies, though versed in Talmudic lore, were utterly ignorant of the pursuits of science. In this extremity, the rabbinites, though loath to adopt a measure which seemed so derogatory to their dignity, called a stranger, Saadia ben Joseph (b. 892 A. D.) of Faium, in Upper Egypt, to Babylonia, and appointed him gaon of Sora. His time as a profound Talmudist, a master of science, and at the same time a bitter enemy of the Karaites, had preceded him. The wisdom of the appointment was proved by the event. Saadia, indeed, was a writer of extraordinary fertility and genius. The reader will gain some conception of the versatility of his mind on learning that this man, apart from his labors on the field of the Talmud, was the author of a Hebrew grammar, a Hebrew lexicon, a book on rhetoric, an Arabic translation of and commentary on the Bible and the Mishna, a work on the philosophy of religion from the Jewish standpoint, and of many minor treatises besides. Not only did he in all his works seize every opportunity that offered a plausible pretext to refute the opinions of the Karaites, but he also directed three separate books—on the marital laws, on the Hebrew calendar, and the divine institutions—expressly against their doctrine, and wrote seven polemical treatises against their most distinguished teachers. The influence of Saadia interposed a barrier to the further spread of Karaism, while at the same time it tended indirectly to strengthen and purify it inwardly. Such attacks as those of Saadia, carried on with the weapons of science and learning, and the keen sword of eloquence, Karaism had never before experienced. They called for counter-efforts on its part, which brought leaders of such high intellectual power to the front as only the hour of danger can awaken. Prominent among these are Joseph el Bazri, the first Jewish writer on the philosophy of religion, and Salmon b. Jerochim. An emulous struggle between the literary rivals of either side began, whose influence was salutary to both parties, encouraging thoroughness and accuracy of investigation. The half century between 900 and 950 A. D., during the lifetime of Saadia and shortly after, is the golden age of the literature of the Karaites. Their principles were then firmly grounded, their theology completely systematized. After the death of Saadia (942) his disciples feebly continued the contest for some time longer; but gradually the cries of the contending champions died out, and when the fight was over the limits of both sects were found to be more strictly defined and closed in than they had ever been previously.

We may say that the rabbinites by their persecutions created Karaism. By their literary opposition they made it strong and enduring. In the following centuries the feeling of hostility between Karaites and rabbinites, which was still at times displayed in their writings, diminished in bitterness. Enlightened men of both parties cherished their friends to practise patience and forbearance toward their opponents, and a distinguished rabbi, Shemaiah Imeti (of Crete or Candia, 1299-1329), even attempted, though to no purpose, to reunite the two divisions of Judaism. A similar attempt was made with the same result by Rabbi Gedaliah Ibn Jacob of London in the year 1487. The relations subsisting between the Karaites and rabbinites of Lithuania, Russia, and Poland during the seventeenth and eighteenth centuries were of a particularly peaceful and cordial character, while in our own century of progressive and liberal culture the last vestiges of mutual distrust have completely disappeared. It is worthy of remark in this connection that even at the time when the animosity of the contending sects was most pronounced, no one ever thought of denouncing the opposing party without the pale of Judaism. On the contrary, some of the very highest authorities of the rabbinites distinctly affirmed that the Karaites, in so far as they were not and treated as Jews, notwithstanding all their errors. The presence



of ten men is required for public worship, according to rabbinical law. Maimonides, it is true, prohibits the counting of Karaites in the number (*Respons.*, No. 71), but he does this, as he tells us himself, not from any desire to exclude them from the fellowship of Israel, but simply because they do not agree with the rabbins in requiring the attendance of the number above specified. He does not scruple to permit even intermarriage between Karaites and rabbins. See David Ibn Simra, *Respons.*, i. 73.) When we remember that the rite of circumcision is performed by the Karaites, as well as the Mohammedans (see *Apparion*, c. 2), in such a manner as totally to invalidate the ceremony in the eyes of the Talmud, it thus becomes clear to us that according to genuine orthodox rabbinism it is birth and not circumcision which makes the Jew.

As regards the scientific and literary activity of the Karaites during the long period of their existence, numerous works of theirs, some of them of great value, might be mentioned. They are partly devoted to theology in all its different branches, partly to philology, philosophy, mathematics, astronomy, and medicine. It is certain beyond a doubt that the ancient Karaites were the fathers of Hebrew grammar, of lexicography, and of a more liberal exegesis, which from them were transferred to the rabbinical Jews. The number of Karaite authors that have become known to us is very great. We give the names of a few of the most eminent. *Teachers of the Law*.—Besides Anan and Benjamin Nahawendi, to whom reference has been made above, Jeshua ben Jehuda (1050) in Jerusalem. He defined the doctrines of the existence of God, of revelation, and of reward and punishment to be the three main principles of Judaism, long before rabbinical writers arrived at a similar classification. Also, Elijah Bashiatschi (1420-91) in Adrianople, whose decisions are still considered authoritative. *Writers on the Philosophy of Religion*.—Joseph el Bazri, with the Hebrew surname Ha Roeh ("the seer"), b. about 940 in Jerusalem, who was considered the greatest philosopher of his age, and was the first to reduce the religious teachings of Judaism to a philosophical system. Ahron ben Elijah (b. 1300) in Cahira, whose chief work, *Ez Chajim* ("Tree of Life"), on the philosophy of religion, has been edited with many learned annotations and explanatory notes by Prof. Delitzsch (Leipsic, 1841). *Exegesis*.—Ali el Bazri, with the Hebrew surname Jepheth (930-991), whose commentaries have been freely used by the best scholars, even of the rabbins, and Ahron ben Joseph (b. 1250 in the Crimea), the author of a celebrated work entitled *Mibchar*. He was also the author of a prayer-book for the Karaites, which superseded all previous ones, and is still in use.

The centre of Karaite learning was situated, for several centuries after Anan, at Jerusalem. Later on, it was transferred to Constantinople, and remained there till 1640. Since then the Crimea, and to some extent Lithuania, became the chief seats of Karaite scholarship. The language employed in the earliest writings of the sect, down to the twelfth century, was the Arabic. The most important of these works were afterwards translated into Hebrew, chiefly in Constantinople, for the benefit of those Karaites who lived in countries where the Arabic was unknown. These translations, embracing ranges of thought for which the Hebrew of the Bible afforded no adequate expression, gave rise to a peculiar Neo-Hebraic idiom among the literati of the Karaites, which differed in many respects from the Neo-Hebraic style current among the Rabbins.

But, however rich the treasures might be that were hidden in the literature of the Karaites, they were not mined, and remained unknown. The learned rabbins in the latter part of the mediæval epoch had lost all interest in Karaism, and Christian scholars took no notice whatever of its existence. It was not until the seventeenth century that a desire was felt to gain more accurate information concerning the Karaites. A beginning was made by John Rittangel, professor at Königsberg, who travelled to Lithuania in 1641, and there visited the Karaite congregation in order to study the doctrines of the sect at the fountain-head. He was followed by Gustavus Perringer, professor of the Oriental languages at Upsala, who undertook the same journey for the same purpose, at the instance of the Swedish king, Charles XI., in 1690. Six years later, two scholars, Swedes as before, went on a similar mission to Lithuania, and induced the Karaites to send one of their learned men to Upsala in order to supply the scholars of that university with detailed information concerning the history and the essential doctrines of their sect. Salomo Toroki, the author of the *Apparion*, was selected for this purpose. In the following year he came to Upsala, was received with great distinction, and wrote a treatise in answer to the questions which were put to him. In Holland, however, where Hebrew and Arabic studies were cultivated with great zeal and devotion, the desire for a better understanding of Ka-

raism was most ardent, and the measures taken to secure it proved most effective. Among the Dutch scholars who took a prominent part in spreading a knowledge of the history and literature of the Karaites we mention, in the first place, Lewin Warner. He not only collected, but carefully studied and annotated, no less than 64 codices of Hebrew manuscripts, among which were 30 codices, containing 79 works of the Karaites. Then Jacob Trigland, professor at Leyden, who in 1698 addressed an epistle to the chacham of the Karaites in Lithuania, in which he propounded four main questions touching the sect. Having received the celebrated work *Dod Mardechai* in reply, he thereupon wrote his book, *Diatribæ de Secta Karorum*. But of greater value than all these were the labors of John Christopher Wolf, published both in separate treatises and in the fourth volume of his *Bibliotheca Hebraica*. A general interest in the scientific study of this remarkable sect did not manifest itself among Jewish scholars until within the last few decades, after a part of the rich fund of manuscripts belonging to Karaite literature had become accessible. Evidence of the new impetus which these studies then received may be found in numerous articles scattered in various periodicals, and in several valuable special treatises on the same subject, a complete enumeration of which will be found in Fürst's *Geschichte des Karäenthums*, vol. iii. p. 133.

The study of the sect of Karaites is as yet by no means exhausted. The greater part of their literature has been lost in the course of time, in consequence of the wandering life which they were forced to lead and the dismal destinies they met with. What remains is, with few exceptions, buried in the great libraries in the shape of half-faded manuscripts. The library of Leyden was for a long time richer than any other in manuscripts and printed works of the Karaites. It has lately, however, been surpassed by the library of St. Petersburg, which is now in possession of the very large and highly valuable collection that was gathered by the Karaite scholar, Abraham Firkowitsch, in the course of many travels undertaken for this purpose, and which was bought at the expense of the emperor. S. ADLER.

**Karajitch** (VUK STEFANOVITCH), b. in 1787, and educated at Carlowitz; served in the Servian war of independence, but fled to Austria when in 1813 the authority of the sultan was re-established, and devoted himself to literary pursuits. His collection of Servian popular songs (4 vols., Vienna, 1814-33) was translated into German and into English. He also made a collection of Servian proverbs and popular tales, and a Servian grammar and dictionary. D. in 1864.

**Karak'**, a small island in the Persian Gulf, situated in lat. 29° 14' N., lon. 50° 20' E. It is of coral formation, without timber, but with fertile soil, good water, and affording safe anchorage. In the eighteenth century the Dutch built a fort here; in this century the English held the island for a short time. It is inhabited by between 2000 and 3000 Arabs.

**Karakorum** is used as the name both of the whole western part of the KUEN-LUN MOUNTAINS (which see), and of one of the few passes (18,400 feet high) by which this range can be crossed. It was also the name of the ancient capital of Mongolia, the city of the mythical Prester John, and was for a time the capital of Genghis Khan. Its ruins have been sought in vain by modern travellers.

**Karaman'**, town of Asia Minor, in the eyalet of the same name, at the foot of the Taurus Mountains. It has some manufactures of cotton and woollen stuffs. Pop. estimated at 12,000.

**Karamzin'** (NIKOLAI MIKHAILOVITCH), b. Dec. 13, 1766; d. June 3, 1826; a remarkable Russian writer and the greatest historian of his country. In early life he was imbued with mystical ideas, and was closely connected with Freemasonry. His first prominent literary production, which gained him great reputation, was his *Letter of a Russian Traveller*, published in 1791-92 in the *Musée Journal*, the editorship of which he assumed. Until 1803, Karamzin devoted himself entirely to journalism and literature, writing poems, criticisms, and tales, the best known of which are *Poor Liza* and *Natalia*. This was his sentimental period. In 1803 he was appointed by the emperor historiographer, with a salary of 2000 roubles, and withdrew for some years to Moscow and to the country, giving himself up entirely to historical studies. Being led by these studies to extreme conservative or retrograde views, in 1811 he presented to the emperor Alexander a *Memoir on Old and New Russia*, which, being opposed to the spirit of reform then in vogue, was not at first well received. In 1816, Karamzin returned to St. Petersburg, and through the influence of Count Arakhtcheief, the all-powerful minister of war, was well received by the emperor, who gave to him the ribbon of St. Anne, with increased rank, and set apart

60,000 roubles for the publication of his *History of the Russian Empire*, which was then completed. The history was published in 1818, and the first edition of 3,000 copies was sold within twenty-five days, and the fame of Karamzin became for ever established. The rest of his life he passed quietly in St. Petersburg and the vicinity, in intimate relations with the imperial family. At his death the emperor granted his family (he had been twice married) a pension of 50,000 roubles.

EUGENE SCHUYLER.

**Karavov-Bazar'**, town of Southern Russia, in the government of Taurida, on the Karasov. It has large manufactures of morocco leather and soap, and is the central market of the Crimea. Pop., comprising Greeks, Russians, Armenians, and Jews, 14,397.

**Karatchev'**, town of European Russia, in the government of Orel. It carries on considerable spinning and weaving, has several oil-mills, and manufactures of sail-cloth and cordage. Pop. 10,750.

**Kardzag'-uj-Szallas'**, town of Hungary, in the district of Jazygia and Cumania. Its trade in wheat, wine, and fruit is very considerable. Pop. 9515.

**Karelians.** See FINNS.

**Karens**, a people of Northern Burmah, belonging to the Mongolian, or perhaps to the Tibetan, family, the independence of whose country was recognized by treaty between England and Burmah in June, 1875. They are chiefly known from the wonderful success among them of the missions established by Messrs. Judson and Boardman of the American Baptist Missionary Society, soon followed by numerous others. In 1868 there were among the Karens 66 native ordained pastors and evangelists, 346 native preachers unordained, 360 native churches, with about 20,000 church members. (See *Mason's Gospel in Burmah* and the *Report of the American Baptist Mission Union* for 1868.) A comparative vocabulary of the two principal Karen dialects, Sgao and Pwo, by Rev. Dr. N. Brown, may be found in *Journal of American Oriental Society*, vol. iv.

**Karg** (GEOGRAPHY). See APPENDIX.

**Karikal'**, a French possession in India, on the Coromandel coast, 150 miles S. of Madras, in lat. 10° 55' N., on the estuary of one of the branches of the Kaveri. Area, 60 square miles. Pop. about 50,000, of whom hardly 1000 are Europeans. The colony is of very little consequence, as the estuary is unfit for navigation.

**Karkor**, city in the desert E. of Palestine, which was the capital of the Midianites in the time of the Judges. Several identifications have vainly been made in modern times: the true site was undoubtedly farther to the S. E. than recent travellers have explored.

**Karli'**, village of British India, in the presidency of Bombay, 40 miles E. of Bombay, is famous for its cave-temple, which, 130 feet long and 40 feet wide, is cut into the rock at a considerable height, and consists of two rows of sculptured pillars, terminating in a semicircular enclosure and bearing an arched roof. The whole structure is well preserved.

**Karlstadt** (ANDREAS RUDOLF), b. at Karlstadt, in Franconia, in 1480; his true name was BODENSTEIN. He studied at different places besides Rome, and was appointed professor in theology at the University of Wittenberg in 1513. He was a learned and eloquent man, and became one of the most enthusiastic and energetic champions of the Reformation, but his temper was vehement, almost violent; and differing from Luther in several points, especially in his views of the Lord's Supper, a disastrous controversy broke out between them. Karlstadt, whose turbulent mind brought him in connection with Thomas Münzer and other fanatics, was twice banished from Saxony, and actually persecuted by the Lutherans. In 1523 he went into exile for the first time. In 1525 he returned, and was reconciled with Luther. But when the contest between Luther and Zwingli began again, in 1528, Karlstadt was once more banished. At last he found refuge with the Swiss Reformers, with whom he agreed concerning the Lord's Supper, and he no doubt contributed much to bring about the schism between the Lutheran and the Reformed churches. D. as a minister at Bale in 1541. His principal writings are *De antiqua spece Cene* (1524), and *Auslegung der Worte: Das ist mein Leib* (1525).

**Karma'thians** [from *Hamdan Karmat*, one of their early leaders], a Mohammedan sect of reformers, who were originally a branch of the Ismailis, and like them became free thinkers. They were at one time very powerful, and held nearly absolute sway over Arabia, Persia, and Syria, everywhere defeating the caliph's armies. In 900 A. D. they made great advances; in 928 they threatened Bagdad; in 930 they attacked Mecca, then full of pilgrims, whom

they slaughtered, desecrating the Kaaba, and carrying away the Black Stone, which they kept for twenty years. Their capital was Lahsa, where they were in power in the eleventh century. Relics of them exist to this day. They now reject Mohammedanism and conceal their real doctrines.

**Karnak'**, a modern village of Upper Egypt, on the right bank of the Nile, occupying part of the site of Thebes, renowned for its magnificent architectural remains. Chief among these is the great temple, 1200 feet long, 330 feet broad, with gigantic colonnades, colossal figures, sculptures of various kinds, in colored sandstone, marble, red and dark granite. Fragments have been found bearing the name of Sesortosis (B. C. 2300). The architecture is due in large part to Meris, who adorned the palace with a list of his royal predecessors. There are memorials of the glory of Amenophis (B. C. 1500) in a body of bas-reliefs of his wars in Asia. The great hall was built by Sethos (B. C. 1340). The chief temple contains sculptures with inscriptions of the time of Ramesses the Great, or Sesostrius (B. C. 1396-28). The great tablet of Karnak was shown and explained by the priests to Germanicus (B. C. 161). (See *ARCHITECTURE, EGYPT, LOWER, THEBES*.) St. John, *Egypt and Nubia* (1844, 355-378); Henry, *L'Egypte Pharaonique* (1846, ii. 263); Bartlett, *Nile-Jour* (*Harper's Monthly*, 1850, i. 212); Champollion-Figene, *Egypte Ancienne* (1848, 310); ib. *Gazette de l'Egypte* (1852); Lepsius, *Letters from Egypt* (1853, Letter XXX.); W. C. Prime, *From Thebes to the Pyramids* (*Harper's Monthly*, 1857, xiv. 463, 467); Weber, *Weltgesch.* (22 30, 31, 42).

C. P. KRAUTH.

**Karnes**, county in S. W. Texas. Area, 830 square miles. It is traversed by the San Antonio River. It has a fertile, sandy soil, is one-third timber-land, and the rest prairie. Stock-raising is the chief industry, but cotton and grain are also raised. Cap. Helena. Pop. 1705.

**Karoo' Bokadam'**, the *Cerberus cinereus*, a freshwater snake of India, nearly four feet long and quite harmless. Other species of the genus are found in the East.

**Karpinski** (FRANCISZEK), b. Oct. 4, 1741, at Holosec, Galicia, and educated by the Jesuits at Lemberg. In 1783 he became secretary to Prince Adam Czartoryski, and lived at the court of King Stanislas; but from 1791 he resided in retirement on his estates in Lithuania, where he d. Sept. 4, 1825. His songs are still very popular among the Poles. His collected works, including a tragedy, *Judith*, a translation of the Psalms, and a number of idylls, were published in 4 vols. at Warsaw in 1804; his memoirs in 2 vols. at Lemberg in 1849.

**Karr** (JEAN BAPTISTE ALPHONSE), b. at Paris Nov. 24, 1808; was educated at the Collège Bourbon; published *Sauvages Tillands* (1822), a successful novel; became chief editor of *Figaro* 1829; and founded *Le Guepce*, a very successful periodical. In 1848 he removed to Nice, where he engaged in gardening on a large scale. He has produced many novels and other works, one of the best of which is the *Voyage autour de mon Jardin* (1843).—His daughter, THÉRÈSE, is a popular writer of books.

**Karroo'** [a Hottentot term], a name applied to the great barren plateaux of Southern Africa. The soil is shallow, resting upon a rocky bed. In the rainy season they furnish abundant pasturage, and portions of them when irrigated have been found very productive.

**Kars**, town of Armenia, ceded to Russia in 1878, situated on a table-land between 6000 and 7000 feet above the level of the sea. It carries on a lively transit trade. In 1855, its fortifications having been much strengthened, it sustained a long siege by the Russians, but was compelled by famine to surrender Nov. 30. It was stormed by the Russians Nov. 18, 1877. Pop. 12,000.

**Karsten** (HERMANN KARL), b. at Stralsund Nov. 6, 1817; studied botany at Berlin; made two great journeys through Northern South America (1843-47 and 1848-56), and was after his return appointed professor in botany at Berlin. His principal writings are *Die Vegetationsorgane der Palmen* (1847), *Flora Columbia* (1857, 66), and *Chemismus der Pflanzenwelt* (1870).

**Kart'haus**, post-twp. of Clearfield co., Pa. Pop. 162.

**Kasanklik'**, town of European Turkey, in Rum-elle, is famous for its manufacture of attar of roses. Pop. 10,000.

**Kas'chan**, town of Hungary, on the right bank of the Hernad. Its church of St. Elizabeth, built 1432-52, is the finest Gothic building in Hungary. Kas'chan has a very brisk trade in wine, wheat, and fruit. Pop. 21,742.

**Kashan'**, town of Persia, in the province of Irak-Ajeme, situated 3690 feet above the level of the sea. It is a beautiful city, with a palace, numerous mosques, baths, and promenades, and important manufactures of velvet, gold brocade, and silk stuffs. Pop. 30,000.



**Kashgar'**, province of East Toorkistan, between lat. 36° and 40° N., and lon. 72° and 77° E., occupies the basin of the Kizil-Darya, along the southern slope of the Tian-Shan Mountains. Area, about 57,000 square miles. In the eighteenth century it was conquered by the Chinese, and they held it to 1863, when, under a general rising of the Mohammedan population, they were driven out, and Kashgar and the adjacent provinces were formed into an independent kingdom by Yakub Beg.

**Kashgar**, capital of East Toorkistan, in lat. 39° 29' N., lon. 76° 12' E., on the Kizil-Darya, in a fertile and well-cultivated plain elevated between 4000 and 5000 feet above the level of the sea. It is surrounded by an earthen wall of considerable height and thickness and surmounted with numerous towers. It has 8 colleges, 11 caravanserais, extensive bazaars, some manufactures of woollens, carpets, gold and silver ware, and a lively trade. The number of its inhabitants is very differently estimated at from 16,000 to 80,000; 60,000 seems the most probable.

**Ka'shin**, town of Russia, in the government of Tver, on the Kashinka, an affluent of the Volga, has extensive tanneries and manufactures of paper, and carries on an active trade in grain and cattle. Pop. 7639.

**Kashmir**. See CASHMERE.

**Kaskaskia**, tp. of Fayette co., Ill. Pop. 1220.

**Kaskaskia**, post-v. of Randolph co., Ill., on the W. bank of the navigable Kaskaskia River, 7 miles from its mouth. It was founded in 1682 by the French under La Salle, and was until 1818 the capital of Illinois. Many of its present inhabitants are of the old French stock. The town was once large and important, but it has declined. The surrounding country is very fine.

**Kaskaskia Indians**, a tribe once living in Illinois. In 1832 they were removed to what is now Kansas, and in 1867 to the Indian Territory. They are intelligent and quite advanced in civilization. They are confederated with the Peorias and others, and are few in number.

**Kaskaskia (or Okaw) River** rises in Champaign co., Ill., flows about 300 miles in a generally S. W. course, and enters the Mississippi in Randolph co. In its lower course it is navigable.

**Kaskes**, tp. of Jackson co., Ala. Pop. 729.

**Kaso'ta**, post-tp. of Le Sueur co., Minn., on St. Paul and Sioux City R. R., 77 miles S. W. of St. Paul. Pop. 903.

**Kassimow'**, town of European Russia, in the government of Riasan, on the Oka. It is an old town, with large tanneries and manufactures of sailcloth. Pop. 7781.

**Kasson'**, post-v. and tp., Leelanaw co., Mich. Pop. 440.

**Kasson**, post-v. of Mantorville tp., Dodge co., Minn., on the line of the Winona and St. Peter R. R., 50 miles W. of Winona, in a farming region, was first surveyed in 1866; contains 3 churches, 2 banks, 2 weekly newspapers, 2 hotels, 1 flour-mill, and 12 stores. In 1873, 400,339 bushels of wheat were shipped from this point. Pop. (1870), 515.

U. B. SHAVER, PUB. "DODGE CO. REPUBLICAN."

**Kasson (JOHN A.)**, b. near Burlington, Vt., Jan. 11, 1822; graduated at the University of Vermont in 1842; studied law in Massachusetts, and practised at St. Louis until 1857, when he removed to Iowa; was appointed assistant postmaster-general in 1861; elected to Congress as a Republican in 1862; commissioner to international postal congress at Paris in 1863; again elected to Congress in 1864, and again in 1872 and 1874.

**Kastamoo'ni**, town of Asiatic Turkey, the capital of the eyalet of the same name, in Asia Minor. It has 36 mosques, 24 public baths, manufactures of leather and cotton, and the vicinity is rich in copper ore. Pop. 48,000.

**Katagoom'**, or **Katagum**, town of Central Africa, in Soudan, capital of an independent district of the same name, fortified with walls and ditches. Pop. about 8000.

**Katah'din (or Katadn)**, Mount, the highest mountain in Maine, reaches 5385 feet above the sea. It stands in a wilderness, is not easy of access, and the view from its top is extensive, but wild and lonely.

**Katahdin Iron-works Plantation**, tp. of Piscataquis co., Me. Pop. 35.

**Ka'ter (HENRY)**, F. R. S. b. at Bristol, England, Apr. 16, 1777; went to India in 1796, where he was engaged for several years on the trigonometrical survey; rose to the rank of lieutenant in the military service, and retired on half-pay in 1814, after which he devoted himself chiefly to scientific studies. He invented about 1825 the important trigonometrical instrument called a *floating collimator*, experimented on telescopes, writing for the *Philosophical Transactions* accounts of various researches; was principal author of Lardner and Kater's *Treatise on Mechanics* in the *Cabinet Cyclopædia*, and wrote *An Account of the Con-*

*struction and Verification of Certain Standards of Linear Measure for the Russian Government* (1832). D. at London Apr. 26, 1835.

**Kathay'**, or **Cathay**. A remarkable phase in the history of intercourse between Europe and farther Asia is best characterized by the name then given in the West to China. Or if China was *discovered*, as books sometimes tell us, in the beginning of the sixteenth century, then the best definition of Cathay will be that it is the name by which China was known in Europe *before its discovery!* That spacious seat of ancient civilization has always loomed so large, however dimly, to Western eyes, and has, in spite of its distance, subtended so large an angle of vision, that once and again we find it distinguished by different appellations, according as it was approached as the terminus of a southern sea-route coasting the great peninsulas and islands of Asia, or as that of a northern land-route traversing the vast longitude of that continent. In the former aspect the name has always been some form of the name *Tsin*, as *Chin* (Sinim?), *Sinæ*, *Thinæ*, *Tzinista*, *Mahá-chfn*, *CHINA*. In the latter point of view it was known to the ancients as the Land of the *Seres*; to the Europeans of the Middle Ages, as the empire of *CATHAY*.

The latter name (*Khitai* in Oriental form) is still that by which China is styled to this day by all or nearly all the nations which know it from the direction of Inner Asia, including the Russians, the Persians, and the nations of Toorkistan, yet it originally pertained to a people who were not Chinese. The *Khitán* or *Khitát* were a nation allied (it is supposed) to the modern Tunguses, whose chiefs, after making themselves supreme over all the tribes from the Sea of Corea to the Altai, in the early part of the tenth century overran the Chinese provinces N. of the Yellow River, and established their empire over them also, under the name of Liao or the *Iron* dynasty. This *Khitán* empire subsisted for two centuries, terminating in 1123, when it was in turn subverted by a new invasion from the N. And it must have been in those two centuries that the name *Khitai* became indissolubly associated with China.

The Nyuché, or Chûrché, a tribe akin to the modern Manchus, displaced the *Khitán*, and reigned under the name of *Kin* or *Golden* dynasty. They about a century later (1214-34) were displaced by those more famous warriors, the Mongols of Chinghiz Khan. The conquest of the *Kin* empire was completed by Okkodaí, the son of Chinghiz; but not till the third generation, and sixty years after the capture of Peking, was the Mongol conquest extended over Southern China, in the reign of Kublai. This southern empire, under its Chinese sovereigns holding their royal residence (*King-sé*) at the great city now called Hangchow, was known to the northern conquerors as *Mantai*, a name often by the Western Asiatics exchanged or confounded with *Máchin*—i. e. the Hindu *Mahá-Chín* (Great China).

The flood of Mongol conquest spread westward as well as eastward, levelling all political barriers, sweeping over Slavonic Europe, and threatening weak and disunited Christendom with annihilation. And when Western Europe had recovered from the alarm of this brief but terrible invasion (1240-42), Asia lay open as it never did before or has done since, and the accidents of war, commerce, and opportunity carried a number of persons in various ranks of life, and from almost every country in Europe, to its remotest regions. Missions also went to the Tartar courts from the pope and the princes of Europe, and among others John of Piano Carpini (1245-47), a native of Umbria, and William de Rubruquis (1253), a Frenchman, both Franciscan monks of superior intelligence, who have left us narratives of high interest. And these brought to Western Europe the revived knowledge of a great and civilized nation occupying a country in the extreme East, on the shores of the ocean, which bore the name, then first heard in Europe, of *CATHAY*. Rubruquis was acute enough to discern that these Cathayans must be the *Seres* of classic fame. But though these travellers saw the people at the Tartar court, and Friar William gives an unmistakable description of them ("Those Cathayans are little fellows, speaking much through the nose, and, as is general with those Eastern people, their eyes are very narrow. They are first-rate artists in every kind of craft. . . . They do their writing with a pencil such as painters paint with, and a single character of theirs comprehends several letters, so as to form a whole word.") the last remark, imperfect as it is, shows the intelligence and observation of the writer), neither traveller reached the country itself.

The first actual European visitors to Cathay of whom we know are the Polos (see *POLO*, MARCO), regarding whom we need say nothing here. But just as they were reaching Venice (1295) after their absence of twenty-six years, the forerunner of a new band of travellers was entering China by the route of the Indian seas. This was John of Monte



Corvino, another Franciscan, who, already nearly fifty years of age, was plunging single-handed into the ocean of paganism to preach the gospel according to the interpretation of his Church. After years of uphill work and solitary labor, others joined him, and the Catholic mission flourished at Cambaluc or Peking, under the patronage of the Great Khan himself. The papal see woke up to the importance of this distant work, made Friar John archbishop in Cambaluc with patriarchal authority, and sent him spasmodically batches of suffragan bishops and missionary friars. The Roman Church spread: churches and houses of St. Francis were founded at Cambaluc, at Yangchow, at the great ocean-port in Fokien which the Westerns called Zayton and the Chinese called T'swanchow, and elsewhere. Among the monks whose duty carried them to Cathay during the interval between 1300 and 1328, when Archbishop John was followed to the tomb by mourning crowds of pagans as well as of Christians, several have left letters or narratives. Among these we have several early letters from the archbishop himself (1305-06); one from Andrew, bishop of Zayton (1326); and the narrative of Friar Odoric, afterwards canonized as a *beatus* of the Church, dictated after his return to his native Friuli (1330).

The narrative of Odoric is the only one that mentions Canton, known to him and the Westerns of that age by the name of Chin-kalan (i. e. "Great China," a Persian rendering of the Indian Mahā-chīna). He landed there on arriving from India, and describes it as a city as big as three Venices, standing on a great river, one day's voyage from the sea. Thence he travels through Fokien, visiting the cities of Zayton and Foochow, and then to Cansay or Kinsay (*King-sai*—i. e. Hangchow), the vastness of which in extent, population, and wealth made the same extraordinary impression upon him as upon Marco Polo and all the travellers who speak of it.\* From this point it is not difficult to trace his journey by Nanking, and across the two great rivers of China, and then by the Imperial Canal to the capital, Cambaluc, where the emperor then reigning was Yesun-timūr, a degenerate descendant of Kublai, in the fourth generation. This traveller on his homeward journey seems to have passed by Central Asia, and by Kabul, reaching his native land in 1329. Several of the stories told by Odoric that were probably regarded as fictions by his contemporaries are remarkably characteristic of China. Besides many particulars occurring in the larger narrative of Marco Polo, he gives the earliest notice of the now well-known Chinese practice of using tame cormorants in fishing; and he mentions the custom of compressing the feet of girls to prevent their growth.

But the Exchange had its emissaries at this time to Cathay as well as the Church. The record is a very fragmentary and imperfect one, but many circumstances and incidental notices show how frequently the far East was reached by European traders in the first half of the fourteenth century—a state of things which it is very difficult to realize when we see how all those regions, when partially reopened, less than two centuries later, seemed as absolutely new discoveries as the empires which in the same age Cortes and Pizarro were conquering in the West.

This commercial intercourse cannot have commenced till some years after 1300. For Monte Corvino, writing in 1305, says it was then twelve years since he had heard any news from Europe, the only Western stranger who had appeared in all that time being a certain Lombard chururgeon, who had spread awful blasphemies about the pope!† Yet even on his first entrance into China, Friar John had been accompanied by "Master Peter of Lucolongo, a faithful Christian man and a great merchant," who purchased a piece of ground for the mission-church opposite the palace gate at Peking. Twenty-one years later, Bishop Andrew of Zayton (1326) quotes the opinions of the Genoese merchants at that great mart touching a question of exchange value. Odoric, dictating his travels in 1326, refers for corroboration of the marvels of Kinsay or Cansay to the many persons at Venice who had themselves been witnesses of all that he asserted. And a later traveller, John Marignolli, mentions that there was a *caravan* (1346), in connection with one of the three Franciscan houses at Zayton, a *fundaco* or factory and warehouse for the use of the Christian merchants.

But the most distinct and notable evidence of the importance of European trade with Cathay is to be found in the work of Francesco Baldoni Pegolotti, written about 1310. This person was a factor in the Levant and elsewhere under the great Florentine house of the Bardi; the house which gave a husband to Dante's Beatrice, and has given a heroine to George Eliot (*Romola*), and which failed, about the date of the book, in consequence of dealings with

Edward III. of England, whose bankers and agents the Bardi were. The book is a regular manual of commerce, giving details of duties, exchanges, and customs of trade at the various marts of Europe and the Levant.‡ But the first two chapters are devoted to information for the merchant bound to Cathay. The route lay from Tana (or Azov) to Sarai on the Volga (above Astracan), and thence by Orzanj (Old Khiva) and Otrar (not far from the modern town of Hozrat Toorkistan) to Almalik (near Gulja on the Ili), and thence to Kanchow in North-eastern China, and so forward to the Grand Canal leading to the great marts of Cansay and Cambaluc (Hangchow and Peking). Particulars are given as to the investments and exchanges proper to this journey, and especially as to the paper money then forming the currency of China. The extent of dealings contemplated may be judged from the example, which the author assumes for illustration, of a merchant carrying goods to the value of some 25,000 gold florins (say \$60,000). Little was to be taken to Cathay except silver in ingots, and the purchases contemplated there were silk and rich silk textures (damasks, gold brocades, and the like). Silk cost then in Cathay about 5 florins (say \$12) for 20 Genoese pounds. The only unsafe part of the road was that between Tana and the Volga, but even there a company of sixty would be "as safe as in your own house."

The picture that we can put together from the notices of mediæval travellers in Cathay is that of the China that we know, but always with a striking contrast as regards the facilities of movement allowed to foreign visitors in the interior. The vast swarms of population and of river-shipping, the great plenty of the necessities of life, the splendor and magnitude of the cities, the high civilization of this heathen people, the cheapness of silk and porcelain, the use of fossil coal and of paper money, are the features which are constantly prominent in these notices. The free intercourse was not, however, of long duration. As the Mongol chiefs in Central and Western Asia, one after another, adopted Islam, the power of bigotry revived, and with it the old obstacles. Thus, already in 1339 we find a merchant, William of Modena, along with certain friars, put to death for the faith at Almalik. About the middle of the century the house of Chinghiz in China began to totter, and its fall in 1368 closed all communication with the Western World. The last notices we possess are contained in a work (strange to say) on Bohemian history by John Marignolli, a Florentine monk who had been sent on envoy to the last of the Mongol emperors by Pope Benedict XII. He had gone by the usual land-route, and after spending about four years (1342-46) at Peking, returned by the sea-route to India, on his way visiting Ceylon, where he was wrecked and robbed. In 1370, the pope, probably in ignorance of the changes in the East, nominated one Friar William of Prato to be archbishop of Cambaluc, but we know not if he attempted to reach his see. He certainly cannot have succeeded. Later prelates appear in some lists, but this has been shown to have arisen from a confusion with another see in Tartar territory, that of Cembalo, otherwise Balaklava, in the Crimea.

Of the same remarkable phase in Chinese history we have also a good many notices in Mohammedan writers. The establishment of a Mongol dynasty in Persia (1258), by which the Great Khan reigning over Cathay was for many years acknowledged as lord paramount, led to a good deal of intercourse. Chinese visitors were by no means unknown at the court of Tabriz, and some of the Persian historians, writing at that court under the patronage of the Mongol princes, have told us much about Cathay, especially Rashid-uddīn, the great minister and historian of the Mongol rulers of Persia (d. 1318). We have also in the book of the Moorish traveller Ibn Batuta, who visited China about 1347-48, many very curious, and in great part true, notices, though in this part of the work it is not possible to give credence to the whole of the traveller's narrative.

With the downfall of the Mongol dynasty in China, as we have said, this curious phase of history came to a close. The new and native rulers reverted to the old indigenous policy, and kept all foreigners at arm's length, whilst Mohammedanism entirely recovered its grasp over Middle Asia, and the Nestorian Christianity, which had acquired considerable sway, as rapidly dwindled and expired. A dark mist descended on the further East, covering Mantzi and Cathay, with those cities of which the mediæval travellers had told such such wonders, *Cashghar* and *Kashgar*, *Zayton* and *Chin-kalan*. And when the veil rose, a century and a half later, before the Portuguese and Spanish navigators, those names were heard no more. In their stead men spoke of *Peking* and *Hangchow*, of *Chinkien* and *Cansay*.

\* This great city retained much of its prosperity till destroyed by the Taipings in our own day.

† The MS. of this book is in the Riccardian Library at Florence. It was printed by G. F. Pegnam del Ventura in a work called *Della Decima*, etc., 1466.



ton. Not only were the old names forgotten, but the fact that those places had been previously known to Europe was utterly forgotten also. Gradually, new missionary priests went forth from Rome—Jesuits now. New converts were made, and new vicariats were constituted; but the old Franciscan churches, and the Nestorianism with which they had battled, had been alike swallowed up in the ocean of paganism. In time, however, slight traces of the former existence of Christian churches came to the surface; and when Marco Polo's book was read by intelligent men, one and another began to suspect that his Cathay and the new China were identical.

But it was a very long time before this was thoroughly or generally understood. When the new interest in discovery recalled attention to the perusal of old travellers, the Cathay of which they spoke was regarded, except by a sagacious few, as a region distinct from those new-found Indies. Cathay had been the aim of the first voyage of the Cabots in 1496, and it continued to be the object of many adventurous voyages, English and Dutch, to the N. W. and N. E. till far on in the sixteenth century. At least one memorable land-journey also was made by Englishmen, of which the investigation of trade with Cathay was a chief object—that in which Anthony Jenkinson and the two Johnsons reached Bokhara by way of Russia in 1558-59. The country of which they collected notices at that city was still known to them only as *Cathay*, and its great capital only as *Cambaluc*.

Cathay as a supposed separate entity may be considered to come to an end with the journey of Benedict Goës, the lay Jesuit. This admirable person was in 1603 despatched through Central Asia, by his superiors in India, with the specific object of determining whether the Cathay of old European writers and of modern Mohammedans was or was not a distinct region from that China of which parallel marvels had now for some time been recounted. Benedict, as one of his brethren pronounced his epitaph, "seeking Cathay, found heaven." He died at Suhechow, the frontier city of China, but not before he had ascertained that China and Cathay were one.

In briefly recalling one more aspect of Cathay, we close this article. It was Cathay, with its outlying islands of Zipangu, or Japan, that Columbus, penetrated by his intense convictions of the smallness of the earth and of the vast extension of Asia eastward, sought to reach by sailing W.; and to the day of his death he was full of the imagination of the proximity of the domain of the Great Khan to the islands and coasts which he had discovered. And these imaginations are curiously embodied in some of the early maps of the sixteenth century, which intermingle on the same coast-line the new discoveries from Newfoundland to Brazil with the provinces of Marco Polo's Cathay.

H. YULE.

**Katif'**, town of Arabia, is situated on the Persian Gulf, in lat. 26° 25' N. The bay on which it stands affords good anchorage, but the town itself, which is fortified, is unhealthy, and its trade is dwindling away. Pop. about 6000.

**Katkov'** (MICHAEL), b. at Moscow in 1820; finished his studies at Königsberg and Berlin, and was for several years professor in philosophy in his native city. Since 1856 he has devoted himself exclusively to journalism, and he has exercised an enormous influence—in a liberal direction by his denunciations of existing wrongs, and in a national direction by the formation of the Old Russian party.

**Kato'nah**, post-v. of Bedford tp., Westchester co., N. Y., on the Harlem R. R., 42 miles N. of New York. It has 1 weekly newspaper.

**Ka'trine, Loch**, a lake of Scotland, in the county of Perth. It is 8 miles long and  $\frac{3}{4}$  of a mile wide, and remarkable as well for the depth and purity of its water as for the beautiful scenery which surrounds it. Glasgow, nearly 25 miles distant, draws its supply of water from this lake.

**Kat'sena**, town of the empire of Sokoto, in Central Africa. It was formerly a large and flourishing city, but since its capture in 1808 by the Fulbes, who almost destroyed it, its trade and manufactures have removed to Kano. It has now only 7000 inhabitants.

**Kattimandu'**, or **Cuttimundoo**, the milky latex or sap of *Euphorbia nereifolia*, an East Indian plant. This substance resembles gutta-percha, and has considerable value in the arts. The leaves are used by the natives for their diuretic, cathartic, and deobstruent powers, and the juice is an ingredient in anti-rheumatic liniments.

**Katun'ga**, or **Eyee**, town of Central Africa, the capital of a state of the same name, is in 8° 59' N. lat., 4° 27' E. lon., and is, like all towns of these regions, surrounded with walls to protect it against marauding tribes. It carries on some trade, and is said to have 15,000 inhabitants.

**Ka'tydid** (*Cyrtophylus concarus*), a large green orthopterous insect of the U. S., belonging to the group Locustariae, found throughout a great part of the country. It is so called from its note, produced in the early part of the night, somewhat resembling the words "Katy did." This noise is produced by the friction of transparent membranes attached to the wing-covers.

**Katzbach**, a river of Prussia, in the province of Silesia, entering the Oder at Parchwitz. On Aug. 26, 1813, the Prussians under Blücher totally defeated the French under Marshal Macdonald on the banks of Katzbach.

**Kauai'**, one of the Hawaiian Islands, is situated in lat. 22° N., lon. 159° 30' W. Area, 640 square miles. Pop. 4961. It is high—Waialeale, the highest point, rising about 6000 feet—of volcanic origin, but very fertile. Koloa and Nawiliwili are the principal towns.

**Kauffman** (MARIA ANNA ANGELICA), b. at Coire, in the Grisons, in 1741. Her father was an itinerant painter of ordinary talents, of whose work nothing authentic remains. His enthusiasm for his art was, however, sincere, and, appreciating the extraordinary gifts of his daughter, he gave her such instruction, opportunity, and stimulus as he could command. Her talent for music rivalled her talent for painting, and for a moment she was tempted to make music her profession, and go upon the lyric stage, as she was urged to do at Milan; but she wisely decided to pursue her first calling. At Como she painted successfully the portrait of the bishop, through whose influence she had many sitters there. At Milan, whither her parents went when she was but thirteen years old, she associated with artists of reputation, studied under competent masters, copied good pictures, and won favor with people of the court. At Schwartzenberg she painted in fresco the twelve apostles by order of the bishop of Constance. In 1761 the father and daughter visited Florence, Parma, Rome, Bologna, Naples, and Venice. In Rome she formed the friendship of Rafael Mengs and Winckelmann, and painted the portrait of the latter to his great satisfaction. In a letter to a friend he wrote of her as "a person of rare merit," "very eminent in portraits in oil." In Bologna she executed what is considered her finest etching, *The Toilet*; in Venice she won praise and patronage from the English there, and in 1766 went to London with Lady Wentworth, who had become interested in her. In London her success was brilliant. The duchess of Brunswick sat to her; she was presented at court, painted portraits of the queen and son of George III., and was overwhelmed by orders from the nobility. She was spoken of as "the beautiful and accomplished Miss Kauffman." In 1768 she was chosen one of the original thirty-six members of the Royal Academy, just started; her pictures held prominent places at the exhibition; she was flattered by the admiration of Sir Joshua Reynolds, and chosen to paint portraits of the most distinguished and beautiful ladies of the court. When the plan of decorating St. Paul's cathedral was entertained, Miss Kauffman was selected, along with Reynolds, West, Bray, and Cipriani, an Italian artist then much in vogue. She lived in England till 1771, when, her father's health failing, she married Antonio Zucchi, a Venetian, and the three left England for Italy. At Venice she lived long enough to paint *Leonardo Dying in the Arms of Francis I.* The latter years of her life were spent in Rome, where Goethe, Herder, and Klopstock were her friends; where she was so much respected that the French general, on taking possession of the city, ordered that her house and property should be unmolested; and where, after a lingering and painful illness, she d. in Nov., 1807.

Angelica Kauffman owed her fame and fortune as much to personal attractions, charm of manner, and social accomplishments as to her art, which was mannered, conventional, and monotonous. Her pictures are graceful and pleasing, harmonious in color, correct in drawing, and sweet in expression, but are not thought deserving of the praise lavished on them by Sir Joshua Reynolds, Rafael Mengs, and Goethe. Her attempts at historical painting were ambitious failures. The galleries of the Louvre in Paris and the Royal Gallery in Dresden contain excellent examples of her work; some of her best pieces are in Russia. In England her compositions are well known. An unfortunate marriage connection, from which she was released by divorce, saddened a portion of her life, but gave to it a romantic interest. Of her later marriage with Zucchi little is known.

O. B. FROTHINGHAM.

**Kaufman**, county of N. E. Central Texas, in the valley of the Trinity River. Area, 950 square miles. It has a very fertile soil, and is well timbered. Live-stock, grain, and cotton are staple products. Cap. Kaufman. Pop. 6895.

**Kaufman**, post-v. and tp., cap. of Kaufman co., Tex., near Trinity River, 10 miles S. of the Texas and Pacific R. R., and about 40 miles S. E. of the city of Dallas, on the

dividing-line between the timbered portion of Eastern Texas and the great wheat-belt of Northern Texas. It has 3 churches (1 colored), 2 schools, 1 bank, 2 hotels, 1 newspaper, and 1 sash and door manufactory; is at the intersection of three projected railroads. Principal occupation, farming. Pop., not found in census returns of 1870, estimated in 1874 at 12,000. G. W. CLARK, Pres. "STAR."

**Kaufmann, von** (C.), Russian general, governor-general of Toorkistan, and adjutant-general to the czar, of German descent, made himself famous by his successful expedition into Central Asia. In 1857 he was appointed governor-general of the vast regions which, partly dependent on Russia and partly inhabited by hostile tribes, formed the provinces of Sir Daria and Semiretschkaia, but which now have been united into the military circle of Toorkistan. His task was to strengthen and extend the influence of Russia in Central Asia, and he soon became engaged in a war with Bokhara. Immediately after his arrival in Toorkistan he took up a position with his troops at Dschisak, on the southern frontier of his territory, and entered on long negotiations with the hostile emir of Bokhara until he received large reinforcements in Mar., 1868. He then commenced to march southward along the river Serafschan. The emir declared war. By prudent and energetic measures Kaufmann succeeded in defeating the force of the emir, though vastly superior in numbers, and in the middle of May he occupied Samarcand. The result of this victory was a peace very advantageous to Russia, by which the emir ceded Samarcand and a large territory, and became a tributary vassal of Russia. Kaufmann now used the humiliation of Bokhara for the subjugation of the most dangerous enemy of Russia in Central Asia—the khan of Khiva. Surrounded on all sides by great deserts, Khiva was unapproachable to Russian armies without the aid of Bokhara. After several cautious reconnoitings, Kaufmann moved in Mar., 1873, three columns, consisting of 12,000 men, from the Caspian Sea, from Orenburg, and from Tashkend, towards Khiva, and after great hardships on the long march he entered the hostile capital June 10. He compelled the khan to a peace advantageous to Russia, and defeated the wild tribes of the Toorkomans and Jermudes, which, although dependent on the khan, would not acknowledge the peace. In consequence of a treaty between the Russian government and England, the Russian army again retired from Khiva, but the unconditional authority of Russia in Central Asia was nevertheless established, numerous military stations, which will prove of great service under future expeditions southward, were established on the Black Sea, the Sea of Aral, and along the Amu-Daria, and the territory of the military circle of Toorkistan was doubled by conquered districts. The residence of the general is Tashkend. ARGENT NILMANN.

**Kaukauna**, post tp. of Outagamie co., Wis., on the Chicago and North-western and the Milwaukee Lake Shore and Western R. Rs. Pop. 1129.

**Kaulbach, von** (WILHELM), b. at Ardsen, in the principality of Württemberg, Oct. 11, 1806. His parents were very poor, and the unfavorable circumstances under which he grew up gave his mind something bitter and sarcastic, at the same time that they strengthened and elevated his character. In 1822 he was enabled by the aid of the sculptor Borch to frequent the Academy of Düsseldorf, where he studied under Cornelius, and when the latter removed to Munich in 1824, Kaulbach followed him. He remained in this city for the rest of his life, and d. there Apr. 7, 1874. His first pictures, *Apollon and the Muses*, on the ceiling of the Odéon, and the sixteen wall-pictures in the palace of Duke Max illustrative of the myth of Cupid and Psyche, all executed in fresco, were produced under the influence of Cornelius, and are kept in a purely idealistic style. But nearly at the same time appeared his *Lancette Asplon*, an oil-painting of the most decidedly realistic character, and to the same style belong his celebrated illustrations to *Romulus Fuchs*, a series of sketches as admirable in their striking conceptions of the character and nature of the different animals as distinguished for their humor and satire. By his true genius did not fully reveal itself until 1837, when he finished the *Battle of the Huns* for Prince Kazovsky; next year followed the *Descent of Jerusalem* for the Fürstothek in Munich. These two pictures, which generally are considered as his masterpieces, are not historical paintings in the common sense of the word. They do not represent facts, but ideas, and the form in which they represent the ideas is thoroughly symbolical or allegorical, in spite of the realistic life and fitness of the details. To this style belong all his largest and most celebrated productions—the decoration of the stairway in the Museum of Berlin, commenced in 1847, *St. Michael the Patron Saint of Germany*, finished shortly before his death, and others. In Germany these pictures produced a very

deep impression; no one here hesitated to set them up as the highest productions of modern art. In foreign countries, however, they did not meet with the same admiration. Their pictorial effect, properly speaking, is not great. They impress principally by their intellectuality, though it cannot be denied that the symbols and allegories are sometimes rather trivial; thus, the *Reformation* is hardly anything more than a clever arrangement of portraits. There is something in Kaulbach's pictures which reminds of Wagner's music. The enthusiasm which they awaken is of a polemical character. They throw down a great mass of modern painting into utter insignificance, but they seem not themselves to satisfy the demands which they raise.

CLEMENS PETERSEN.

**Kau'nitz** (WENZEL ANTON), PRINCE, count of Rietberg, b. at Vienna Feb. 2, 1711; studied at Leipsic and Leyden; travelled through France and Italy; and entered the diplomatic career in the Austrian service in 1735. By the consummate skill with which he negotiated the Peace of Aix-la-Chapelle in 1748, and still more by his astonishing success in forming an alliance between Austria and France while ambassador in Paris (1750-52), he acquired great fame as a diplomat; and 1753, Maria Theresa made him chancellor and placed him at the head of the Austrian government. This position he held for nearly forty years, and he was generally considered the greatest statesman of his age. Under the reign of Joseph II. his influence decreased, especially after the failure of his negotiations for the annexation of Bavaria to Austria. In 1792 he retired on account of old age. D. June 27, 1794. His policy was exclusively Austrian, and centred in the one idea of making Austria great, but in details, with respect even to some of the most important political transactions—as, for instance, the division of Poland, the church reforms of Joseph II., etc.—it is doubtful whether they were originally planned by him. Personally, he was a man of perfect honesty, with taste for science and art, generous and amiable in spite of his enormous vanity.

**Kau'ri Pine**, the *Dammara australis*, and other species of the same genus, produced in Australasia and the adjacent regions. They are coniferous trees of noble size, and the best quality as timber. This timber is used for ships' masts and planks. The trees produce kauri gum or New Zealand dammar, extensively used in making varnishes.

**Kautz** (ALBERT), U. S. N., b. Jan. 29, 1839, in Ohio; graduated at the Naval Academy in 1858; became a lieutenant in 1861, a lieutenant-commander in 1865, a commander in 1868; served in the flag-ship Hartford at the passage of Forts Jackson and St. Philip and capture of New Orleans, Apr. 24, 1862, and in the various engagements with the Vicksburg batteries in June and July, 1862. Highly commended in the official despatches for "gallantry and ability."

FONHALL A. PARKER.

**Kautz** (AUGUST VALENTIN), b. Jan. 5, 1828, in the village of Leipheim, near Pforth, grand duchy of Baden; emigrated to the U. S. in 1848 with his parents, who settled in Brown co., O., in 1831; graduated at West Point, and appointed brevet second lieutenant of infantry July, 1852; promoted first lieutenant 1853; captain 6th Cavalry May, 1861; appointed colonel 2d Ohio Cavalry Sept. 2, 1862; brigadier-general of volunteers May 23, 1864; served during the civil war in the Virginia Peninsular campaign, 1862; in the Army of the Ohio in pursuit of Gen. Morgan and the siege of Knoxville 1863, and with the Army of the James, commanding cavalry division, 1864-65, participating in the occupation of Richmond, Va., Apr. 3, 1865, commanding 1st division 20th corps; member of the military commission for the trial of the assassins of Pres. Lincoln; appointed lieut.-col. 34th Infantry July, 1866; transferred to 15th Infantry Mar., 1869; col. 8th Infantry June, 1874. Author of *Campaigns 1861-65*, *Customs of Soldiers*, *Non-Commissioned Officers and Soldiers*, 1864, and *Customs of Soldiers in Office* (1866).

G. C. S. MOSS.

**Kava**. See *AVA*.

**Kaval'la**, small town of European Turkey, in the valley of Salonika, on the Egean Sea, opposite the island of Thasos, is noted as the birthplace of Mehmet Ali, and has an important export trade in lead tobacco. P. 10,000 ann.

**Kavanaugh** (JEREMY), daughter of Major Kavanaugh, a novelist, was b. in 1821 at Thetford, Ireland, and from childhood resided chiefly in Paris, where she remained until 1841 to London. She produced a very large number of novels, tales for children, etc., among which were *Waverley* (1848), *Anthony* (1851), *Robert* (1850), *Sister* (1850), *D. at Nice*, France, Oct. 28, 1871.

**Kavanaugh** (HARRIS H.), D. D., b. near Winchester, Ky., in 1802, was Methodist preacher in 1827, and Kentucky conference in 1828, and for fifty years has been



a successful itinerant; was superintendent of public instruction in Kentucky in 1839, and became bishop of the Methodist Episcopal Church, South, in 1864.

**Kavi**, the ancient sacred language of the island of Java in the East Indies, is based chiefly upon the Sanskrit, a knowledge of which was brought by Brahmanic immigrants from India about the beginning of the Christian era. It gradually became corrupted by the ordinary Javanese tongue to the extent of about two-fifths of its vocabulary. The alphabet is nearly the same as the Devanagari, although the order of the consonants is varied. The name of the language signifies "learned" or "wise," and has been applied only since it began to be distinguished from the aboriginal languages by the composition of a literature. This took place in the early centuries of the Christian era. A considerable number of works is still extant, devoted largely to legends of the Creation and poems concerning mythical heroes. In the fifteenth century the sacred language, as well as the religion taught by it, was driven from Java, and took refuge in the neighboring small island of Bali, where some knowledge of it is still retained by the natives. William von Humboldt has subjected the Kavi language to a searching examination, and has extracted much curious information—*Über die Kawi-Sprache*.

**Kaw**, tp. of Jefferson co., Kan. Pop. 749.

**Kaw**, tp. of Jackson co., Mo. Pop. 1612.

**Kawkaw'lin**, post-v. and tp. of Bay co., Mich., on the Jackson Lansing and Saginaw R. R., at the mouth of Saginaw River and the head of Saginaw Bay. Pop. 756.

**Kaye** (JOHN), D. D., b. at Hammersmith, England, in 1783; graduated at Christ's College, Cambridge, in 1804; became master of his college in 1814; regius professor of divinity in 1816; bishop of Bristol in 1820, and of Lincoln in 1827. He wrote *The Ecclesiastical History of the Second and Third Centuries, illustrated from the Writings of Tertullian* (1826), *Writings and Opinions of Clement of Alexandria* (1835), *Writings and Opinions of Justin Martyr* (1836), *Government of the Church during the First Three Centuries* (1855), several charges to his clergy, and two or three anonymous treatises directed against Catholicism. D. at Lincoln Feb. 19, 1833.

**Kaye** (SIR JOHN WILLIAM), b. in England in 1814; served for some years in the army of the East India Company; returned to England in 1845, and devoted himself to literature. In 1856 he entered the Indian home civil service; in 1859 became secretary in the political and secret department of the India office; and was knighted in 1871. He published a *History of the War in Afghanistan* (1841-53), *History of the Administration of the East India Company* (1853), *Life and Correspondence of Lord Metcalfe* (1854), *Life of Sir John Malcolm* (1856), *Christianity in India* (1859), *History of the Sepoy War* (2 vols., 1866-71), and *Essays on an Optimist* (1870). D. July 24, 1876.

**Kazan'**, or **Kasan**, government of Russia, bounded by Viatik, Novgorod, and Astrakhan. Area, 23,650 square miles. Pop. 1,670,337. The surface is flat, but the soil fertile, affording excellent pasture. Cattle and bees are reared, good timber is grown, and the fishing in the Volga is considerable.

**Kazan**, town of Russia, the capital of the government of Kazan, on the Kazanska, 4 miles from its influx in the Volga. It has a university, a theological seminary, a military school, 2 gymnasias, and several other educational institutions. Its manufactures of leather, soap, hardware, and spirits are considerable and its trade very extensive. It was destroyed by fire twice in this century, in 1815 and 1842, but rebuilt more beautiful each time. In the neighborhood is the magnificent Semiozernoi convent. Pop. 78,602.

**Kazbin'**, or **Casbin**, town of Persia, in the province of Irak-Ajemei, in a beautiful plain covered with orchards and encircled by hills. It manufactures velvet, silk, satin, brocade, coarse cotton fabrics, and articles of iron and brass. Its breeds of camels and horses are very celebrated. The number of its inhabitants is not ascertained. The area it occupies is very large, but a great portion of it is covered with ruins.

**Kaz'incy** (FRANZ), b. at Er-Semlyén, Hungary, Oct. 27, 1759; studied law, and held several minor offices during the earlier part of his life, though literature was always his principal occupation. Being implicated in the conspiracy of Martinovics, he was condemned to death in 1793. He was pardoned, but kept in prison for seven years. After his liberation in 1801 he devoted himself exclusively to literature, and exercised a great influence both by his own works and by his numerous translations from the German, French, and English. He was one of the leaders of the movement by which the Latin language was laid aside and

the native tongue adopted as the medium of Hungarian literature. D. Aug. 22, 1831.

**Kea'gy** (JOHN M.), M. D., b. in Lancaster co., Pa., about 1795; d. at Philadelphia Jan. 30, 1837. He taught chiefly in the public high school at Harrisburg, where he published his *Pestalozzian Primer* in 1827, a book made up largely of "thinking lessons," the modern "object lessons." He advocated, and to some extent practised, the mode of teaching a child to read words "as if they were Chinese symbols." (See Barnard's *Jour. of Education*, 1871, vol. XXII, p. 649.) S. S. HALDEMAN.

**Kean** (CHARLES JOHN), son of Edmund Kean, b. at Waterford, Ireland, Jan. 18, 1811; d. Jan. 22, 1868; was educated at Eton, but was withdrawn before completing his studies there, in consequence of his father's broken fortunes; declined a cadetship in the service of the East India Company, and made his first appearance on the stage at Drury Lane Theatre on Oct. 1, 1827, in the character of Norval. His reception was cold, and success came to him slowly. In 1830 he visited America, and appeared as Richard III. at the Park Theatre; returned to England Jan., 1833, and played in the provincial theatres; made a professional trip to Hamburg; came to London in 1838, and took position, as Hamlet, in the front rank of his profession. In 1839 he visited again the U. S. and Havana; returned to London in 1840; in 1842 married Miss Ellen Tree; crossed the Atlantic once more with his wife in 1846; in 1847 went back, and after playing engagements in Birmingham, Manchester, Liverpool, and Dublin, and at the Haymarket, he identified his fortunes with the Princess Theatre, which he made popular and lucrative. Twice Mr. Kean was entrusted with the management of the Windsor theatricals. His production of *Richard III.* and of *King John*, first attempted in the U. S. on a scale of splendor till then unknown, had great celebrity. Mr. Kean gained his chief reputation in the tragedies of Shakespeare—*Hamlet*, *Macbeth*, *Richard II.*, *Richard III.*, *Romeo and Juliet*—but he did not sustain the grand traditions of his father. O. B. FROTHINGHAM.

**Kean** (EDMUND), b. in London Mar. 17, 1787; d. in Richmond May 15, 1833; date of birth is not quite certain. His father, it is believed, was connected as a mechanic with the Royalty Theatre; his mother was an actress of little repute. The child was born and reared amid the associations of the stage, and early attracted attention by his aptness in juvenile parts. For fourteen or fifteen years he was connected with strolling companies, played in every variety of rôle, and by practice acquired professional facility. His first appearance on the London stage was at Drury Lane Jan. 26, 1814, in the character of Shylock. His success was immediate, and was raised to the highest point by his impersonations of Hamlet, Richard III., Macbeth, Othello, Iago, Lear, Sir Giles Overreach, Sir Edward Mortimer, and other parts then popular. He visited the U. S. in 1820, and again in 1825; his last appearance was in 1833, with his son Charles, as Othello; his strength failed him in the middle of the play, and he was borne out in the arms of his son. Kean was a man of genius and accomplishment, a student in his profession, of extraordinary powers of mimicry and conversation, but irregular in life, capricious in temper, and eccentric in habit. Tradition represents him as one of the greatest actors that ever trod the boards. In moments he was surpassingly great, but his reliance on his genius made him unequal. His biography by "Barry Cornwall" (Mr. Procter) gives an interesting account of the actor and the man. The *Reminiscences* of Mr. Macready contain allusions to him that show how he was regarded from a professional point of view. Mr. Macready speaks of him as "one of the most extraordinary theatrical geniuses that have ever illustrated the dramatic poetry of England." Kean was small of stature, but graceful, and when under the influence of passion effective, and even grand. His countenance was expressive, his eye brilliant, his action free and noble, his voice flexible and strong. His power of impersonation was wonderful; in his best moments "he seemed to clutch the whole idea of his character." The impression he made in the U. S. was impaired by his own waywardness in refusing to complete an engagement in Boston on his first visit there. O. B. FROTHINGHAM.

**Keane** (JOHN), LORD, b. at Belmont, Ireland, in 1781; entered the British army in boyhood; served in Egypt, and in Spain during the Peninsular war, gaining the rank of major-general; commanded the British expedition against New Orleans in 1814 until superseded by Pakenham; was severely wounded at the battle of New Orleans; commanded the West Indian forces 1823-30, and acted for some time as governor of Jamaica. In 1833 he was sent to India, and during the Afghan war (1839) captured the stronghold of Ghuznee, for which exploit he was made a peer and received from the East India Company a pension of



£2000. D. at Burton Lodge, Hampshire, England, Aug. 24, 1844.

**Kearnersville**, post-tp. of Forsyth co., N. C. Pop. 995.

**Kearney**, county of Nebraska, bounded on the N. by Platte River. Area, 500 square miles. It is rolling prairie, well adapted to pasturage. Cap. Lowell. Pop. 58.

**Kearney**, post-v. of Washington tp., Clay co., Mo., on the Kansas City branch of the Hannibal and St. Joseph R. R. It has 1 weekly newspaper. Pop. 396.

**Kearney**, tp. of Hudson co., N. J. Pop. 974.

**Kearney** (LAWRENCE), b. at Perth Amboy, N. J., Nov. 30, 1789; entered the U. S. navy as midshipman in 1807; served on the coast of the Southern States during the war of 1812; destroyed pirates in the West Indies, Gulf of Mexico, and in the Levant; commanded the China squadron in 1841, securing American commercial rights; returned in 1844; became commodore in 1866; and d. at Perth Amboy Nov. 29, 1868.

**Kearney Junction**, post v. and tp., cap. of Buffalo co., Neb., on the Union Pacific R. R., at its junction with the Burlington and Missouri R. R., 198 miles W. of Omaha. First town-lots were sold Sept. 9, 1872; in June, 1873, it numbered about 600 inhabitants, 200 buildings costing \$149,000, 3 hotels, 3 banks, 1 school, 19 stores of various kinds, and a depot costing \$29,000. It is in the Platte River Valley, in the midst of a fine agricultural region, with deep-black clayey soil, well watered by running streams. It has 2 daily and 2 weekly newspapers.

C. M. CLAPP, MANAGER "KEARNEY TIMES."

**Kearny** (PHILIP), nephew of Gen. Stephen W., b. in New York June 2, 1815; graduated at Columbia College, and studied law, but in 1837 accepted a lieutenancy in the 1st Dragoons, of which regiment his uncle was then colonel, and soon after visited Europe under orders of the government to examine and report upon the tactics of the French cavalry service. Here he attended the Polytechnic School at Saumur, and subsequently served as a volunteer in the Chasseurs d'Afrique in Algeria, winning the cross of the Legion of Honor. Returned to the U. S. in 1840, and was attached to the staff of Gen. Scott 1841-44, under whom he served with great gallantry in the Mexican war; captain of dragoons in 1846, and brevetted major for Contreras and Churubusco. In the final assault on the city of Mexico he lost an arm at the San Antonio gate; subsequently served in California and in command of an expedition against the Indians on Columbia River. Resigned Oct., 1851, and went to Europe, where he continued his military studies; served in the Italian war of 1859 as volunteer aide to Gen. Maurier of the French army, being engaged at Magenta and Solferino, and for bravery was a second time decorated with the cross of the Legion of Honor. The news of the outbreak of civil war in the U. S. caused his hasty return home, where his proffered services were at once accepted by the government. Appointed at once a brigadier-general of volunteers, he was assigned to the command of a brigade of New Jersey troops. In the Peninsular campaign of 1862 he commanded a division, and at Williamsburg and Fair Oaks his services were most brilliant and valuable, as well as throughout the subsequent hard fighting here. Arriving at Harrison's Landing, he was promoted to be major-general of volunteers, to date July 4, 1862. Subsequently, in the second battle of Bull Run, he was again conspicuous, and at Chantilly, where he was killed Sept. 1, 1862, while reconnoitring in advance of his troops.

G. C. SIMMONS.

**Kearny** (Gen. STEPHEN WATTS), uncle of Philip, b. at Newark, N. J., Aug. 30, 1794; on the outbreak of the war with Great Britain he abandoned his studies at Columbia College, and entered the army as first lieutenant 13th Infantry Mar., 1812; in the following October he was distinguished in the assault on Queenstown Heights, and promoted to be captain Apr., 1813; on the close of the war he was retained in the army, rising through successive grades to be brigadier-general in 1846. In the war with Mexico he commanded at the commencement the army of the West, which made conquest of the province of New Mexico; establishing a provisional government at Santa Fe, he continued his march to California, and Dec. 6, 1846, fought the battle of San Pascual, where he was twice wounded; subsequently commanded the troops of sailors and marines and detachment of dragoons in the battles of San Gabriel and Plains of Mesa, Jan. 8 and 9, 1847. He was governor of California from Mar. to June, 1847; joined the army in Mexico, and was governor of Vera Cruz Mar., 1848, and May, 1848, of the city of Mexico. For his services in New Mexico and California he was brevetted major-general. Author of *A Manual for the Exercise and Manoeuvring of*

*U. S. Dragoons, Organic Law, and Laws for the Government of the Territory of New Mexico*. D. at St. Louis, Mo., Oct. 31, 1848.

G. C. SIMMONS.

**Kear'sarge, Mount**, a conspicuous mountain in Carroll co., N. H.; lat. 44° 6' 20" N., lon. 71° 5' 40" W., height, 3200 feet. On the suggestion of the wife of the assistant secretary of the navy, a daughter of Levi Woodbury of New Hampshire, the secretary in 1861 named the vessel which sank the Alabama in 1864 after this mountain. Another one of the same name, in Merrimack co., N. H., formerly called *Kyar-Sarga*, by the Indians Cowisewaschook, height 2950 feet, has been erroneously claimed for this honor.

G. V. FOX.

**Keating**, tp. of Clinton co., Pa. Keating Village (Nashy P. O.) is on the Philadelphia and Erie R. R. P. 439.

**Keating**, tp. of McKean co., Pa. It includes Smethport, the county-seat. Pop. 1435.

**Keating**, tp. of Potter co., Pa. Pop. 78.

**Keats** (JOHN), b. in London in 1796; was sent to a school at Enfield kept by the father of Charles Cowden Clarke; served 1810-15 an apprenticeship to a surgeon, and then studied in London; became the friend of Leigh Hunt, Lamb, and the other authors of the so-called Cockney school; published in 1817 a volume of verses, followed in 1818 by *Endymion*, and another volume of poems in 1820. Keats died of consumption at Rome Feb. 24, 1821. The often-repeated statement that Keats was killed by the bitter attack upon him by Gifford in the *Quarterly Review* was uniformly denied by those who knew him best, and Gifford's criticism was more injurious to its author, and justly so, than to any one else. The fame of Keats as a poet has widened much since his death, and after making due allowance for his youth and inexperience as a writer, his poems certainly display that indescribable quality called genius in an unusual degree.

**Keayne** (Capt. ROBERT), b. probably in London in 1594 or 1595; was a member of the Honorable Artillery Company in London, and by trade a merchant tailor. He aided Plymouth colony by donations as early as 1624, and became one of the founders of the Massachusetts colony, settling at Boston in 1635. He brought over considerable estate; organized in 1638 the Ancient and Honorable Artillery Company of Boston; was frequently representative for Boston from 1638 to 1649; was a liberal donor to Harvard College, and by legacy founded a free school at Boston, now the Latin Grammar School. He was a brother-in-law of the celebrated John Wilson, first minister of Boston, both having married daughters of Sir John Mansfield, master of the Minories; was an eccentric man, and his singular will (reprinted in part in *N. E. Gen. Reg.*, vol. vi.) covers over 50 pages, being perhaps the longest on record in America.

**Keble** (JOHN), M. A., b. at Fairford, Gloucester, England, Apr. 25, 1792, passed B. A. at Corpus Christi, Oxford, 1810; became a fellow of Oriel 1811; was public examiner at Oxford 1814-16; took deacon's orders 1815, priest's 1816; was a tutor at Oxford 1818-23; became professor of poetry 1831; was one of the original Tractarians, and a leader of the Anglo-Catholic movement; became vicar of Hursley 1836. D. at Bournemouth Mar. 29, 1866. In 1827 he published *The Christian Year*, a volume of sacred poetry which attained a wide popularity, and upon which his fame chiefly rests; also published *Prelectiones Academicæ* (1844), *Lyca Iamæctium* (1847), *The Psalms in English Verse*, *De Poetion Vi Medica* (1847), some volumes of sermons, and many tracts and pamphlets upon ecclesiastical subjects. (See *Memoirs of Rev. John Keble*, by Sir John T. Coleridge, 1869.)

**Keesketmet'**, town of Hungary, the capital of the district of Pesth-Solt. The rearing of cattle and horses is the chief pursuit of the inhabitants, and the annual cattle-fair held in this city is the most important in the whole country. Pop. 42,089.

**Kedge**, a small anchor used in hauling a vessel from one mooring to another, in pulling off a ship that is aground, etc. Kedges are also useful in preventing ships from fouling with their bower anchor.

**Ked'geri**, or **Kij'uri**, town of British India, in the presidency of Bengal, at the mouth of the Hooghly. As this river forms the main entrance into the Ganges and the road to Calcutta, the town has acquired considerable notoriety, and the first telegraph line in India was laid between it and Calcutta, a distance of 40 miles.

**Kee'chies**, a tribe of Indians residing on the Washata River in the Indian Territory. They are related to the Pawnees and Wichitas, and formerly lived on Trinity River in Texas, but were removed in 1829. They number little over 100.



**Keel**, in shipbuilding, is the beam which passes under the ship's hull from stem to stern. It is usually made up of several heavy timbers bolted together lengthwise. The ship's ribs, stern, and stern post spring from the keel, which is external to the hull, as the keelson is internal. Below the keel one or more *false keels* are bolted on.

**Kee'ler**, tp. of Van Buren co., Mich. Pop. 1303.

**Keel'hauling**, a punishment formerly employed in the Dutch and other navies. The offender, with suitable ropes attached, was dropped from one yard-arm into the sea, hauled beneath the keel of the ship, and then drawn up to the opposite yard-arm. The culprit was heavily weighted with lead or iron.

**Keel'son**, or **Kelson**, the beam inside a ship's hull which runs fore and aft directly over the keel. It is made up of timbers scarped, notched, and bolted into one, and the keelson is itself securely bolted to the keel.

**Keen** (WILLIAM WILLIAMS), M. D., b. Jan. 19, 1837, in Philadelphia; entered Brown University in 1859 and Jefferson Medical College in 1862; studied 1864 at Paris, Vienna, and Berlin; returned in 1866, and began practising in Philadelphia; became proprietor of the Philadelphia School of Anatomy, which he conducted with great success; lectured on anatomy at this institution and on pathological anatomy at Jefferson Medical College, and was appointed trustee of Brown University and Crozer Theological Seminary, and surgeon to St. Mary's Hospital, Philadelphia. His principal writings are—*On Reflex Paralysis* (1864), *Gunshot Wounds* (1864), *Practical Anatomy* (1870), *Sketch of the Early History of Practical Anatomy* (1874), *Diagrams of the Nerves of the Human Body* (1872), *Clinical Charts of the Human Body* (1872), *Gunshot Wound of the Brain* (1871), *Anat., Pathol., and Surg. Uses of Chloral* (1874), etc.

**Keene**, tp. of Adams co., Ill. Pop. 1283.

**Keene**, post-tp. of Ionia co., Mich. Pop. 1271.

**Keene**, city, cap. of Cheshire co., N. H., 92 miles N. W. of Boston and 65 miles N. of Springfield, Mass., on a wide plain surrounded by lofty hills, has broad thoroughfares shaded by stately elms, and claims to be the most beautiful inland city of New England. The public buildings consist of a fine court-house, city hall, high-school building, and 7 well-built churches. Central Square, from which radiate the five principal avenues, is planted with trees, and contains a soldiers' monument erected at a cost of nearly \$20,000. The city is well supplied with water brought by an aqueduct from Silver Lake, 3 miles distant. There are 2 weekly newspapers, a large public library, a gymnasium, 3 national and 2 savings banks, 3 hotels, 5 Masonic lodges, 1 lodge and 1 encampment of Odd Fellows. Two railroads centre here; a third (the Manchester and Keene) is about to be built. The city is noted for excellent public schools and for its business prosperity and enterprise. The manufactures are large; there are 3 steam-mills manufacturing furniture, sash and blinds, and machinery. The Cheshire R. R. employs several hundred men in the manufacture of locomotives and cars. There are 3 steam-tanneries, an iron-foundry, a flannel-mill, gas-works, carriage and sleigh manufactories, and granite-quarries affording employment to about 400 men. The valuation of taxable property in Apr., 1874, was \$4,500,000. Pop. 5971. THOS. C. RAND, ED. "N. H. SENTINEL."

**Keene**, post-v. and tp. of Essex co., N. Y. The township contains Mt. Marcy, the highest of the Adirondacks, and has iron-mines and manufactures of iron. Pop. 720.

**Keene**, post-tp. of Coshocton co., O. Pop. 787.

**Keene** (LAURA), b. in England in 1820; came to the U. S. as an actress in 1852, and had great success in light comedy, as also in Australia in 1854. Returning to America in 1855, she became manager of the Varieties Theatre in New York, and soon afterward inaugurated another theatre, long known by her name, now the Olympic. Here she introduced in 1858 the very successful comedy of *Our American Cousin*. She appeared on the stage with success in the principal American cities until shortly before her death, which took place at Montclair, N. J., Nov. 4, 1873. It was at one of her representations of *Our American Cousin* that President Lincoln was assassinated in 1865.

**Keen'er**, tp. of Jasper co., Ind. Pop. 71.

**Keener** (DUNCAN F.), b. in Maryland or Virginia; removed to Louisiana; was a member from that State to the Confederate Congress in 1861, and to the end of the war he held a high position throughout. He was brief, practical, able, and eloquent in debate. Since the war he has taken no active part in politics, but exerted a great influence in preventing a collision between the Federal troops under Gen. Emory and the State troops under the McEnery officials in New Orleans in Sept., 1874.

**Keener** (JOHN C.), D. D., b. in Baltimore, Md., 1819;

educated at Wesleyan Academy, Wilbraham, Mass., and at Wesleyan University, Middletown, Conn.; was editor of the *New Orleans Christian Advocate* (M. E. Church, South) from 1865 to 1870, and was elected bishop in that year. In 1873 he visited the Southern Methodist missions in Mexico, which were at that time entrusted to his superintendence. He is author of *Post Oak Circuit*.

**Keese'ville**, post-v. in Chesterfield tp., Essex co., and Au Sable tp., Clinton co., N. Y., lying on both sides of the Au Sable River, which is the boundary between those two counties, 4 miles W. of Lake Champlain and 150 miles N. of Albany. It has 6 churches (2 Catholic), a graded school, a national bank, a public hall, and a weekly newspaper. Iron and nail works constitute the principal industry. The water-power is excellent. A woollen-factory was erected here in 1813, and a rolling-mill in 1816. Three bridges connect the two parts of the village, one being an iron suspension bridge. Pop. about 3000.

W. LANSING, ED. "ESSEX CO. REPUBLICAN."

**Keff**, or **El-Keff**, the ancient *Sicca Veneria*, town of Tunis, near the Algerian frontier, is beautifully situated among fertile and well-cultivated surroundings, and has a strong citadel. Pop. 6000.

**Keigh'ley**, town of England, in the county of Yorkshire, on the Aire. Its manufactures of woollen and worsted goods are very considerable. Pop. 15,005.

**Keight'ley** (THOMAS), b. in Dublin in Oct., 1789; graduated at Trinity College in that city in 1808, and devoted himself to the production of a series of classical textbooks and works on history and mythology, by which he became widely known in England and America. His best works were—*Outlines of History, Mythology of Ancient Greece and Italy, History of India, and Shakespeare Expositor*. He received a pension from the English government in his later years, and d. at Erith, Kent, Dec., 1872.

**Keil** (KARL AUGUST GOTTLIEB), b. at Grossenhain, near Dresden, Saxony, Apr. 23, 1754; was educated in theology at the University of Leipsic, in which he became tutor, lecturer on exegesis and hermeneutics, professor extraordinary of philosophy (1785), of theology (1788), and full or ordinary professor in 1793. His writings in German and Latin are especially valuable upon the subject of hermeneutics, in which he is recognized as a master. His *Manual of Hermeneutics* appeared in 1810; his miscellaneous Latin writings were published after his death by Goldhorn, under the title *Opuscula Academica, etc.* (Leipsic, 2 vols., 1821). D. at Leipsic Apr. 22, 1818.

**Keim** (THEOPHIL), D. D., b. at Stuttgart, Württemberg, Dec. 17, 1825; studied at the University of Tübingen (1843-48), devoting himself, under the guidance of Baur, to philosophy, biblical criticism, and ecclesiastical history; was tutor in those branches at Bonn (1850) and at Tübingen (1851-55); was ordained deacon (1857) and archdeacon (1859) at Esslingen, and became in 1860 professor of theology at the University of Zurich. He wrote volumes upon the history of the Reformation in several parts of Germany; in Ulm (1851), in Swabia until the Diet of Augsburg (1855), in Esslingen (1860), *Andreas Blarer, the Swabian Reformer* (1860), *The Human Development of Jesus Christ* (1861), *The Historical Words of Jesus* (1864), and recast the latter two works into *The Historical Christ* (1866), which at once gave him a wide reputation. He then devoted himself to a more biographical work upon the same subject, called *History of Jesus of Nazara*, of which two volumes have appeared (1867 and 1871), and have been translated into English (London, 1873). D. Nov. 17, 1878.

**Keim** (WILLIAM HIGH), b. at Reading, Pa., June 25, 1813; educated at Mt. Airy Military Academy; was chosen Representative in Congress in 1858, and State surveyor in 1859; served as major-general of Pennsylvania volunteers in Patterson's campaign on the upper Potomac (1861), and as brigadier-general U. S. volunteers in McClellan's army. D. at Harrisburg, Pa., May 18, 1862.

**Keim'er** (SAMUEL), a printer in Philadelphia in the early part of the eighteenth century, celebrated in the *Autobiography of Franklin*, who was employed in his office. Little is known of Keimer beyond these incidental notices; the place and time of his birth and death are alike undiscoverable. Franklin states that he was originally "one of the French prophets, and could act their enthusiastic agitation," and gives an amusing account of his projects for founding a new religion, the cardinal doctrines of which were never disclosed. Keimer went to Barbadoes, where in 1734 he was printing the *Gazette*, and in 1741 a work of his entitled *Caribbeana* was printed in London.

**Kei River, Great**, separates the formerly so-called British Kaffraria, which now forms a part of the Cape Colony, from Kaffraria proper, and empties itself into the



Indian Ocean. Like all rivers of Kaffraria, it is unfit for navigation, its bed being very rocky and irregular.

**Keiskam'ma**, a river in the Cape Colony, rises in Amatola, and flows into the Indian Ocean after a course of 80 miles.

**Keith**, new county in S. W. Nebraska, adjoining Colorado, intersected by the two forks of the Platte, and traversed by the Union Pacific R. R. Area, 2016 square miles.

**Keith** (GEORGE), b. at Aberdeen, Scotland, about 1640; was educated for the Presbyterian ministry at the University of Aberdeen; adopted Quaker principles about 1664, and in 1675 was associated with Robert Barclay in defending that sect in public discussions with the university students. He was also associated with Penn in similar discussions with the Baptists in London. In 1682 he took charge of a Quaker school at Edmonton, and was imprisoned in Newgate for refusing to take an oath and preaching without license 1684. Soon afterward he came to America; became surveyor-general of East Jersey, and in 1689 took charge of a Quaker school in Philadelphia. Next year he went to New England as a Quaker preacher, and was engaged in disputes with Increase and Cotton Mather. Returning to Philadelphia, he became involved in controversy with his own sect, chiefly about the atonement, and ultimately came into sharp collision with William Penn himself, whom he charged with deism, and by whom he was denounced as an apostate. Keith thereupon founded a sect known as Keithians, Christian Quakers, or Baptist Quakers, but ultimately entered the Church of England, and was employed as a missionary for the conversion of his former fellow-believers. From 1702 to 1705 he made a tour of the Northern colonies, and converted many hundreds of Quakers, who were baptized by him. Returning to England in 1706, he was appointed rector of Edburton in Sussex, where he d. about 1715. He was a man of deep learning, well versed in Platonism, and wrote many theological tracts both for and against Quakerism; also two works of travels in America (1699 and 1705) and a *New Theory of the Longitude* (1709). (See Janney's *History of the Friends*, Philadelphia, 1867, and Watts's *Bibliotheca Britannica*.)

**Keith** (GEORGE), b. at Kincardine, Scotland, in 1635, and received a military education. After the death of Queen Anne he espoused the cause of the Pretender, was outlawed, and his estates were confiscated. For several years he lived in Rome with the Pretender, then in Spain, but entered at last into the service of Frederick II., whose friend he became, and who employed him in several responsible positions—as ambassador to Paris 1751, as governor of Neufchatel 1754, etc. Through the king's mediation his estates were restored to him, but he continued to reside at Potsdam, where he d. May 25, 1778.

**Keith** (GEORGE KEITH ELPHINSTONE), ADMIRAL, VISCOUNT, b. at Elphinstone, Scotland, Jan. 12, 1746; entered the navy in boyhood, and, as post-captain commanding the frigate *Persus*, took part in the actions of Bunker Hill (1775) and Fort Mifflin on the Delaware (1777). In 1793 he served with the Mediterranean squadron under Lord Hood at Toulon, and as admiral was despatched in 1795 to operate against the Dutch colonies. He took possession of Cape Colony in South Africa, Ceylon, Cochin, Malacca, and the Molucca Islands, and in Aug., 1796, captured a Dutch squadron near Saldanha Bay, West Africa. For these brilliant services he was created an Irish peer, as Baron Keith of Stonehaven Marischal. In Mar., 1800, he blockaded Masséna in Genoa, co-operating with the Austrians, who besieged and took that city. He co-operated with Abercrombie in the Egyptian expedition, and in 1815 commanded the Channel fleet, which prevented the escape of Napoleon I., and brought about his surrender to Capt. Maitland of the *Bellerophon*. In 1814 he was created Viscount Keith of the peerage of the United Kingdom. D. at Tullialan, Perthshire, Scotland, Mar. 10, 1823.

**Keith** (JAMES FRANCIS EDWARD), brother of George (1685-1778), b. at Kincardine, Scotland, June 11, 1696; took part, like his brother, in the rebellion against the Hanoverian house; was outlawed, and lived for several years at Paris and in Spain. In 1734 he entered the Russian service, and distinguished himself very much in the wars against Turkey and Sweden. In 1743 he was made a field-marshal, but in 1747 he left Russia, went to Berlin, and was one of Frederick's great generals. He was a man of great military talent and much appreciated by the king. He fell at Hochkirch Oct. 14, 1758.

**Keith** (Sir WILLIAM), b. in the N. of Scotland about 1680; became surveyor-general of customs in America for the Southern colonies; was governor of Pennsylvania for the proprietors 1717-26; was fond of intrigue, vain, and treacherous, but the colony prospered under his administration. Author of a *History of Virginia* (1738) and a

volume of tracts and papers (1749). D. in London Nov. 17, 1749.

**Keithsburg**, post-v. and tp. of Mercer co., Ill. It is on the Mississippi River and the Chicago Burlington and Quincy R. R., and has a national bank and 1 weekly newspaper. Pop. of v. 1179; of tp. 1579.

**Keitt** (LAWRENCE M.), b. in Orangeburg district, S. C., Oct. 4, 1824; graduated at the State College, Columbia, in 1843; studied law, and was admitted to practice in 1845; was elected to the State legislature in 1848, and to Congress in 1853, which position he held until he resigned it in the winter of 1860-61, after South Carolina had passed her ordinance of secession. He was then elected to the Confederate Congress, which met in Montgomery on Feb. 4, 1861; in this body he acted a conspicuous part in the formation of the provisional and permanent constitutions for the Confederate States. He subsequently entered the military service with a colonel's commission, and gallantly fell at the head of his regiment in repelling the assault at Cold Harbor on the 3d of June, 1864. As an orator and a popular declaimer Mr. Keitt held a high position. A. H. STEPHENS.

**Kelat'**, the cap. of Beloochistan, in lat. 28° 52' N. and lon. 66° 33' E., situated in a narrow valley 6000 feet above the sea. It is surrounded with walls, and has some importance as a fortress, but it is ill built and dirty, and its trade and manufactures are of very little consequence. Pop. 12,000.

**Kellermann'** (FRANÇOIS CHRISTOPHE), b. at Strasbourg 1735; d. in 1820; was raised slowly, under the old monarchy, to the rank of brigadier-general, when the Revolution of 1789 broke out, and suddenly made general-in-chief. He won the famous battle of Valmy in 1792 against the allies, who were marching on Paris. Kellermann, being a moderate republican, was arrested in 1793, and remained in prison until the Thermidor reactionary revolution in 1794. He commanded in 1795, with success, the armies of the Alps and of Italy, and Napoleon made him duke of Valmy and marshal of France. Kellermann was a soldier, not a politician; he did not stick, therefore, by Napoleon, any more than he had done by the radical republicans who had been the first to discover and employ his rare military genius. On the fall of the empire in 1815, he rallied to the Bourbons, who confirmed his title of duke and made him a peer of France. FELIX AUBIGNÉ.

**Kellermann** (FRANÇOIS ETIENNE), son of F. C. Kellermann, b. at Metz in 1776; received his military education under his father; was aide-de-camp to Napoleon in 1796, and brigadier-general in 1799. He distinguished himself very much in the battles of Marengo, Austerlitz, and Waterloo. After the restoration of the Bourbons he withdrew from the service. D. June 2, 1855.

**Kelley**, tp. of Ripley co., Mo. Pop. 240.

**Kelley** (WILLIAM DARRAH), b. in Philadelphia Apr. 12, 1814, a grandson of Maj. John Kelley, a Revolutionary officer of New Jersey. He was (1835-39) a jeweller of Boston, Mass.; was admitted to the Philadelphia bar in 1841; became a leading Democrat; was attorney-general of Pennsylvania 1845-46; a judge of the common pleas court 1846-56; and in 1854 became a republican; was a prominent member of Congress 1861-74, and has taken a high rank as an effective public speaker.

**Kelley's Island**, one of the Wine Islands of Lake Erie, belongs to Erie co., O., and has flourishing vineyards, producing large quantities of wine and grapes. Pop. of Kelley's Island tp. 838.

**Kellogg**, post-v. and tp. of Jasper co., Ia., on the Chicago Rock Island and Pacific R.R., 45 miles E. of Des Moines. It has 3 churches, 1 English newspaper (weekly), large pump-factory, and the usual number of stores and shops. It has good water-power and numerous branches of industry. Pop. of tp. 1507.

S. C. MITCHELL, Ed. "NEWS."

**Kellogg** (CLARA LOUISE), b. in Sumterville, S. C., July, 1842, of Northern parentage and ancestry. Her father was a man of remarkable ingenuity in mechanical invention; her mother had unusual gifts as a musician, a talent with the pencil, and even skill in the cutting of camcos. Clara was their only child. A year after her birth the family removed to New Haven, Conn., and resided there till 1856, when they went to New York. Here the young girl's musical genius was appreciated, and by help of a friend her musical education was begun under the direction of Millet, Rivarde, Manzochi, and Albites, all teachers of the first rank in their time. She studied with intense industry, ambition, and passion for art, devoting herself wholly to her pursuit, learning along with music the French and Italian languages. Her vocal, piano, and chamber music was acquired in New York, the first person she received a London from Arditi being scarcely worthy of mention. A



private presentation made so favorable an impression on her auditors that she was brought out in the character of Gilda (*Ripollito*) at the Academy of Music in the season of 1861-62, and sang that season ten or twelve times. In 1867 she appeared in London at Her Majesty's Theatre under the management of Mr. Mapleson, and was immediately engaged for the following or summer season. Returning to the U. S. in 1868, she made a brilliant tour through the States with Mr. Strakosch, gaining new laurels, till 1872, when she again accepted a London engagement, and sang at Drury Lane with Nilsson under Mapleson's management. Her success was even more signal than before; she sang also at a "private" concert given by the queen at Buckingham Palace. On her return to the U. S. she resumed her professional career, singing in Italian opera till Nilsson and Lucre absorbed the attention of the fashionable world of music; then, about two years ago, she determined to establish in America on a popular basis the English opera. Into this enterprise she threw herself with all her accustomed energy, aided by a deep confidence in the musical appreciation and enthusiasm of the American people, assuming the direction of the pieces, the training of the singers, the translation of the *libretti* from French or Italian, and in general the conduct of the business. Her labors have been severe (in the winter of 1874-75 she sang no fewer than 125 nights), but they have been crowned with complete success. In the Western cities her popularity is immense. She has fairly domesticated opera there. Miss Kellogg has a fine musical organization, great capacity for labor, a retentive memory (she is perfectly familiar with thirty operas—not with her own part only, but with all the parts and with the instrumentation), severe conscientiousness as an artist, an ardent enthusiasm, and a voice of great compass and purity. To these gifts she unites an uncommon talent for business. She is, moreover, much respected as a woman for her blameless life, the perfect decorum of her behavior, and the goodness of her heart.

O. B. FROTHINGHAM.

**Kellogg** (EDWARD N.), U. S. N., b. Dec. 8, 1842, in Maine; graduated at the Naval Academy in 1861; became a Lieutenant in 1864, a lieutenant-commander in 1866; served on board the *Oncida* at the battle of Mobile Bay, Aug. 5, 1864, and was commended for skill and courage. D. of yellow fever at Pensacola in the fall of 1874.

FONHALL A. PARKER.

**Kellogg** (FRANCIS W.), b. at Worthington, Hampshire co., Mass., May 30, 1810; removed at an early age to Michigan, and became a lumber-merchant. After serving in the legislature he was elected a Representative in Congress in 1858, re-elected in 1860 and 1862, and appointed in 1865 collector of internal revenue for the district of Alabama; was returned to Congress from Alabama in 1868.

**Kellogg** (GEORGE), the father of Clara Louise Kellogg, b. June 19, 1812, at New Hartford, Conn.; graduated at Wesleyan University, 1837; was principal of Sumter Academy, Sumterville, S. C., 1838-41, but is chiefly distinguished as an inventor and manufacturer. Among his inventions are a jack-chain machine, capable of making a yard of chain a minute; a dovetailing machine; improved surgical implements; type-distributing and other machines. Has introduced into England American machinery for making hooks and eyes, hats, etc. Residence, Cold Spring, N. Y.

**Kellogg** (STEPHEN WRIGHT), A. M., b. at Shelburne, Mass., Apr. 5, 1822; graduated at Yale in 1846; became a lawyer of Waterbury, Conn.; clerk of the State senate 1851; was in both houses of the legislature; judge of probate 1854-60; delegate to the Chicago Republican conventions of 1860 and 1868; elected in 1871 as Representative in Congress, and re-elected in 1873, but defeated at the election of Apr., 1875.

**Kellogg** (WILLIAM), b. in Ashtabula co., O., July 8, 1814; removed to Illinois in 1837; studied law; acquired an extensive practice, chiefly in respect to land titles; was member of the State legislature 1849-50; judge of the circuit court for three years; elected to Congress in 1856, re-elected in 1858 and 1860; appointed in 1864 minister resident in Guatemala, and in 1866 chief-justice of Nebraska.

**Kellogg** (WILLIAM PITT), b. in Vermont in 1830; removed in 1848 to Illinois; became a lawyer in 1854; was in 1856 and 1860 a Presidential elector; chief-justice of Nebraska in 1861; served as a colonel of volunteer cavalry in the civil war, and became a brigadier-general; was collector of the port of New Orleans; U. S. Senator from Louisiana 1868-71; was in 1872 declared elected governor of Louisiana for the term ending in 1877, which office he still (1875) holds, after the failure of an insurrectionary attempt (Sept., 1874) to displace him in favor of the Democratic candidate—a movement which resulted in Federal military interference, a Congressional investigation (1875), and a finally accepted compromise between the parties.

**Kel'loway Rock, The**, an arenaceous limestone underlying the Oxford Clay in England, and apparently the lowest member of the Middle Oolite. (See JURASSIC.) The term Callovien was applied by D'Orbigny to a geological horizon corresponding to the Kelloway Rock.

**Kel'ly**, tp. of Warren co., Ill. Pop. 1295.

**Kelly**, tp. of Cooper co., Mo. Pop. 1372.

**Kelly**, tp. of Union co., Pa., contains Kelly Point P. O. and West Milton P. O. Pop. 942.

**Kelly** (ROBERT), L.L.D., b. Dec. 10, 1808, in New York City; graduated at Columbia College 1826, entering and leaving at the head of his class. He then joined his brothers John and William as an active partner in the house of J. & W. Kelly & Co., retiring in 1837 to devote himself to the cause of education and to public affairs. He was regarded as the founder of the Free Academy; was president of the board of education and a regent of the University of the State; also a trustee of New York and Madison universities, and one of the founders of the University of Rochester, presiding over its board. He was identified for many years with the House of Refuge, the president of its board of managers, and actively engaged in many other benevolent, literary, and financial associations in his native city. He was a scholar of rare culture and master of many languages. He held the office of chamberlain of the city at the time of his death, Apr. 27, 1856.

**Kelly** (WILLIAM), b. in New York City Feb. 4, 1807. His father, Robert Kelly, d. 1825, leaving three sons, John, William, and Robert, all minors. The two first, the "boy-merchants," as they were called, aided by Robert after leaving college, ably conducted the extensive house until 1837, when, John having d. in 1836, the other brothers retired and gave themselves to promoting charity and education. In 1842, William purchased the estate known as "Ellerslie," near Rhinebeck, and became a leading farmer. President of New York State Agricultural Society 1854; one of the founders of the State Agricultural College at Ovid, president of its board. He was many years president of the trustees of Rochester University, and of the board of Vassar College from its foundation till his death; president of the Baptist educational commission, and active in many other charitable and religious enterprises; a managing director in railroad, steamboat, banking, and trust companies, and working president of several iron companies. A New York State senator 1855-56, and Democratic candidate for governor in 1860. A man of great benevolence, widely but silently diffused. D. at Torquay, Eng., Jan. 14, 1872.

**Kelly's Mills**, tp. of Madison co., Ala. Pop. 1525.

**Ke'loid**, more correctly **Che'loid** [Gr. *χηλῶν*, a "crab's claw," from some fancied resemblance], a name applied to two apparently distinct skin diseases: (1) A sort of fibroid tumor of the true skin, often appearing on the scar of a cut or burn. It is almost certain to return after excision, is not malignant, and is thus far not curable. This is the *keloid* of Alibert. (2) A much more general disease, sometimes spreading over the whole body. Congested tubercles, generally originating near the sternum, advance gradually over the body, are very irritable, and cause trouble by itching, especially in warm weather. Cold applications and tonic treatment palliate but do not cure it. Negroes are more subject to this disease than white persons.

**Kelp**, **Barilla**, or **Varec**, names applied to the ashes or products of incineration of seaweeds. These products were of far more importance to former generations than at present, having once been the sole source of the valuable alkali soda, for making soap and glass, previous to the grand discovery of the French chemist Leblanc, of manufacturing soda from common salt. At present the chief interest that attaches to kelp is as the principal material from which the element *iodine* is obtained. The name for seaweed ashes used in France is *varec*. Weeds are also used, particularly for manufacturing the variety called *barilla*, in Sicily, Spain, and some other countries, which grow on the sea-shore in saline soils, these plants being cultivated in those countries for the purpose, and the ashes used in making soap, even at the present day, though apparently a very poor material for the purpose. Kelp and varec, on the other hand, are made exclusively from the *Algae* and *Fuci*, which grow on rocks in great abundance, between high and low water mark, on the coasts of Ireland, Scotland, Wales, the Orkney Islands and the Hebrides, and on the coast of Brittany.

The seaweeds are dried, and burned to ash in rough stone or brick ovens built on the shore. The ash fuses into a solid mass, which is broken up and sent to market. Twenty-four tons of seaweeds are necessary to produce one ton of kelp. This substance, produced from actual marine plants,



is much poorer in soda-salts (except chloride of sodium) than the barilla variety, but contains more potash-salts. The composition of these products varies within wide limits, and the few analyses quoted give scarcely a general idea, being confined to a few special cases.

*Saucesed Ashes, Kelp: without Charcoal and Carbonic Acid.*

Constituents.		<i>Laminaria saccharosa</i> , North Sea.	<i>Fucus digitatus</i> , Clyde.	<i>Fucus vesiculosus</i> , North Sea.	<i>Fucus vesiculosus</i> , Clyde.
Potash	ascarbonates.	21.77	22.40	17.68	15.23
Soda	the CO <sub>2</sub> omitted.	1.84	8.29	5.78	11.16
Lime		6.50	8.79	4.71	8.15
Magnesia		8.13	7.44	6.89	7.16
Chloride of sodium		33.72	28.39	35.38	25.10
Chloride of potassium					
Iodide of sodium		4.70	3.62	.43	.37
Phosphate of lime		8.41	5.63	5.44	2.99
Phosphate of iron		.75			
Oxide of iron			.62		.33
Oxide of manganese					
Sulphuric acid		10.60	13.26	23.71	28.16
Silica		.58	1.56	.28	1.35
		100.00	100.00	100.00	100.00
Percentage of ash in the weed, dried at 212° F....		9.78	20.40	20.56	16.39

*French and Spanish Barilla, called also Varec.*

	Alicante.	Cherbourg.	Spain.
Sulphate of potash	.....	22.19	15.85
Chloride of potassium	.....	16.00	10.55
Chloride of sodium	65.00	45.78	68.35
Carbonate of soda	2.00	9.53	traces.
Sulphate of lime	.....	.....	1.10
Insoluble	3.00	1.50	
Iodine compounds	.....	traces.	
Sulphate of soda	30.00		
Water	.....	5.00	4.00
	100.00	100.00	99.85

(For the preparation from kelp of the iodine of commerce, see under IODINE.) H. WURTZ.

**Kel'sey**, tp. of El Dorado co., Cal. Pop. 315.

**Kel'so**, post-tp. of Dearborn co., Ind. Pop. 1908.

**Kelso**, tp. of Sibley co., Minn. Pop. 442.

**Kelso**, tp. of Scott co., Mo. Pop. 1000.

**Kel'ton**, post-v. of Box Elder co., Ut., on the Central Pacific R. R., 89 miles W. of Ogden.

**Kem'ble**, a name distinguished from first to last in the records of the English stage. The founder of the family, Roger, himself an actor and theatrical manager, b. in Hereford, Eng., Mar. 1, 1721, d. in 1802, had twelve children, the eldest of whom, Sarah, married an actor named Siddons. (See Mrs. Siddons.) The oldest son was JOHN PHILIP, b. in Prescot, Lancashire, Eng., Feb. 1, 1757. This was the "great Kemble." He was educated partly at the Roman Catholic seminary of Sedgely Park in Staffordshire, and afterwards at the English College at Douay in France; returned to England at the age of nineteen, and made his first appearance at Wolverhampton Jan. 8, 1776, in the character of Theodosius; made his first appearance in London at Drury Lane, in Sept., 1783, as Hamlet; became manager of that theatre in 1790; in 1803 bought a sixth share in Covent Garden Theatre for \$24,000, and became manager of it. The theatre was burned in 1808, but immediately rebuilt. An increase in the prices of admission to the new house (from six to seven shillings for the boxes, and from three to four shillings for the pit) caused the O. P. (old price) riots, which lasted for some months and menaced the ruin of the establishment. At this time Mr. Kemble was grossly insulted and abused. In 1817 he took leave of the London stage, retired soon afterward to the S. of France, and finally took up his residence at Lausanne, Switzerland, where he d. Feb. 26, 1824. Mr. Kemble's style of acting was more suited to the lofty and majestic than to the pathetic and tender. In parts like Cato, Coriolanus, Rollo, Macbeth, Hamlet, Lear, King John, he was supreme. His person was of heroic mould, his action was stately, his declamation noble and true. In moments of passion he rose to great power. But his form lacked suppleness, his limbs were rigid, his voice was husky and unmusical, and a constitutional asthma gave a labored character to his utterance. As an artist he had not "the art to conceal his art;" as a scholar he was close and exact; as a companion he was genial; as a man he was held in high esteem. His *Life* was written by his friend, Mr. Borden, in 2 vols., 1825.—GEORGE STEPHEN, brother of the foregoing, b. in Kingston, Herefordshire, May 3, 1758; made his debut in London at Covent Garden in 1783, and was theatrical manager in London, Edinburgh, and Glasgow. D. June 3, 1822.—ELIZA-

BETH (Mrs. Whitlock), sister of the above, b. in Warrington, Lancashire, Apr. 2, 1761; d. Feb. 27, 1836; made her first appearance at Drury Lane in 1783; came to the U. S. in 1792, and played with great success. She performed several times before George Washington. In 1807 she returned to England and retired from the stage. In person and voice she was said strikingly to resemble Mrs. Siddons. CHARLES, eleventh child of Roger, b. at Brecon, S. Wales, Nov. 27, 1775; d. in London Nov. 12, 1854; was educated at Douay; made his first appearance at Drury Lane in 1794, playing Malcolm, with his brother John as Macbeth, and his sister, Mrs. Siddons. He was an excellent comedian, appearing at his best in characters like Benedick, Petruchio, Charles Surface, very creditably in Cassio, Mark Antony, Edgar, but failing in deeply tragic parts. "A first-rate actor in second-rate parts." He adapted German and French plays for the London stage, and in late life was appointed examiner of plays. He visited the U. S. in 1832 with his daughter, Fanny Kemble, and retired from the profession in 1840.—FRANCES ANNE (commonly called "Fanny"), daughter of Charles, b. in London in 1811. She possessed the family talent for the stage, but not the family passion for it. Her theatrical career was suddenly decided on to relieve the financial embarrassments of her father, and in six weeks after her mind was made up she came out at Covent Garden in Oct., 1829, as Juliet to her father's Romeo. Her success was marked in characters like Juliet, Portia, Bianca, Belvidera, Lady Teazle, Camiola, and Julia in *The Hunchback*. In 1832 she came to the U. S. with her father, and met with enthusiastic applause. In 1834 she married Mr. Pierce Butler, a Philadelphia gentleman of wealth, and retired from the stage. The marriage being unhappy, she left her husband and resided in Lenox, Berkshire co., Mass. In 1846-47 she passed a year in Europe, and on her return, having obtained a divorce in the courts of Pennsylvania, resumed her maiden name. Since 1848 Mrs. Kemble has been known as a reader of Shakspeare in the chief cities of the U. S. and in Great Britain. In 1860 she left America, and from that time her residence has been partly in England and partly in the U. S., with two intervals of continental travel. At present she resides near Philadelphia, wholly withdrawn from public life. Mrs. Kemble is the author of several books in prose and verse: *Francis the First*, a play, written when she was seventeen years old, and performed in London; *A Journal of a Residence in America* (2 vols., London and Philadelphia, 1835); *The Star of Seville*, a play; *A Year of Consolation*, a record of her visit to Italy in 1846; *Residence on a Georgia Plantation* (1863), and a volume of poems.—ADELAIDE, younger sister of Frances, b. in London in 1820. Her talents, both for the dramatic and lyric stage, were brilliant, but her marriage in 1843 to Mr. Edward Sartoris prevented her pursuing a career which, beginning in Venice, had given continued promise of success in Trieste, Milan, Padua, Bologna, and was culminating in London, where she sang in *Norma*, *Figaro*, *Sonnambula*, *Semiramide*, and other operas. She published in 1867 *A Week in a French Country-house*.—Her son, ALGERNON CHARLES, married the daughter of Pres. Grant in May, 1874. O. B. FROTHINGHAM.

**Kemble** (GOVERNOUR), b. in New York City Jan. 25, 1786, a son of Peter Kemble, his mother being Gertrude Gouverneur, descended from Jacob Leisler of colonial history, and whose daughter was the wife of Abram Gouverneur; graduated at Columbia College in 1803; became interested in commercial pursuits, and saw much of the leading countries of Europe, then agitated by the wars of Napoleon; subsequently visited the Mediterranean ports, and transacted business for the U. S. in connection with the supply of the squadron at the time of the war with Algiers about 1815; established in 1817 the West Point Foundry at Cold Spring; was member of Congress 1827-31, and of the constitutional convention of New York in 1846; was one of the first and most active advocates of the Hamilton River R. R., and an early and efficient friend of the Panama R. R.; to his other qualities he united a love of art, manifested by a rich collection and a kindly regard for artists; was one of the last nine survivors of the Tontine Association of New York, organized in 1790, and at whose death (Sept. 16, 1875) the accumulated profits were divided.

**Kemble** (JOHN MITCHELL). See APPENDIX.

**Kemp** (JAMES), D. D., b. in Aberdeenshire, Scotland, in 1764; graduated at Marischal College, Aberdeen, in 1786; came to the U. S. in 1787, took orders in the Protestant Episcopal Church in 1789; held various rectories in Maryland, in which diocese he became in 1814 a suffragan, and in 1816 the diocesan bishop. He was 1816-27 provost of the State University. D. in Baltimore Oct. 28, 1827, in consequence of an accidental injury.



**Kemp** (JOHN), CARDINAL, b. at Wye, Kent, England, in 1280; was ambassador to Aragon in 1315; bishop of Rochester in 1419, of Chichester in 1421, of London in November of the same year; chancellor and archbishop of York in 1426; resigned the Great Seal in 1432; joint ambassador to France, and made cardinal-priest in 1439; endowed the College of Wye in 1447; again chancellor in 1450; made cardinal bishop and archbishop of Canterbury by papal bull in 1452, and d. Mar. 22, 1454.

**Kempelen, von** (WOLFGANG), BARON, b. at Presburg, Hungary, Jan. 23, 1734, was the inventor of a so-called "automaton chess-player," made for the amusement of the empress Maria Theresa (1769), which was exhibited in Paris in 1784, and afterwards in England and the U. S. It is not properly an automaton, but an ingenious contrivance for concealing a living player, as is fully explained in *Tomlinson's Amusements in Chess* (1845), but its mechanical ingenuity is great. Baron Kempelen also invented in 1778 an automaton speaking human figure, which he explained in an illustrated work, *Le mécanisme de la parole* (1791). He filled several political posts at the Austrian court, published poems and dramatic pieces, and d. at Vienna Mar. 26, 1804.

**Kempfen**, town of Prussia, in the province of Posen, on the Schummei-wasser, has manufactures of soap, tobacco, and woollens, and an active trade in horses and cattle. Pop. 5822.

**Kempfenfelt** (RICHARD), ADMIRAL, b. at Westminster, England, in 1720; became rear-admiral in 1779; captured a French convoy on its way to the West Indies in 1781; drowned at Spithead by the sinking of his vessel, the Royal George, with nearly 900 men, Aug. 29, 1782.

**Kemper**, county of Mississippi, bounded on the E. by Alabama. Area, 775 square miles. It is fertile and somewhat diversified with hills. Cotton, live-stock, and corn are the staple products. Cap. De Kalb. Pop. 12,920.

**Kemper** (JACKSON), D. D., LL.D., CANTAB., b. in Pleasant Valley, Dutchess co., N. Y., Dec. 24, 1789, and graduated at Columbia College in 1809. In 1811 he took deacon's orders in the Protestant Episcopal Church, and in 1812 was ordained a priest. After holding rectorships in Philadelphia for twenty years, and one for some time in Norwalk, Conn., he was made missionary bishop of Indiana and Missouri, and was afterwards transferred to Iowa, Wisconsin, etc. In 1854 he became bishop of Wisconsin. D. at Delafield, Waukesha co., Wis., May 21, 1870.

**Kemper** (JAMES LAWSON), b. in Madison co., Va., in 1824; graduated at Washington College, Va., in 1844; studied law; was ten years member of the Virginia legislature, two years Speaker; colonel of 7th Virginia regiment C. S. A. in 1861; brigadier-general 1862; major-general 1864; distinguished himself at most of the battles on the Peninsula; was wounded and taken prisoner at Gettysburg; elected governor of Virginia in 1873 by the Democratic party.

**Kemper** (REUBEN), b. in Fauquier co., Va., was the son of a Baptist preacher, with whom he emigrated to Ohio in 1800. Soon afterward, Reuben and two of his brothers settled in Mississippi Territory, engaged in land-surveying, and conceived the project of stirring up an insurrection in West Florida against the Spanish government. They formed an expedition for that purpose in 1808, which was unsuccessful; attempted with the same result the capture of Mobile (then a part of West Florida), and in 1812 joined the great expedition organized by Gutierrez and Toledo against Mexico. In this campaign Reuben Kemper commanded, with the rank of colonel, a force of several hundred Americans, at whose head he won some brilliant actions in Texas, but the results of victory were neutralized by dissensions between the Mexicans and Americans, and the latter returned in disgust to the U. S. Kemper took part under Gen. Jackson in the defence of New Orleans, afterward settled down in Mississippi as a planter, and d. at Natchez in 1826.

**Kempis** (THOMAS À), b. at Kempen, near Cologne, in 1280; his family name was HAMERKIN (Lat. *Mallucius*). In 1400 he entered the monastery of Mount St. Agnes, near Zwolle, of which his elder brother was prior, and in 1413 was ordained priest; in 1425 was elected sub-prior. D. July 26, 1471. By the other monks of the monastery he was highly esteemed for his deep piety, his untiring industry as a scholar, and his great gifts as a teacher and supervisor of the novices; and his authorship soon spread his fame far outside the boundaries of his personal acquaintance. He wrote several books; among others, a chronicle of the monastery of Mount St. Agnes. A collected edition of his works was given by the Jesuit Sommalus (Antwerp, 1607). But the book which sent his name to the remotest corners of the world is his *De Imitatione Christi*. It has been

translated into all languages in which books are printed and read, and it is used as a book of devotion and religious instruction by all Christians, without regard to differences in creed, race, or standpoint of mental development. With the exception of the Bible, it is probably the book most read in the whole of Christian literature. In consequence of his personal humility, and in harmony with the moral maxims of his order (*ama necesse*), Thomas à Kempis has never mentioned himself directly as author of the book; on the other hand, there exist copies of the work, the oldest of 1441, which ascribe the authorship to the celebrated theologian Jean Gerson, chancellor of the University of Paris. These two circumstances have occasioned a very sharp controversy between French and German theologians, and the question seemed at one time doubtful. (See *Gerson, Gersonade Kempis*, 1828, Vienna.) Of late, however, it seems to have been decided finally in favor of Thomas à Kempis. He is mentioned by three contemporary writers as the author of the book. There is a perfect harmony in doctrines and in style between *De Imitatione Christi* and other devotional writings of Thomas à Kempis. It can be satisfactorily explained how the copyists could make the mistake and ascribe the authorship to the celebrated chancellor (or to St. Bernard, or an Italian abbot, Gerson, for there are many rivals). A new edition of the book was given, after an autograph by Thomas à Kempis, by Hirsche (Berlin, 1873-74).

**Kempsville**, post-v. and tp. of Princess Anne co., Va., 104 miles S. E. of Norfolk, and at the head of tidal-water on the E. branch of Elizabeth River. Pop. 3100.

**Kemp'ten**, town of Bavaria, on the Iller. It has some manufactures of cotton and woollen goods. Pop. 10,370.

**Kemptville**, post-v. of Grenville co., Ont., Canada, on the St. Lawrence and Ottawa Railway. It has a good trade and manufactures of lumber. Pop. of sub-district, 872.

**Ken** (THOMAS), b. at Berkhamstead, England, in July, 1637; was educated at Winchester and Oxford; travelled on the Continent as far as Italy in 1674; became in 1679 chaplain to Mary, princess of Orange (the future queen of England); was chaplain to Lord Dartmouth in the Tangier expedition, and subsequently (1684) to Charles II., by whom he was soon after made bishop of Bath and Wells. He attended that king on his deathbed. On the accession of James II. he was one of the "seven bishops" committed to the Tower for refusing to obey illegal commands of that monarch. Bishop Ken, however, refused to take the oath of allegiance to William III., and was deprived of his bishopric in consequence. He passed his declining years at Longleat, engaged in writing devotional works, among which his morning and evening hymns are still popular. D. at Longleat, Wiltshire, Mar. 19, 1711. (See his *Life*, by George L. Duyckinck, New York, 1859.)

**Kenai'ans**, a branch of the Athabascan family of Indians, living in Alaska, deriving their name from Kenai, the peninsula between Cook's Inlet and Prince William Sound. The Kenaians are held to include all the Indians N. of Copper River and W. of the Rocky Mountains, except the Innuits or Esquimaux and the Aleuts, and are estimated to number 25,000. They resemble in manners, customs, and religion the tribes of Northern Asia, especially in their practices of cremation, infanticide, etc., and their system of caste.

**Ken'ansville**, post-v., cap. of Duplin co., N. C., 7 miles E. of Magnolia Station on the Wilmington and Weldon R. R. Pop. 2878.

**Ken'dal**, town of England, in Westmoreland. Certain kinds of cloth are manufactured here, which for centuries have been known under the name of "Kendals." Pop. 13,442.

**Ken'dall**, county of N. E. Illinois. Area, 324 square miles. It is a fertile rolling prairie, dotted with groves of timber. It is traversed by Fox River and the Chicago Burlington and Quincy R. R. Cattle, grain, and wool are the staple products. Cap. Yorkville. Pop. 12,399.

**Kendall**, county of S. W. Central Texas. Area, 475 square miles. It is one-third prairie, and the rest is well timbered. Live-stock, wool, grain, and cotton are raised. There are many German settlers. The climate is healthful and pleasant. Cap. Boerne. Pop. 1536.

**Kendall**, post-v. and tp. of Kendall co., Ill. Pop. 1445.

**Kendall**, post-v. and tp. of Orleans co., N. Y. The township lies on Lake Ontario. The village has 4 churches. Pop. 1744.

**Kendall**, tp. of La Fayette co., Wis. Pop. 1131.

**Kendall** (AMOS), LL.D., b. at Dunstable, Mass., Aug. 16, 1789; graduated at Dartmouth in 1811; in 1814 became a lawyer of Lexington, Ky., where he was for a time

a tutor in Henry Clay's family. He afterwards removed to Georgetown, Ky., where he was postmaster and editor of the *Argosy*, an able Democratic newspaper. In 1829, Jackson made him fourth auditor of the treasury. He was 1835-40 postmaster-general. In 1840 he became manager of Prof. Morse's interest in the telegraph business. He was an early friend of public schools in the West, founded the deaf and dumb asylum at Washington, and was a liberal benefactor of Columbian College, and of the Baptist church with which he was connected. He wrote a work on his *Life and Times*, and published a *Life of Andrew Jackson* (1844, incomplete). D. at Washington, D. C., Nov. 12, 1869.

**Kendall** GEORGE WILKINS, b. at Amherst, N. H., in 1807; became a printer, and worked in many places in the South and West at his trade. In 1835 he settled in New Orleans, where, with F. A. Linsslen, he founded the *Free Press* newspaper. He took part in the Santa Fe expedition of 1841, and during the Mexican war was with Gens. Taylor and Scott, and furnished to his newspaper the earliest and fullest accounts of all movements, incurring thereby a large expense. He published *Narrative of the Texas Santa Fe Expedition* (1844), and *The War between the U. S. and Mexico* (1851, with costly illustrations). In 1862 he removed to Comal co., Tex., where he had a large grazing rancho. D. at Post Oak Springs, Tex., Oct. 21, 1867.

**Kendall's Mills**, post-v. of Fairfield tp., Somerset co., Me., on the W. bank of the Kennebec River (here crossed by a lofty railroad bridge), and on the Maine Central and the Kennebec and Portland R. Rs. It has a fine water-power and manufactures of lumber, etc.

**Kendallville**, city of Noble co., Ind., at the intersection of the Lake Shore and Michigan Southern and the Grand Rapids and Indiana R. Rs. It is surrounded by a rich agricultural region, and affords an excellent market for all kinds of produce. It has 8 churches, 1 national bank, manufactories, a free school building, and 1 weekly newspaper. Pop. 2164. C. O. MYLES, Ed. "STANDARD."

**Kendell, von** (ROBERT), b. at Königsberg Feb. 27, 1824; studied jurisprudence, and held in 1862 a position at the court of Breslau. In 1863, Bismarck gave him an appointment in the ministry of foreign affairs, and from this time he always accompanied the great minister. At all diplomatic negotiations, on travels and in wars, he was always at the side of Bismarck. Sometimes he was sent on independent diplomatic errands; thus, he represented the North German confederation at the opening of the canal of Suez in 1869. In 1871 he was elected to the diet, and in Apr., 1873, he was sent as ambassador to Rome.

AUGUST NIEMANN.

**Kendo'ta**, tp. of Todd co., Minn. Pop. 94.

**Ken'drick**, tp. of Greene co., Ia. Pop. 887.

**Kendrick** ASABEL CLARK, D. D., LL. D., b. at Poultney, Vt., Dec. 7, 1809; graduated at Hamilton College, Clinton, N. Y., in 1831; was professor first of ancient languages, and subsequently of the Greek language alone, in the literary and theological seminary at Hamilton (which afterward became Madison University), from 1831 to 1850. Since then he has been professor of Greek in the University of Rochester. He has published several introductory Greek textbooks; the *Anabasis* of Xenophon, with notes and vocabulary; an edition of *Select Orations of Demosthenes*; *Echoes*, being poems from the German and French; *Our Political Principles*; a revised edition of Olhausen's *New Testament Commentary: Commentary on the Epistle to the Hebrews* in Lange's *Biblical Commentary*; and *Life and Letters of Mrs. Emily C. Jackson* (1861).

**Kendrick** HENRY L., b. in New Hampshire in 1812; graduated at the U. S. Military Academy; entered the army as brevet second lieutenant of infantry July, 1830, but was retained at the Academy for twelve years as assistant professor of chemistry, mineralogy, and geology, in the mean time having been transferred to the artillery, and attained the rank of captain in 1846. In the war with Mexico he was engaged in the siege of Vera Cruz, battle of Cerro Gordo, and defence of Puebla, where he gained the brevet of major. From the close of the war he served principally in garrison and on frontier duty, being engaged in frequent expeditions against, and numerous actions with, hostile Indians; and for five years in command of a post in New Mexico, when in 1857 appointed professor of chemistry, mineralogy, and geology at the Military Academy, which chair he has since continued to fill.

**Kendrick** (Capt. JOHN), b. in Boston. was a resident of Wareham, Mass., and commanded a privateer during the Revolutionary war. In 1787 and 1791 he made a voyage of exploration along the N. W. coast of America and among the islands of the Pacific, and opened up the sandal-

wood trade with China. Congress gave him a medal for the first of these voyages, in which his second in command, Capt. Gray, discovered the Columbia River. Capt. Kendrick was accidentally killed in a harbor of Hawaii in 1791, by a ball fired in a salute from an English vessel.

**Kendrick** NATHANIEL, D. D., b. at Hanover, N. H., Apr. 22, 1777; received but a limited early education; was licensed as a Baptist preacher in 1803. After pastoring at Lansingburg, N. Y., 1809-18, Middlebury, Vt., 1818-30, and Eaton, N. Y. (1817), he was chosen professor of theology and moral philosophy at Madison University, remaining in that post until his death at Hamilton, N. Y., Sept. 11, 1848.

**Kenduskeag**, post-v. and tp. of Penobscot co., Me., 12 miles N. W. of Bangor. It has 3 churches, and manufactures of lumber, cooperage, stoves, farming tools, and other goods. Pop. 770.

**Kenduskeag River**, an affluent of the Penobscot, in Maine, flows S. E. to Bangor, where it empties into a tidal basin. The fall of its waters is extensively utilized in sawing lumber and in other manufactures.

**Kenealy** EDWARD VAUGHAN HYDE, D. C. LL. B. at Cork, Ireland, in 1819; educated at Trinity College, Dublin; became early celebrated for his knowledge of many languages, having published translations of songs and ballads from and into the Greek, Latin, French, Italian, Portuguese, Dutch, German, Spanish, Swedish, Danish, Romaine, Magyar, and Irish languages. He was a contributor to Dr. Maginn's *Home Ballads*, to the *Dublin Courier and Magazine*, and *Edwin's Magazine*; published in 1830 *Ballads, or the Deceasephants*; in 1840 *the New Pantomime*, both works abounding in wit and brilliant criticism. Of late, Dr. Kenealy has become widely known as the impassioned advocate of "the Claimant" in the celebrated Tichborne case (1873); founded a newspaper, *The Irishman*, in 1874, which attained an immense circulation; was elected a member of Parliament, and took his seat in Apr., 1875.

**Ken'eh**, town of Upper Egypt, on the right bank of the Nile, 34 miles N. of the ruins of Thebes, has large manufactures of earthenware, and carries on an extensive trade with Arabia and Central Africa. Pop. 10,000.

**Ken'itworth**, town of England, in Warwickshire. It contains some ruins of Kenilworth Castle, which became notable in the history of Queen Elizabeth on account of the gorgeous manner in which the earl of Leicester entertained her here for seventeen days; which entertainment forms the subject of a romance of Walter Scott and a novel of Ludwig Tieck.

**Ken'ites** [Heb. *Kenizim* and *Kenizim*; Gr. *Kenaitai*], a collective name for a tribe or race which resided in the Sinaitic desert and other districts adjoining the land of Canaan at the time of the Hebrew Exodus. They seem to have been akin to the Midianites and to the Amalekites, but were distinguished from the mass of those tribes by their steadfast friendship for and alliance with the Hebrews, for which reason they received allotments with the tribe of Judah. Jethro, the father-in-law of Moses, was a Kenite, whence some modern critics have built up a vast fabric of argument to show that the Mosaic ritual was derived from intercourse with the Kenites in the desert, and many theories have been broached connecting the Kenites with Cain as their ancestor, and attributing to them an important part in Hebrew history down to a late period. (See E. Bunsen's *Keys of St. Peter*, London, 1867.)

**Ken'naday** JOHN, D. D., b. in New York City Nov. 3, 1800; joined the New York Methodist conference in 1823; preached in Philadelphia, New York, Brooklyn, N. Y., and New Haven, Conn. D. Nov. 13, 1864.

**Ken'namer's**, tp. of Marshall co., Md. Pop. 412.

**Kennebec'**, county of S. W. Central Maine. Area, about 900 square miles. It is traversed by the Kennebec River, and by the Maine Central and the Portland and Portland R. Rs. The surface is a level, the soil mostly fertile. Live-stock, grain, hay, wool, and dairy products are the great staples. The county has abundant water-power, timber, and building-stone. The manufactures include lumber, carriages, sleighs, leather, saddlery, metallic wares, machinery, agricultural and edge tools, and wooden and other wares. Ice and building stone are exported. Cap. Augusta. Pop. 100,000.

**Kennebec**, tp. of Mendon co., Pa. Pop. 100.

**Kennebec River** rises at Mendon, Maine, although its principal head stream, the Moose River, is 60 miles W. of that place, at a distance of 60 miles. The river falls some 1000 feet in 100 miles, and its water at Augusta, where the river is crossed by a large dam, affording great water-power. Sea-going steamboats and coasting vessels ascend to this point, except at low water,



when they stop at Hallowell or Gardner, and in winter, when navigation ceases entirely. Above Augusta small steamboats ascend to Waterville, 18 miles farther, where, as at many points above, there is much valuable water-power. The river is navigable for ships to Bath, 12 miles. Its banks are fertile and beautiful, and are the seat of a large trade in lumber, provisions, hay, cattle, &c. It reaches the sea in lat. 43° 44' 26" N., lon. 69° 45' W.

**Kennebunk',** post-v. and tp. of York co., Me. The village is on the navigable Kennebunk River, 3 miles from the sea. It has an insurance company, a national bank, 6 churches, manufactures of twine, braid, lumber, shipping, and other goods, and is the seat of a good coasting-trade. Kennebunk Dépôt is a thriving post-village on the Portsmouth and Portland R. R., 24 miles S. W. of Portland. Pop. of tp. 2603.

**Kennebunkport',** post-v. and tp. of York co., Me., at the mouth of Kennebunk River, 3 miles below Kennebunk. It has a good harbor, a thriving trade, and manufactures of shipping and ships' furniture, and contains 5 churches. It is a pleasant summer resort. It was permanently settled in 1629. Pop. 2372.

**Ken'nedale,** post-v. and tp. of Tuscaloosa co., Ala., on the Alabama and Chattanooga R. R. Pop. 1262.

**Ken'nedly,** post-v. of Poland tp., Chautauqua co., N. Y., on the Atlantic and Great Western R. R. and on Conewango Creek. It is sometimes called FALCONER.

**Kennedy** ANTHONY, b. at Baltimore, Md., in 1811; removed in childhood to Virginia; studied law, and became a planter and cotton-manufacturer; served in the legislature of Virginia from 1839 to 1843; returned to Baltimore in 1850; was elected to the Maryland legislature in 1856, and was U. S. Senator from 1857 to 1863.

**Kennedy** BENJAMIN HALL, b. at Summer Hill, near Birmingham, England, Nov. 6, 1804; graduated at Cambridge in 1827; took orders in the Church of England; became assistant master at Harrow in 1830, and was head master of Shrewsbury school from 1836 to 1866, becoming in 1867 regius professor of Greek in the University of Cambridge. He has held numerous preferments in the Church, and written many valuable manuals for the study of the classical languages.—His brother, CHARLES RANN, b. at Birmingham Mar. 1, 1808; graduated at Trinity College, Cambridge; became a barrister (1835); published *Poems* (1843), a translation of *Virgil* into English blank verse (1850), a translation of the *Orations of Demosthenes* (5 vols., 1841-63), with notes and appendices; several law-books and miscellaneous verse. D. at Birmingham in 1867.

**Kennedy** (GRACE), b. in Ayrshire, Scotland, in 1782; resided in Edinburgh, and wrote under assumed names many novels and tales of a moral and religious tendency which had an extensive circulation and were translated into several languages. Among them are *Decision* (1821), *Father Clement* (1823), *Anna Ross, the Orphan of Waterton* (1823), and *Philip Colville* (1824). D. at Edinburgh Feb. 28, 1825.

**Kennedy** (JOHN PENDLETON), LL.D., b. in Baltimore, Md., Oct. 25, 1795; was educated at the University of Maryland, where he graduated in 1812. In 1814 he took part as a volunteer in the battles of Bladensburg and North Point. After the war was over he studied law, and was admitted to the bar in 1816; having a taste for letters, he found time in the midst of his professional engagements to devote some leisure hours to a new publication entitled *The Red Book*, of which he became the chief editor. It was issued every two weeks, and was made up of miscellaneous articles in prose and verse. In 1820 he was returned as a member of the house of delegates of the State legislature, which position he held for three years with high distinction. Being more devoted, however, to law and literature than to politics, he resumed his favorite pursuits. In 1832 he published a work of fiction entitled *The Scallor Barn*, which consisted of a collection of sketches of Virginia country life soon after the Revolution. This book was extensively read and became very popular. In 1835 appeared his celebrated *Horseshoe Robinson*, a work that added greatly to his reputation. The hero was a Revolutionary soldier of South Carolina. In 1835 appeared his *Rob of the Bowl*. In this year he was elected a member of Congress from Maryland, which position he held with great distinction for six years. In the Presidential canvass in 1840 he was one of the electors for his State on the Harrison ticket. In this year he published the annals of *Quodlibet*, which was a burlesque or satire on the political issues of the day. In 1846 he was again returned to the house of delegates of the State legislature, of which body he was made Speaker, and took an active part in the measures which were then adopted to resume the payment of the State debt and for the restoration of the public credit. In politics Mr. Ken-

nedy was an ardent and earnest Whig of the Henry Clay school. In 1849 he published the memoirs of the life of William Wirt, which is one of the most finished productions of the kind from any American pen. In the same year (1849) he was chosen provost of his *alma mater*, which position he continued to hold during the remainder of his life. He was also vice-president of the Maryland Historical Society. In 1852 he was appointed by Pres. Fillmore secretary of the navy, which position he held until the close of that administration. It was under his auspices at the head of the navy department that the Japan expedition of Com. Perry and the second Arctic exploration of Dr. Kane were mainly due. During the late war Mr. Kennedy's sympathies were entirely on the Federal side. His antislavery sentiments were very strong throughout his whole life. After the war he made an extensive tour in Europe, chiefly with a view of benefit to his health. He did not long survive his return, but d. at Newport, R. I., Aug. 18, 1870. At his death he was not only provost of the University of Maryland and vice-president of the State Historical Society, but was also chairman of the trustees of the Peabody Academy of Baltimore and a member of the board of trustees of the Peabody Southern Educational Fund. A. H. STEPHENS.

**Kennedy** (JOSEPH C. G.), LL.D., b. Apr. 1, 1813, at Meadville, Crawford co., Pa., and educated at Allegheny College; was superintendent of the U. S. census of 1850 and 1860, secretary to the National Institute and U. S. Agricultural Society in 1854; sent as commissioner to Europe in 1851 to investigate the administration of census; appointed U. S. examiner into the condition of national banks; wrote *Census of 1850 and 1860; History and Statistics of Maryland*; prepared the law for U. S. census; received a gold medal for his statistical researches from the king of Denmark, and is member of different French, German, and Belgian scientific societies.

**Kennedy** (JOSIAH FORREST), M. D., b. Jan. 31, 1834, near Landisburg, Perry co., Pa.; graduated at Dickinson College in 1855, and in medicine at the University of City of New York in 1858, and settled at Tipton, Ia.; was commissioned assistant surgeon in U. S. regular army in 1861, which position he resigned in Oct., 1862; settled at Des Moines in 1870, where he now (1875) practises his profession. Dr. Kennedy has published in the medical journals several papers on practical medicine, and is assistant secretary to the State Medical Society.

**Kennedy** (WILLIAM MCGEE), b. in Tennessee in 1783; joined the South Carolina Methodist conference in 1805, and was a founder of his denomination in North and South Carolina and in Georgia. D. in 1840.

**Ken'nedysville,** post-v. of Kent co., Md., on the Kent County R. R. Pop. of tp. 3247.

**Ken'neket,** tp. of Dare co., N. C. Pop. 599.

**Ken'ner's Prairie,** a v. of Matagorda co., Tex. Pop. 65.

**Ken'net** (WHITE), D. D., b. at Dover, England, Aug. 10, 1660; was educated at St. Edmund Hall, Oxford, of which he became vice-principal; was made in 1707 dean, and in 1718 bishop of Peterborough. He was a man of indefatigable industry, and accumulated a vast collection of historical MSS., largely in his own handwriting, which now form part of the *Landdowne Collection* in the British Museum. Besides more than fifty miscellaneous publications, he wrote a *History of England from the Accession of Charles I. to that of Queen Anne*, forming part of Hughes' collection (1706; 2d ed. 1719); *Bibliotheca Americanae Primordia, an Attempt Toward Laying the Foundation of an American Library* (1713); and *A Register and Chronicle, Ecclesiastical and Civil, from the Restoration of King Charles II.* (vol. i. fol., 1728). His American library was collected with a view to writing a work under the title *A Full History of the Propagation of Christianity in the English North American Colonies*, which unfortunately was never executed. D. at Peterborough Dec. 19, 1728. (See his *Life*, by Rev. W. Newton, 1730).—His brother, BASIL KENNET, D. D., b. at Postling, Kent, Oct. 21, 1674; graduated at Corpus Christi College, Oxford; was long chaplain at the English factory at Leghorn, Italy (1706-13), and was elected in 1714 president of his college at Oxford, where he d. in 1714 or 1715. He wrote *Romæ Antiquæ Notitia, or the Antiquities of Rome* (1696), a work which for a century was the standard school-book on the subject; an *Exposition of the Apostles' Creed*, a *Paraphrase on the Psalms*, in verse (1706), and translations of Puffendorf and Pascal.

**Ken'nett,** post-v., cap. of Dunklin co., Mo., on the St. Francis River, and 28 miles W. of Gayoso on the Mississippi.

**Kennett,** a b. (P. O. name, KENNETT'S SQUARE) and tp.,

Chester co., Pa., on the Philadelphia and Baltimore R. R., and in a rich agricultural district. Pop. of b. 881; of tp. 1308.

**Kennett** (LUTHER M.), b. at Falmouth, Ky., Mar. 15, 1807; studied law; removed in 1825 to Missouri, and engaged in mercantile pursuits; settled in St. Louis in 1842; was chairman of the Pacific R. R. convention held there in 1849; was mayor of St. Louis 1850-52; president of the St. Louis and Iron Mountain R. R. in 1853, and chosen Representative in Congress for St. Louis district in 1854.

**Ken'nicott** (BENJAMIN), D. D., b. at Totness, Devonshire, England, Apr. 1, 1718, of humble parentage; was aided by a subscription to enter Wadham College, Oxford, 1744; wrote while an undergraduate two dissertations, *On the Tree of Life* and *On the Oblations of Cain and Abel*; became fellow of Exeter College and keeper of the Radcliffe Library, and after many years' labor produced his great work, the *Vetus Testamentum Hebraicum cum Variis Lectionibus* (2 vols., 1776-80), and d. at Oxford Sept. 18, 1783.

**Ken'non** (REV. ROBERT L.), M. D., b. in Granville co., N. C., in 1789; was educated under the Rev. Dr. Moses Andrew, uncle of Bishop Andrew, at Spartan, Ga., and at the South Carolina College. His medical training was begun under Dr. William Lee, Jasper co., Ga., and completed in Columbia, S. C. He entered the itinerant ministry in the South Carolina conference, M. E., in 1809. On account of ill-health he located and practised medicine for several years in Georgia and Alabama; but re-entered the itinerant ministry in 1824 in Alabama, and exercised his sacred functions with great success till Jan. 9, 1838, when he d. while attending the session of the Alabama conference in Columbus, Miss. His remains were taken to Tuscaloosa, and there interred. A mural monument, bearing an inscription written by his intimate friend, Gov. Collier, placed near the pulpit in the Methodist church of Tuscaloosa, perpetuates his memory. T. O. SUMMERS.

**Ken'nonburg**, post-v. of Wayne tp., Noble co., O. Pop. 94.

**Kenockee'**, post-v. and tp. of St. Clair co., Mich., 15 miles W. of Port Huron. Pop. 1229.

**Kenosha**, county of S. E. Wisconsin, bounded on the E. by Lake Michigan and on the S. by Illinois. Area, 276 square miles. It has a fertile limestone soil. Cattle, grain, and wool are staple products. It is traversed by the Kenosha Rockford and Rock Island and the Chicago and Milwaukee R. Rs. Cap. Kenosha. Pop. 13,147.

**Kenosha**, city, cap. of Kenosha co., Wis., on Lake Michigan, 51 miles N. of Chicago and 34 S. of Milwaukee, almost in the S. E. corner of the State. It is on the Chicago and Milwaukee and Kenosha and Rockford R. Rs.; has a good harbor, 9 churches, 1 bank, 4 hotels, 2 weekly newspapers, several public and private schools, including a high school, a seminary, and 2 Catholic parochial schools, a public library, a reading-room, 3 carriage and 1 wagon manufactory, the latter turning out 5000 per year, numerous manufactories of wooden implements and furniture, several tanneries, lumber-yards, and fisheries, 2 water-cure establishments, numerous stores and shops of every kind, 2 telegraph-offices, 2 foundries, 5 Masonic, Odd-Fellows, or other associations, and 2 parks, whence the name of "Park City." Pop. 4309. HAYS McKINLEY, Ed., "TELEGRAPH."

**Keno'za Lake** is within the city limits of Haverhill, Mass. Its beauty is celebrated by the poet Whittier. Its area is 238 acres. It is a favorite resort for pleasure parties.

**Ken'rick** (FRANCIS PATRICK), D. D., b. in Dublin, Ireland, Dec. 3, 1797; studied at Rome, where he was ordained a priest in 1821. He was sent to this country, and was for nine years conductor of the Roman Catholic seminary at Bardonia, Ky. In 1828 appeared his *Letters from Omicron to Omicron*, a controversial work. In 1830 he was made bishop of Arath in *paphos*, and coadjutor to Bishop Conwell of Philadelphia, to which see he was translated in 1842. He founded the seminary of St. Charles Borromeo, and in 1851 became archbishop of Baltimore, and in 1852 apostolic delegate; in 1859 honorary primate of the U. S. He published *Theologia Dogmatica* (4 vols., 1839-40), *Theologia Moralis* (3 vols., 1841-43), and several other works, mostly polemical. D. at Baltimore July 8, 1863. At the time of his death he had nearly finished a revision of the English Bible, with copious notes.

**Kenrick** (JOHN), b. in Exeter, England, about 1803; was for some years classical tutor in the College of York, and became in 1840 professor of history in the New College at Manchester. He translated Zumpt's *Latin Grammar* (1829), published a volume of *Greek Exercises* the same year, *An Essay on Primitive History* (1846), *Ancient Egypt under the Pharaohs* (1850), and *Pharaohs* (1857). The two latter volumes are of considerable value, and have been reprinted in the U. S.

**Kenrick** (PETER RICHARD), D. D., a brother of Archbishop Francis P. Kenrick, b. in Dublin in 1806; was trained at Maynooth; became a Roman Catholic priest in Ireland; emigrated to the U. S., and was for a time editor of the *Catholic Herald*, Philadelphia; was also vicar-general to his brother. In 1841 he was made bishop of *Drasa in parthos*, and coadjutor to the bishop of St. Louis, to which see he was translated in 1843. In 1847 he became the first archbishop of St. Louis. He has written *The Holy House of Loreto*, *Anglican Ordinations*, and some other works.

**Ken'sett** (JOHN FRIEDRICH), b. Mar. 22, 1818, at Cheshire, Conn., d. in New York Dec. 14, 1872; worked as a lad with his uncle, Alfred Daggett, an engraver; went to England in 1840, and began the practice of landscape art in 1845; passed several years in England and Europe, studying nature in Switzerland, on the Rhine, in the mountains of the Abruzzi, in Sicily, by the Bay of Naples, among the Italian lakes, amid the scenery of the Campagna and the associations of Rome, always observing and patiently transferring to the canvas the impressions taken by his eye. In 1848 he returned to America, and was equally faithful in his study of native scenery at Newport, Beverly, and other parts of the Atlantic sea-coast, among the White Mountains, the Adirondacks, the Catskills, on Lake George, the Hudson, the upper Mississippi and Missouri, at Niagara; passing his summers in collecting materials for winter-work in his studio in New York. A facile and diligent artist, well trained, quick in perception and delicate of touch, he executed a great number of pictures singularly equal in merit, and of a very high rank in excellence. His personal qualities of sincerity, modesty, and purity, which made him beloved by many friends, made his pictures dear to lovers of truth and feeling in art. His work commands the best prices. The collection of his sketches, made for exhibition and sale after his death, excited unusual interest. Mr. Kensett belonged to the "realistic school," as it is called, but was polished, harmonious, sweet, and sympathetic. He was made a member of the National Academy of Design in 1849, and was for some years a member of the national art commission formed to superintend the decoration of the Capitol at Washington. O. B. FROTHINGHAM.

**Ken'sington**, post-v. of Berlin tp., Hartford co., Conn., 15 miles S. W. of Hartford.

**Kensington**, post-v. and tp. of Rockingham co., N. H., 6 miles S. of Exeter. It has 3 churches, and manufactures of leather, etc. Pop. 642.

**Kensington**, Pa. See PHILADELPHIA.

**Kensington Gardens**, one of the public parks of London, 24 miles in circuit and extending along Hyde Park. In its western part stands Kensington Palace, which during the eighteenth and the beginning of this century was the residence of the kings of England.

**Kent**, county of England, comprising the south-eastern angle of the island between the mouth of the Thames and the Strait of Dover. Area, 1627 square miles. Pop. 733,887. The ground is undulating, traversed by the North Downs; the soil is very fertile and the climate mild and genial. The whole county consists of gardens in which vegetables and fruits are raised for the market of London, and meadows on which a multitude of sheep are reared. Hops are the principal product.

**Kent**, county of New Brunswick (Canada), bounded on the E. by Northumberland Strait. The soil is generally very fertile. Agriculture, lumbering, fishing, and ship-building are carried on. Cap. Richibucto. Pop. 19,101.

**Kent**, county of Ontario, Canada, extending from Lake St. Clair to Lake Erie. It is intersected by the river Thames and the Great Western Railway. The surface is level and fertile. The W. part is a kind of prairie, sometimes overflowed. Cap. Chatham. Pop. 26,886.

**Kent**, county of Central Delaware, extending across the State from Maryland eastward to Delaware Bay. Area, 240 square miles. The soil is generally level and quite fertile. Live-stock, grain, wool, and fruit are the staple products. The manufactures include carriages, lumber, etc. The county is traversed by the Delaware and the Maryland and Delaware R. Rs. Cap. of co. and State, Dover. Pop. 29,804.

**Kent**, county of Eastern Maryland. Area, 318 square miles. It has Chesapeake Bay on the W., Delaware on the E., and the navigable Susquehanna and the Potomac on the N. and S. respectively. The county is nearly level, but not low; its soil is a light, fertile, clayey loam, easily cultivated. Live-stock, grain, wool, and fruit, especially peaches, are largely produced. The county exports large quantities of fish and oysters. It is traversed by the Kent County and the Queen Anne's and Kent R. Rs. Cap. Chertown. Pop. 17,102.



**Kent**, county of Michigan, in the S. W. central part of the southern peninsula. Area, 864 square miles. It has a rolling surface and a rich limestone soil. Salt and gypsum are found in the county. Cattle, grain, wool, butter, and hay are staple products. Lumber, carriages, flour, clothing, cooperage, and saddlery are leading articles of manufacture. The county is traversed by numerous railroads, mostly centring at Grand Rapids, the capital. Pop. 50,403.

**Kent**, county of Rhode Island, extending from Narragansett Bay on the E. to the Connecticut line on the W. Area, 180 square miles. The soil is generally good, the surface uneven. Live-stock, grain, hay, and potatoes are the staple crops. The streams afford good water-power. There are important manufactures of cotton goods, and some lumber is sawed. The county is traversed by the Providence and Stonington and the Hartford Providence and Fishkill R. Rs. Cap. East Greenwich. Pop. 18,595.

**Kent**, post-v. and tp. of Litchfield co., Conn., on the Housatonic River and R. R., adjoining the W. boundary of the State, 48 miles N. of Bridgeport and 45 miles W. of Hartford. It has 3 churches, 5 stores, a hotel, and a seminary. The principal industry is farming. There were formerly 3 blast furnaces for the manufacture of pig iron, now only one; a newspaper, maintained for several years, was discontinued in 1874. Pop. of tp. 1744, including a few Indians of the Housatonic tribe. W. H. KIRK.

**Kent**, post-tp. of Stephenson co., Ill. Pop. 1116.

**Kent**, post-v. of Republican tp., Jefferson co., Ind., 8 miles W. of Madison. Pop. 309.

**Kent**, tp. of Warren co., Ind. Pop. 601.

**Kent**, tp. of Putnam co., N. Y. Pop. 1547.

**Kent**, post-v. of Franklin tp., Portage co., O., 31 miles S. E. of Cleveland, on the Cuyahoga River, which here affords a fine water-power, utilized by extensive cotton and flour mills and by various manufactures. Kent is the geographical centre and divisional terminus of the Atlantic and Great Western R. R., of which the principal car and machine shops are located here. The village is noted for the manufacture of superior window-glass from the pure white sand rock which abounds here, and also as the locality where Capt. Samuel Brady made his famous leap across the Cuyahoga River when pursued by Indians. It has 1 national and 1 savings bank, 1 weekly newspaper, a fine public school edifice, 6 churches, and 30 mercantile establishments. M. DEWEY, ED. "SATURDAY-BULLETIN."

**Kent** (EDWARD), LL.D., b. at Concord, N. H., Jan. 8, 1802; graduated at Harvard in 1821; attended a course of law lectures by Chancellor Kent in New York, and engaged in legal practice at Bangor, Me., 1825; was a member of the legislature from 1829 to 1833; mayor of Bangor for two years, and governor in 1838 and 1840. In 1843 he was commissioner for settling the Maine boundary-line under the Ashburton treaty; delegate to the national Whig convention in 1848; consul at Rio Janeiro from 1849 to 1854, and in 1859 associate justice of the State supreme court. D. at Bangor, Me., May 19, 1877.

**Kent** EDWARD AUGUSTUS, DUKE OF, b. Nov. 2, 1767; was the fourth son of King George III.; joined the army; participated in the capture of some of the French West India Islands; was appointed governor of Nova Scotia and commander-in-chief of the British forces in North America. The island of St. John changed its name to Prince Edward in his honor. On his return to Europe he married (May 20, 1818) a German princess, MARIA LOUISA VICTORIA (b. 1786; d. Mar. 16, 1861), widow of the prince of Leiningen, daughter of the duke of Saxe-Coburg. From this marriage the reigning queen of England, Alexandrina Victoria, was born in 1819, and the duke d. Jan. 23, 1820.

**Kent** (JAMES), LL.D., b. at Philippi, Putnam co., N. Y., July 31, 1763, was the son of Moss Kent, surrogate of Rensselaer co. He graduated at Yale College in 1781; was a student with Egbert Benson; was admitted to the bar in 1787, and settled at Poughkeepsie; was a member of the legislature in 1790 and 1792. In 1793 he removed to New York, and became a master in chancery, a leader among the Federalists, an associate and friend of Hamilton and Jay, and professor of law in Columbia College. While here he became profoundly versed in the civil law. In 1797 he became recorder of New York, then an officer presiding over a court of civil jurisdiction; in 1798-1804 was a puisne judge of the supreme court of New York, and in 1804-14 chief-justice. In the latter year he was appointed chancellor of New York, which office he held till 1823. He was in 1822 a member of the constitutional convention at Albany; in 1824 resumed his professorship in Columbia College. D. in New York City, Dec. 12, 1847. His legal and chancery decisions are mostly preserved in Caines' and in Johnson's reports. His great work, the *Commentaries on American Law* (4 vols., 1826-30), is one

of the greatest and most useful legal works of the age, and its merits have been as freely acknowledged in Great Britain as in this country. Chancellor Kent was one of the fathers of American jurisprudence. His simple style, his abundant learning, his accurate citations, and, above all, his own good sense and conscientious character, have given his writings and decisions a permanent value.

**Kent** (JOSEPH), M. D., b. in Calvert co., Md., Jan. 14, 1779; was educated as a physician, combining the practice of his profession with agriculture on an extensive scale—first in Calvert co., and after 1806 in Prince George co. He was a Representative in Congress 1811-15 and 1821-26, governor of Maryland 1826-29, and U. S. Senator 1832-37. D. near Bladensburg Nov. 24, 1837.

**Kent** WILLIAM, b. in Yorkshire, England, about 1685; was apprenticed to a coach-painter, and showed so much talent that he was enabled by the help of patrons to study the fine arts at Rome. In 1716 he was invited by the earl of Burlington to return to England as his guest, and resided with that nobleman for the remainder of his life. He was in some request as painter, sculptor, and architect, but his real importance was as the founder of landscape-gardening in England, the best specimen of the new principles of taste being Kensington Gardens. D. Apr. 12, 1748.

**Kent Island**, the largest island in Chesapeake Bay, belongs to Queen Anne co., Md. It is 15 miles long, and is very fertile. It has 4 churches and important oyster fisheries. It is the site of the earliest settlement in the State. It was colonized in 1631 by William Claiborne and others. Pop. 1847.

**Kentland**, post-v. of Jefferson tp., cap. of Newton co., Ind., on the Pan-Handle (Pittsburg Cincinnati and St. Louis) R. R. It is situated on the Grand Prairie, in the N. W. of the State, in a rich agricultural section; has 1 newspaper, 1 bank, 1 plough-factory, a first-class school building, several churches, hotels, stores, shops, and mills. Pop. 802. JOHN B. CONNER, ED. "GAZETTE."

**Kenton**, county of Kentucky, having the Ohio River on the N. Area, 150 square miles. It is hilly, but generally fertile, having a good calcareous soil. Tobacco, live-stock, and corn are the agricultural staples. It has manufactures of cigars, tobacco, iron, etc., chiefly carried on at COVINGTON (which see), its chief town and capital. The county is traversed by the Kentucky Central and the Louisville and Cincinnati R. Rs. Pop. 36,096.

**Kenton**, post-v. and hundred of Kent co., Del., on the Maryland and Delaware R. R. Pop. 2655.

**Kenton**, post-v. of Pleasant tp., cap. of Hardin co., O., on the head-waters of the Scioto River, near the centre of the State. It has 9 churches, 3 banks, 2 weekly newspapers, 2 hotels, 8 manufactories, 3 mills, and 60 stores. Principal industry, farming and lumbering. Pop. 2610.

A. W. MILLER, ED. "REPUBLICAN."

**Kenton** (SIMON), b. in Fauquier co., Va., Apr. 3, 1755; went to Kentucky at the age of eighteen in consequence of an affray, and was associated with Boone and other early pioneers. He acted for some time as a spy for Lord Dunmore, the British governor of Virginia; participated in the war of independence W. of the Alleghenies; returned to Virginia in 1784; removed his whole family to Kentucky, and continued to take part in all Indian wars until Wayne's campaign in 1793 established the supremacy of the white race in the Ohio Valley. Kenton "took up" immense tracts of land, but when they became valuable they were invariably lost to him through the invasions of settlers, coupled with his ignorance of law, so that he was ultimately reduced to great poverty. He took part with the Kentucky troops in the Canadian campaign in the second war with England, fought at the battle of the Thames, finally had lands confirmed to him by the legislature of Kentucky and a pension by the U. S. Congress. D. in Logan co., O., Apr. 29, 1836.

**Kent's Hill**, post-v. of Readfield tp., Kennebec co., Me., is the seat of the Maine Wesleyan Seminary and Female College. The seminary was founded in 1821; the college chartered in 1859.

**Kentucky**, one of the central States of the Mississippi Valley, lying between the meridians of 82° 3' and 89° 26' W. lon., and between 36° 30' and 39° 6' N. lat. Its extreme length from E. to W. is 308 miles; its greatest breadth from N. to S., 172 miles. The northern and north-eastern boundaries of the State are very irregular. The Tug Fork, or main stream, of the Big Sandy River forms the boundary between it and West Virginia on the N. E., from the summit of the Cumberland Mountains, about lat. 37° 33', to Catlettsburg, where the Big Sandy joins the Ohio. From this point the Ohio River forms its N. N. E., N., and N. W. boundary to Cairo, where that river enters the Mississippi; Ohio, Indiana, and Illinois lying N. of the

Ohio, and the jurisdiction of Kentucky extending to low water mark on the N. side of the Ohio River. The Mississippi forms its western boundary, and separates it from



Seal of Kentucky.

Missouri. Tennessee bounds it on the S. for the whole distance, the dividing-line being the parallel of  $36^{\circ} 30'$  from the Mississippi to the Tennessee River, and that of  $36^{\circ} 28'$  thence to the meridian of  $83^{\circ} 40'$  W., whence a curved line following the summit ridges of the Cumberland to the Big Sandy separates it from West Virginia on the S. E. The area of the State, according to the census of 1870, is 37,680 square miles, or 24,115,200 acres. The State lies wholly within the Mississippi Valley, and all but about 1000 square miles of it in the sub valley of the Ohio.

*Face of the Country, etc.* Topographically, Kentucky is divided into two unequal areas—the mountain district, in the eastern and south-eastern sections of the State, covering about 10000 square miles; and the table land, including all the region W. to the Mississippi. Through this table-land the rivers of the State plough deep furrows. The State is emphatically well watered, but most of the larger streams in passing through the table-land have made for themselves valleys of erosion varying in depth at different points from 25 to 600 feet. There are, strictly speaking, very few hills in this table-land, though the bluffs give the landscape the appearance of high hills and abrupt valleys at some points, and the geological structure of the country gives it the aspect of rounded and mammillated slopes at others. With the exception, then, of the mountainous districts of Eastern and South-eastern Kentucky, which have the general characteristics of the Alleghany range, being simple regular curves of great N. and S. extension, but comparatively narrow in an E. and W. direction—Pine Mountain, for instance, having a length of 70 miles, and an average width of not over 5 miles, and rising in the ridges of Pine Mountain and Cumberland Mountain to the height of fully 2000 feet—the topography of the State may be regarded as a succession of river-valleys deeply incised, having a general N. W. and S. E. trend, with considerable stretches of table-land lying between, and having an average elevation of 100 feet above the streams. The river-valleys are rarely more than two miles in width. As we proceed eastward from the Mississippi, the table-lands rise gradually; those between the Mississippi and a line drawn due S. from Louisville are about 600 feet above the sea; between this line and one drawn due S. from Covington they rise to 1000 feet or a little more. Lexington, which seems to be the highest point of the table-lands, is 1070 feet above the sea, and from it the land slopes in every direction, and the decline toward the E. continues till we reach the base of the Pine and Cumberland ridges.

*Rivers, Lakes, etc.* About 800 miles of the boundaries of the State are riverine, including the Big Sandy, the Ohio, and the Mississippi. The two large tributaries of the Ohio (as well as many smaller ones), the Cumberland and Tennessee, have their ultimate sources in the mountain-district of the State, and both, after a westerly tour to the S., return to the State, and, crossing it, pour their waters into the Ohio. Other affluents of the Ohio are Clark's River, Tradewater River, and the large and important streams, Green, Salt, Kentucky, and Licking rivers, and still farther E. the Little Sandy. The W. Fork of Big Sandy is a considerable stream, as are also several of the tributaries of the Cumberland, Kentucky, Licking, and Green. The Mississippi has a few small tributary streams in the State. With the completion of the slackwater navigation improvements now in progress, Kentucky will have nearly 4000 miles of navigable waters in her bounds, of which more than half will be within regions containing

valuable coal and iron deposits. There are no considerable lakes in the State.

*Geology.*—The geological structure of the State is very simple. Its exposed rocks represent the Upper Cambrian (Lower Silurian), including the Trenton and Hudson River groups, about 700 feet in thickness; the Silurian, thinly developed; the Devonian, consisting mainly of about 100 feet of shale; the Sub-carboniferous, consisting of the Waverley, a thick series of sandstones and limestones (300 to 500 feet); the Sub-carboniferous limestone (10 to 300 feet); and the Carboniferous series (1500 to 2500 feet). In the W., between the Mississippi and the Tennessee rivers, there is a tract of beds of a later Tertiary age, which have a thickness of perhaps 300 feet. Just W. of the Tennessee River, where it re-enters the State, the northernmost point of the great cretaceous rocks which extend through Tennessee, Eastern Mississippi, and Western Alabama, appears at the surface. The beds below the Carboniferous seem to have been deposited in a nearly uninterrupted succession from the lowest to the highest, except in the region from Covington to Casey co., where a strip of about sixty miles wide (directly through the blue-grass country) was lifted above the sea, probably about the time of the Carboniferous era or earlier, thus for a time forming a nearly complete barrier between the eastern and western coal fields. E. and W. of this the land remained low, and the deposits of the Coal periods were made with from ten to twenty alternations of exposure to the air and submersion beneath the sea. The geology of Kentucky is not at all local or individual in its character; the Tertiary is a part of the great Tertiary deposit of the lower Mississippi River; the western coal-field is a prolongation of that of Illinois, and the eastern of the Appalachian fields; and the Devonian and Silurian stretch southward from Indiana and Ohio.

*Economic Geology and Mineralogy.*—The most important of the economic mineral resources of Kentucky are its rich and abundant deposits of coal and iron. The whole coal-area is about 14,000 square miles, of which 10,000 are in the eastern and 4000 in the western basin. The coal-beds vary in number and thickness, but will probably average in the eastern section in good exposures about ten beds, aggregating 30 feet; and in the western coal-measures about the same thickness, but fewer beds. Most of this coal, especially in the W., is a soft bituminous coal, though some cannel is found: it resembles the English coal very strongly. The eastern deposits have more splint coals, which are better adapted to smelting and iron-making. The iron district of the State covers about 20,000 square miles, in almost all of which ores of such richness as to pay well for working are found. The best ores are connected with rocks of the Clinton group of the Silurian, where one bed has been discovered having a depth of 20 feet or more. Good ores are also found between the Carboniferous limestone and the upper coal-measures. Some of the upper beds in Edmondson co., in the Green River country, are oolitic in character, and have a thickness of 5 feet or more. Most of the iron is produced in small charcoal furnaces, though no State in the Union is better provided with good coals for smelting and reducing purposes. Lead exists in the Trenton and Cincinnati limestones and in the Carboniferous limestone, but has not been successfully worked. Building-stone of excellent quality exists in several sections, and is exported to some extent. The Sub-carboniferous sandstones of the Waverley group are in considerable demand both in Cincinnati and Louisville, and the oolites of the Sub-carboniferous limestone are unrivalled in beauty and durability. Silver ore has been found near Cumberland Falls. A more remarkable contribution to economic geology is that afforded by the salt springs or licks of the State. The early deposited rocks—the Potomac sandstone and the oil bearing sand rocks—were laid down in shallow waters, and absorbed considerable quantities of salt from the brine. In time, springs charged with this saline deposit found their way to the surface, usually in some marshy valley, and thither all the herbivorous mammals naturally resorted to lick the salt which had crystallized around the springs. This practice must have continued for many thousands of years, and hence we find in these swampy licks vast quantities of the remains of these animals. The skeletons of the buffalo and the deer, and below these of the elephant, the mastodon, and mammoth, the fossil elk, and a host of musk-ox, lie in countless numbers. Barren Lick, Boone co., has in an area of about 60 acres many thousands of these fossil skeletons. The remains of a much more recent date very clearly that the elephant period in this region was one of cold and low temperature. There are numerous medicinal springs of great virtue in the State; those of Harrodsburg, Blue Lick, etc. contain considerable quantities of sulphur. Saltpetre, gypsum, and white abound



in the caves. The caverns of the State form one of its most remarkable features; the Mammoth Cave, which is the most widely known of the thousands in the State, though possibly not the largest, is very fully described in this volume by Prof. N. S. Shaler, and the caverns of Kentucky are also discussed in the same article. (See MAMMOTH CAVE.) We may say here that they occur throughout the entire range of the Sub-carboniferous limestone, or over a region of 6000 to 8000 square miles. In the region drained by the Green River and its affluents they are very numerous, and the belief is very general that they underlie almost the whole region. In some places there are what are called sink-holes, considerable tracts often containing trees of large size, under which the roof of the cavern has given way and precipitated these patches (which are from 50 to 150 feet or more in diameter) to the floor of the cavern, often 200 or 300 feet below. In some cases these sink-holes become partially filled with water; in others, the trees and shrubs continue to grow and stretch up toward the light. A few of them are funnel-shaped and very deep, having been sounded to the depth of 300 feet without reaching bottom.

**Soils and Vegetation.**—The last glacial period did not spread its ice-sheet over Kentucky, but stayed its course a few miles N. of the Ohio River. Hence, there are not in the State the gravelly soils which are found wherever the advancing front of the glacier has pushed forward its moraine, made up from the debris of widely separated rocks. The soil of the Cincinnati basin, which includes the entire blue-grass region, may properly be called a soil of immediate derivation; i. e. it is formed by the disintegration of the rocks of the Cincinnati group, which contain brachiopods in great numbers. This crumbling blue limestone, which falls to pieces on exposure to the air, renders the soil derived from it one of surpassing fertility, and by its constant disintegration restores to it the constituents drawn from it by the crops. Hemp and tobacco, both exhausting crops, can be produced on these lands in undiminished quantities for a score or more of years in succession, and their rich and gigantic growth is nowhere surpassed; and the grasses and grains of the region are remarkable for their luxuriance and their nutritive qualities. The region of the Sub-carboniferous limestone owes its fertility, which is almost as great as that of the blue-grass country, to the same cause, the disintegration of fossiliferous limestone. These two tracts comprise about three-sevenths of the area of the State. The other four-sevenths are less suited to the culture of grain and the best grasses, except the overflowed lands of the river-bottoms, which have soils of remote derivation. The soils underlaid by the beds between the top of the Cincinnati group and the top of the Carboniferous are of fair fertility, and oftentimes rich in materials suited for certain crops. The soils within the Carboniferous areas are admirably suited both for fruit and for tobacco culture, and under proper and skilful tillage will produce any crops adapted to this climatic belt. The great difference between these lands—a part of which have been known as barrens—and the rich blue-grass country is, that the former require a fair and judicious use of manures, while the latter manure themselves through the disintegration of the fossiliferous limestone. There is, however, very little really barren land in the State. The peculiarity of the soils is manifested in the distribution of the forests. On the Sub-carboniferous limestone there are grand forests on the uplands where the blue ash (*Fraxinus quadrangulata*) and the black walnut (*Juglans nigra*) mark the richest tracts. Rich but less fertile soils have extensive forests of beech (*Fagus ferruginea*). On the sandstone soils, especially within the Carboniferous areas, the forests are of oak, of which there are six or seven species, as *Quercus alba*, *monticola*, *lobata*, *rubra*, *nigra*, etc. In the richer lowlands the tulip tree (*Liriodendron tulipifera*) and the sweet gum (*Liquidambar styraciflua*) form considerable forests. The open parks which form so fine a feature of the blue-grass region are mainly of the sugar-maple (*Acer saccharinum*) and other maples, the tulip tree, blue ash, black walnut, etc. In the swamps of the S. W. the cypress (*Taxodium distichum*) is the principal constituent of the forests. In the mountainous district of Eastern Kentucky there are limited areas of pine (*Pinus mitis*). There are of course other forest trees in the State, but the species named are the most important. When the State was first settled by the whites there was a tract of about 7000 square miles lying between the Ohio River and the Tennessee line, and between the 85th and 87th meridians, embracing most of the Devonian shales and a part of the Carboniferous beds, which was open prairie, having no trees except along the streams; this was due unquestionably to the fires kindled in the grass by the Indians each year. On the suppression of these fires this region immediately sprang up in timber, and is now densely wooded wherever it is not under cultivation.

**Zoology.**—Very few of the larger surviving wild animals of the Mississippi Valley have now a home in Kentucky. The buffalo or bison, which in the last century roamed in very considerable herds through this State, and perhaps as far E. as the base of the mountains, became extinct in the State before the beginning of the present century. The elk may have disappeared a little earlier; the panther has been seen within fifty years. Bears and wolves are very rare. Deer are still found in considerable numbers in the forests, and the raccoon, the opossum, the badger, and ground-hog are not uncommon. There are at least two species of the hare or American rabbit, and five or six of the squirrel; moles, dormice, rats, field-mice, etc. are sufficiently plenty. Of game birds, the wild-turkey is found in most of the counties of the State, and grouse, partridges, quails, etc. abound. The rivers contain a good supply of most of the fresh-water fish, and fresh-water mollusks, including many species of the Unionidae, the fresh-water lobster, etc., are found in great abundance. We have spoken already of the fossils found in the swamps; there are very many fossils also in the caves, but except some insects, crustaceans, and fishes, none of them are peculiar to the State. The so-called eyeless fish of the Mammoth Cave is not known elsewhere.

The following paragraphs on the pre-historic remains of man found in Kentucky, from the pen of Prof. N. S. Shaler of the Lawrence Scientific School, State geologist of Kentucky, seem in place here:

**Pre-historic Remains of Man.**—Two distinct stages are marked by these remains—the first, or most remote, by the mound-builder works; second, the later conditions, during which the common Indian graves are formed. The first of these stages was evidently a period of considerable duration, in which the State was in possession of a people considerably more civilized than the common North American Indians; they built regular fortifications on tolerably uniform plans, and they traded for copper from Lake Superior and shells from the Gulf of Mexico. They seem to have been an agricultural people, their numbers being too great for constant subsistence by the chase, and their fortifications implying fixity. Their general culture and habits would seem to have been as high as that of the Natchez Indians when they were first approached by the whites. Although there are within the State twenty or more forts and many thousand mounds built by these people, they do not seem to have existed within these in such numbers, or for so long a time, as they did in Ohio. The State is also completely wanting in the "picture mounds," or representations of animals, so common in the North-west. This people was probably here before the coming of the buffalo, as its bones are not found among their remains, nor its form on their very numerous carvings and pottery. There are other evidences of the very recent coming of this species into the Mississippi Valley. There is an utter absence of evidence that this people ever came into contact with the earlier fauna of the *Elephas palmigerus* and the mastodon; none of the animals of that time figure among their art products. Possibly to the same age we may attribute the cave remains of Western Kentucky, which have not been as yet much examined. They show prolonged occupation of the shallow caverns and "rock-houses" of that region, but they all, so far as examined by the Kentucky survey, show only animals of the present period. Several hundred caverns and "rock-houses" in the western district exhibit signs of occupancy. Sometimes these caverns are combined with fortifications, the caves being used for residence, and stone walls or earthworks for the defence of the hill above.

During the last few centuries of the Indian occupation we find this State apparently used as a hunting-ground rather than as a place of permanent settlement. It seems likely from analogy with other countries that this neutral condition of the area between the Tennessee and the Ohio had been brought about by long conflicts between the southern and the northern peoples of this region. The essential similarity of the customs of the Natchez Indians, especially in the matter of mound-building, to the so-called mound-builders of the Ohio Valley, points to the probable conclusion that this neutral hunting-ground of Kentucky marks the southernmost point of penetration of a distinct warlike race which drove the more ancient people to the southward. These invading peoples are likely to have been the ancestors of the tribes the whites found in residence along the northern borders of the Ohio River.

As a whole, the pre-historic remains of Kentucky point to the conclusion that there was no indigenous man dating farther back than about two or three thousand years. There seems no evidence of succession in the stages of development, such as we find in the European pre-historic records. The oldest remains belong to a state of culture answering, on the whole, to the polished Stone Age of Europe, though

the use of copper for ornaments, and the amount of traffic indicated by the presence of materials brought from great distances, seem to be an indication of an even greater advance in civilization. It seems likely that the highly finished forts, showing a capacity for quite definite measurement, the strongest evidence of culture, came long after the earliest mounds. Despite the fact that mounds perish very slowly, we may trace every gradation, from those nearly blended with the natural surface to those which can hardly have withstood a thousand years. This seems not to be the case with the fortifications; most of them, at least, have still great distinctness of outline, and often could be made tenable by modern troops with a few hours' labor. Some of these forts would require several thousand men for a garrison to make their walls of any utility; this, together with the fact that mound-builders' remains are most numerous where the soil is best fitted for agriculture, seems to show that they must have been in the main agricultural. Some of their pottery shows considerable skill in manufacture, and a nice taste in the use of incised ornaments. The frequent presence of pipes shows the use of tobacco. The great care taken of the dead, and the prodigious accumulations about some of the funeral mounds, seem to point to the conclusion that they were worshippers of ancestors. There is no evidence of phallic-worship in the remains as yet discovered within the State. Their weapons seem to have been the same as those of the North American Indians generally, except that the spear seems to have been more commonly used; their axes are almost always made from materials derived from beyond the great lakes. The buffalo seems to have followed on the footsteps of the vanishing mound-builders; with their disappearance the forests returned, except over the country of the Barrens in the central part of Western Kentucky.

There is no reason to suppose that in its most peopled state, before the coming of the whites, this region ever had anything like its present population; nor are there any reasons for supposing that an antiquity of 3000 or 4000 years would not embrace all the human events of which we have any record here.

N. S. SHAVER.

**Climate.**—In general it may be said that the climate of Kentucky is delightful. The mean annual temperature is about 55°, and the extremes, not often reached, are zero and 100°. The winter commences late in December, sometimes not till January, and the cold weather seldom lasts long after the 1st of March. The winter and spring months are the seasons of greatest rainfall, the summer and autumn being usually somewhat dry. The heavy rains of winter and spring, falling on the adhesive red or blue clay of the central counties, makes locomotion somewhat difficult except on the superb macadamized roads of the State. The summers are long and somewhat hot, though the extremes of heat are less than in States farther N. In the southern counties cattle are not sheltered in winter, and very little hay is cut. The blue-grass, falling down as it ripens, protects the lower portion of its stalk, and furnishes as nutritious grazing in winter as in summer. Tables I. and II. give, first, the maximum, minimum, and mean temperatures of each month and the year at five different points; and second, the monthly, quarterly, and annual rainfall at the same points.

**Agricultural Products.**—The large proportion of exceedingly fertile soil in the State, its capacity for producing a great variety of crops, and its extraordinary facilities for conveying its crops to the best markets, are good and sufficient reasons why, in proportion to its area, Kentucky should be one of the best agricultural States in the Union. That these great advantages have not been so fully developed as they should have been is doubtless true; yet the agricultural position of the State is very creditable to her. The census of 1870 gave the following statistics of the agricultural wealth and productions of the State: Value of farms, \$311,258,916; of farming implements and machinery, \$8,572,896; of all farm productions, including betterments and additions to stock, \$87,177,371; animals slaughtered and sold for slaughter, \$24,121,861; of home manufactures, \$1,683,272 (obviously an under-estimate, as few States have manufacture so largely at home joints, linsey, woolsey, bagging, and other articles used largely on the farms, as Kentucky); forest products, \$74,321; market garden products, \$27,329; orchard products, \$1,231,385; wages paid to farm-hands, including board, \$10,700,382. A more particular statement of the principal crops and the amount of each was as follows: wheat, 5,728,791 bushels; rye, 1,108,933; Indian corn, 59,091,096; oats, 6,620,103; barley, 238,186; buckwheat, 3443; cotton, 1080 bales; flax, 237,268 pounds; hemp, 7777 tons; silk cocoons, 43 pounds; wool, 2,234,430 pounds; hay, 204,339 tons; hops, 947 pounds; tobacco, 108,705,549 pounds; maple-sugar, 269,416 pounds; maple-molasses, 49,073 gallons; sorghum-molasses, 1,710,453 gallons; common pota-

toes, 2,391,662 bushels; sweet potatoes, 802,111; peas and beans, 119,926; bees-wax, 32,557 pounds; honey, 1,171,009; domestic wine, 62,360 gallons; clover-seed, 2331 bushels;

TABLE I.—Temperatures.

	January	February	March	April	May	June	July	August	September	October	November	December
Max. Temp.	61	67	75	82	87	94	96	96	93	87	80	74
Min. Temp.	21	27	32	37	42	48	53	57	61	65	68	71
Mean Temp.	41	47	53	59	64	71	74	76	77	76	74	72
Max. Wind	10	10	10	10	10	10	10	10	10	10	10	10
Min. Wind	10	10	10	10	10	10	10	10	10	10	10	10
Mean Wind	10	10	10	10	10	10	10	10	10	10	10	10
Max. Rain	10	10	10	10	10	10	10	10	10	10	10	10
Min. Rain	10	10	10	10	10	10	10	10	10	10	10	10
Mean Rain	10	10	10	10	10	10	10	10	10	10	10	10

TABLE II.—Rainfall and Barometer.

	January	February	March	April	May	June	July	August	September	October	November	December
Rainfall	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5
Barometer	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Max. Bar.	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Min. Bar.	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0
Mean Bar.	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0	30.0

toes, 2,391,662 bushels; sweet potatoes, 802,111; peas and beans, 119,926; bees-wax, 32,557 pounds; honey, 1,171,009; domestic wine, 62,360 gallons; clover-seed, 2331 bushels; flax-seed, 14,657; grass seed, 1,896. Other products: butter, 11,874,958 pounds; cheese, 113,419; milk sold, 1,345,779 gallons. Of some of these crops we have later statistics from the usually accurate estimates of the agricultural department. If the census statistics are correctly in the way of under-estimate. The following are the figures for the year 1871: farm value, \$8,131,000; stock, valued at \$2,478,130; wheat, 1,100,000 bushels, worth \$8,742,200; rye, 1,107,000 bushels, worth \$82,000; oats,



7,037,000 bushels, worth \$2,533,320; barley, 218,000 bushels, worth \$218,000; buckwheat, 3600 bushels, worth \$3096; common potatoes, 1,797,000 bushels, worth \$1,076,940; tobacco, 152,000,000 pounds, worth \$10,944,000; hay, 337,900 tons, worth \$1,392,706. The land under cultivation that year in these crops was reported at 3,732,042 acres. In 1870 the value of the entire live-stock of the State was reported as \$66,287,343, and the numbers were—317,034 horses, 99,230 mules and asses, 247,615 milch cows, 69,719 working oxen, 382,993 other cattle, 936,765 sheep, and 1,838,227 swine. The report of the agricultural department for Jan., 1874, estimates the number of horses at 343,900, of mules and asses at 83,600, of oxen and other cattle at 380,400, of milch cows at 229,400, of sheep at 808,100, of swine at 2,008,000, and the aggregate value of the live-stock of the State at \$50,950,792. We are inclined to believe that these are under-estimates, both as to number and value. A shrinkage in values of nearly \$16,000,000 is hardly probable.

**Manufactures.**—The latest published statistics of manufactures in Kentucky are those of the census of 1870. The comparatively slow development of manufacturing industry in the State makes this a matter of less moment than in the newer States, where the changes of a single year are marvellous. During the decade from 1850 to 1860 the increase of manufactures was rather from the increase in the price of the articles manufactured than from any addition to the number of establishments or employes. From 1860 to 1870 there was no more advance, especially after the war, but with the best and most permanent water-powers in the world, and an abundance of coal to generate steam, Kentucky is far behind many of the other States in the extent and variety of her manufactures. The discoveries of coal, iron, and petroleum in such extensive deposits may stimulate her citizens to greater activity. The manufacturing statistics of the State in 1870 were—number of establishments, 5390, for which the motive power was—steam-engines, 1147, with 31,928 horse-power; and 459 water-wheels, with 7640 horse-power. These establishments in 1870 employed 30,636 persons, of whom 27,697 were men, 1159 women, and 1790 children and youth; the estimated capital of these establishments was \$29,277,809; the wages paid, \$9,444,524; the raw material used, \$29,497,535; and the annual product, \$54,625,809. The greatest of these manufacturing interests in the State is the production of iron and iron goods, including pig iron, forged and rolled, castings of all sorts, and stoves, heaters, and hollow-ware. In 57 establishments there were produced in 1870 iron and articles of iron to the value of \$7,869,653; malt and distilled liquors come next, 176 distilleries and breweries, producing liquors valued at \$5,222,089; flouring-mill products, in 190 mills, are made to the extent of \$5,093,213; lumber planed and sawed is produced in 278 mills to the extent of \$3,748,809; tobacco, as chewing, smoking, snuff, and cigars, in 102 establishments to the extent of \$2,097,005; bagging in 11 factories to the amount of \$1,752,120; leather, tanned and curried, in 182 tanneries to the amount of \$1,693,574; furniture in 90 cabinet-shops to the amount of \$1,463,977; wool-carding and cloth-dressing, and woollen goods in 125 establishments to the amount of \$1,312,458; machinery of all kinds in 28 establishments to the value of \$1,453,426; agricultural implements in 44 factories to the amount of \$1,384,917; carriages and wagons in 325 establishments to the extent of \$1,339,909; clothing in 167 establishments to the amount of \$1,181,138; tin, copper, and sheet-iron ware in 127 shops to the extent of \$1,051,026; saddlery and harness in 212 shops to the amount of \$1,013,852; printing and publishing in 31 offices to the amount of \$842,210. The other more important manufactures were—book-binding, boots and shoes, bread and other bakery products, brick, bridge-building, cement, confectionery, cooperage, cotton goods, glassware, monuments and tombstones, paints, lead, and zinc, and sash, doors, and blinds. Of these only boots and shoes and bridge-building exceeded in the aggregate \$500,000.

**Mining.**—The census returns for 1870 in regard to the mining interests of Kentucky are singularly imperfect. Only 35 mines are reported, employing 925 persons, with a capital of \$761,450, paying \$312,486 wages, using \$31,083 of raw material, and producing ores, coal, etc. to the value of \$509,245. It is hardly beyond the truth to say that single mines produce a larger amount than this. "The coal resources of Kentucky," says Prof. Shaler, "are only exceeded by those of Pennsylvania, and the quantity of iron ore is probably not exceeded by any American State. The coal and iron products of the State already reach several millions in value, and are destined to have a great and rapid development."

**Railroads.**—Having a larger amount of water-communication in its navigable streams through almost every part

of its territory than almost any other interior State (estimated by Prof. Shaler at over 4000 miles), and provided with magnificent macadamized roads to most of its larger towns, Kentucky has not until recently felt the necessity for railroad extension to the same extent as most of the adjacent States. In 1841 there were but 28 miles of railroad in the State, and there was no increase till after 1848; in 1851 there were 94 miles; in 1860, 510; in 1862, 567; in 1872, 1123; and in Jan., 1875, 1519 miles in operation, the cost of the roads, with the equipment, being \$62,728,511. The principal roads, beginning on the eastern border of the State, are the Lexington and Big Sandy, beginning at Catlettsburg, at the mouth of the Big Sandy, where it connects by a bridge with the Chesapeake and Ohio from Huntington, and extending to Lexington, 118 miles; about 73 miles of this are now completed, and the whole will be in running order during the present year; the Eastern Kentucky, Riverton to Grayson, with two branches to coal-mines, in all 28 miles; the Elizabethtown and Paducah, 185 miles (this is to be continued from Elizabethtown to Lexington, to connect with the Lexington and Big Sandy); the Kentucky Central, with branches, 123 miles; the Louisville Cincinnati and Lexington, with the Cincinnati branch, in all 189 miles; the Louisville and Nashville, in all 436 miles; the Paducah and Memphis, 165 miles (of which about 53 miles are in the State); the Evansville Henderson and Nashville, 98 miles in the State to Guthrie; the Madisonville and Shawneetown R. R., about 55 miles; and several short railroads connecting with Southern or South-western lines.

**Finances.** The assessed valuation of the State in 1870 was \$409,544,244, of which \$311,479,694 was of real estate and \$98,064,600 was of personal property. The true valuation that year was estimated to be \$604,318,552. The total taxation of that year, not national, was \$5,730,118, of which \$2,254,413 was State, \$1,307,833 county, and \$2,167,872 town, city, etc. The State indebtedness was \$3,076,480, for which bonds had been issued, and \$816,000 floating debt. Four years of prosperity have increased materially the valuation of the State and diminished both its debt and its taxation. On Oct. 10, 1871, the entire debt was but \$2,720,710, of which \$1,652,317 was of bonds issued to the board of education, and not negotiable, and \$1,068,394 negotiable. On Oct. 10, 1872, this debt had been reduced to \$766,394, but \$200,000 in bonds had been authorized to meet a floating debt; the negotiable debt of the State therefore stood at \$966,394; the sinking fund at the same time amounted to \$1,691,991, or more than \$700,000 more than the negotiable debt. For the fiscal year ending Oct., 1873, the receipts from taxes were \$1,024,460, and the expenditures \$1,476,469, including some payments on the State debt which were ordered paid from the sinking fund. The State bonds are 5 and 6 per cent. bonds, and have commanded a ready sale at good prices.

**Commerce.**—Kentucky has a small amount of foreign commerce, Louisville, its chief city, being a port of entry, and exporting and importing directly to some extent; but its interior commerce is of great magnitude, variety, and importance. Its numerous navigable rivers, as well as its railroads and its macadamized roads, enable the State to send its products to market with great facility, and the imports rival the exports in quantity and value. The principal articles shipped are: tobacco, whisky, salt, beef, pork, bacon, flax, hemp, and cotton-baling stuffs, ropes and cordage, flour, ale and beer, iron, as pig iron and in castings of all kinds, etc. Horses, mules, and cattle are sent eastward in great numbers, the State maintaining the highest reputation for its horses both for racing and trotting purposes, and for service as carriage and family horses, its mules being of greater size and better quality than those of the other States, and its cattle being of the best breeds and in the best condition from the excellence of its pasturage. There are no statistics accessible which give the amount of this internal commerce at a later date than that of the census of 1870, and these only incidentally, but there can be no doubt that it annually reaches at least \$400,000,000.

**Banks.**—There were Nov. 1, 1874, 47 national banks, 1 of which was closing; the 46 in operation had a capital of \$10,018,900 paid in, \$9,381,850 of bonds on deposit, \$10,264,670 circulation issued, of which \$1,299,069 had been redeemed, and \$8,335,601 of circulation still outstanding. At the same date there were 45 State banks in operation, having an aggregate capital of about \$12,000,000; 3 savings banks, having a capital of \$450,000; amount of deposits not stated; and 38 private banking-houses, many of them with very large capital. There were Jan. 1, 1875, 12 fire and marine insurance companies in the State, 2 of them mutual, and the remainder having an aggregate capital of \$1,384,000, and assets of the whole (in 4 cases including notes) of \$1,889,656.33; liabilities aside from cap-

ital and net surplus, \$343,774.88; amount of insurance written during the year, \$47,425,263; premiums received during the year, \$47,568; losses paid during the year, \$244,738. At that time there was but 1 life insurance company in the State, the Southern Mutual Life at Louisville, organized in 1866, with \$100,000 capital, \$742,005 assets, \$629,631 liabilities, \$261,663 income, and \$201,678 ex-

penditures; 2166 policies for the aggregate amount of \$5,820,923 in force at that date.

*Population.*—We have endeavored to throw into tabular form as many facts in regard to the population of Kentucky, past and present, as possible. The earlier censuses are very defective in regard to the sex and ages of the colored population, whether free or slave, yet the annexed

Census year	Whites.	Free colored.	Slaves.	Total.	Males.	Females.	Native.	Foreign.	Of school age 5 to 18.	Of male age 15 to 45.	Of voting age over 21.	Colored population write.
1790	61,133	114	12,430	73,677	*32,211	*28,922						
1800	179,873	739	40,343	220,955	*93,956	*85,915						
1810	324,297	1,713	80,561	406,511	*168,805	*155,432						
1820	434,644	2,759	126,732	564,135	293,192	275,125						
1830	547,787	4,917	165,213	687,917	352,084	335,833			204,571			
1840	790,243	7,317	182,258	979,818	500,088	479,740			232,570			
1850	761,413	10,011	210,981	982,405	502,730	479,675	949,652	31,420	362,889		*119,243	*40,018
1860	919,484	10,684	225,483	1,155,651	592,321	563,363	1,095,885	59,799	428,466	*131,211	*191,391	*70,640
1870	1,098,692	22,210	none.	1,321,011	665,675	655,336	1,257,613	63,398	454,539	239,483	289,471	332,176

table will be found to contain some interesting statistics not heretofore tabulated. The density of the population to the square mile in 1860 was 26.07; in 1860, 30.94; in 1870, 35.33. The number of families in 1870 was 232,797, or 5.67 to a family; the number of dwellings, 224,969, or 5.87 persons to a dwelling. In 1870 the number of white males of all ages was 507,326, of white females, 479,740; of colored males, 108,391; of colored females, 113,906; of Indian males, 41; of Indian females, 61; the number of native males was 651,020, of native females, 626,593; of males of foreign birth, 34,655; of females of foreign birth, 28,743. The number of males of school age was 230,491, of females of school age, 224,018. The number of male citizens (i. e. voters) was 282,365.

*Education.*—The interests of higher education were subjects of thought and action very early in the history of the State. Transylvania University at Lexington (now merged in the Kentucky University) was organized and chartered in 1793, and other collegiate schools not long after; but very little attention was paid to free or popular education. Academies and private schools were established all over the State, and to these the sons and daughters of wealthy planters and manufacturers were sent, while a large proportion of the children of the poorer classes were entirely without instruction. There was no provision for common schools until 1821, when one-half of the clear revenue of the Bank of the Commonwealth was set apart for a school fund; and no system of public schools was established until 1838, though a bill for that purpose was passed in 1830. Under the organization of 1838 there was a board of education and a superintendent of public instruction appointed. Under this law each county could at its option vote to organize public schools within its own territory, and then avail itself of the aid of the school fund, which at this time amounted to a considerable sum. In a number of counties no organization took place, owing, it was said, to the impossibility of finding in the county three men who possessed the educational and other qualifications required for school commissioners. In 1854 provision was made by the legislature for the education of 150 teachers in the State University at Lexington. In 1870 a bill was passed for the reorganization of the school system, and in the winter of 1872-73 it was completely reorganized. Its

chief executive officer is now the superintendent of public instruction, elected for four years, and having a salary of \$3000 besides clerk hire. The board of education, who constitute his cabinet, consists of the superintendent, the attorney-general, the secretary of state, and two professional educators; the State board of examiners consists of the superintendent and two practical educators selected by him. There is also a county commissioner for each county, elected by the presiding county judges and the justices of the peace for two years, and a county board of examiners, consisting of the county commissioner and two well-educated and competent persons to sit with him, who are appointed by him. The school fund consists of the interest at 6 per cent. on \$1,327,100, a non-negotiable bond of the State, the dividends on 735 shares of the stock of the Bank of Kentucky, taxes on some other banks, and whatever distinct tax the people of the respective school districts may vote to impose upon themselves. Teachers' institutes are required to be held annually in July and August in each county by the county commissioners. The legal school year is five months of 22 days each; the scholastic age in the State is from 6 to 20 years. Provision was made by the legislature of 1874 for the establishment of schools for colored children, but on a basis so narrow and restrictive that it is doubtful whether it will be enforced very generally. The number of children of school age reported at the close of 1873 was 416,763; the number of schools was 3521, the number of teachers about 6000, the expenditure, aside from the interest on county school-bonds, was \$977,425.82. The interest in public school education in the State is evidently increasing. There were but 24 academies and high schools which reported to the superintendent of public instruction in 1873; these had 138 instructors and 2621 pupils. There are normal departments in three of the colleges of the State—Berea, Georgetown, and the Kentucky State University—and normal schools under private or associational control at Catlettsburg (6 teachers, 75 pupils, 3 years' course), Catlettsburg (6 teachers, 50 students, 3-5 years' course), and Lexington (American Missionary Association, 280 pupils). Besides these there are training-schools at Lexington and Frankfort. There are 12 universities and colleges in the State; the following were their statistics in 1873-74:

Name of university or college.	Place where located.	Number of students.	Value of grounds, buildings, and library.	Amount of endowment.	Income of productive funds.	Receipts from tuition and other sources.	Volume of books.
Berea College	Berea	5 44	\$115,000	\$91,000	\$1,330	\$29,000	1,500
Bethel College	Russellville	6 28	175,000	20,000	5,460	3,900	1,000
Chester College	Chester	11 100	20,000				
Centre College	Danville	6 75	70,000	180,000	11,000	2,800	7,000
Central University	Richmond	5 122	29	16,200			
Emmance College	Lancaster	8 45	50,000			15,000	1,500
Georgetown College	Georgetown	7 28	80,000	125,000			
Kentucky Medical Institute	Frankfort	6 17	75,000				
Kentucky University	Lexington	8 194	100,000	200,000	12,000	1,370	2,000
St. Mary's College	St. Mary	10 81	8,000				
Warren College	B. Wm. Green	3 62	15,000				
Wesleyan University	Mt. Vernon	1 35	13				

There were 11 colleges or seminaries for women, having 75 professors and instructors and 1940 pupils, of whom 742 were in the collegiate and 271 in preparatory studies. In all, music, both instrumental and vocal, is taught. These had libraries ranging from 500 to 5000 volumes; 1 had a gymnasium; 3, chemical laboratories; 4, philosophical cabinets; 2, natural history museums; and 1, an astronomical observatory. There were 10 professional and

scientific schools in the State in 1873, as shown in the table of professional schools on the next page.

*Libraries.*—In 1870, the census reported 10 public and private libraries in the State, with 160,000 volumes. Of these, 1172, having 318,900 volumes, were public. This number included 2 State libraries, with 6000 volumes; 10 town and city, with 1,140 volumes; 21 county and law libraries, with 61,290 volumes; 10 agricultural and college libraries, with 20,675 volumes (the colleges named above have 28,000 volumes, and the professional schools 25,000 more); 717 Sunday-schools, with 160,777 volumes;

\* Whites only enumerated.

† White children only enumerated.



207 church libraries, with 53,707, and no historical or circulating libraries; while the Public Library of Kentucky at Louisville has 45,000 volumes, the Historical Library in that city over 10,000, the Mercantile Library of the same

city more than 20,000, and Lexington and several other towns have circulating libraries. The number of private libraries reported is 4374, containing 1,590,245 volumes.

*Newspapers.*—In 1872, Kentucky had 105 newspapers,

Name of professorial school.	Place.	Number of instructors.	Students.	Value of grounds and buildings.	Amount of property funds.	Income from productive funds.	Receipts for 1874 from all other sources.	Volumes in library.
<b>I. THEOLOGICAL:</b>								
Bible College, University of Kentucky.....	Lexington.....	4	88	.....	.....	.....	.....	.....
Danville Theological Seminary.....	Danville.....	4	.....	\$24,000	\$189,000	\$11,500	.....	7,500
St. Joseph Seminary and College.....	Radstown.....	8	.....	20,000	1,800	.....	28,000	8,000
Theological School of Bethel College.....	Russellville.....	1	14	.....	.....	.....	.....	.....
Western Baptist Theological Institute.....	Georgetown.....	2	22	.....	48,000	.....	.....	3,000
<b>II. LAW:</b>								
College of Law, Kentucky University.....	Lexington.....	3	26	.....	.....	.....	.....	3,000
<b>III. MEDICAL:</b>								
Louisville Medical College.....	Louisville.....	12	217	.....	1,500	.....	.....	.....
Medical department, University of Louisville.....	".....	15	253	200,000	.....	.....	15,000	4,000
Louisville College of Pharmacy.....	".....	3	25	.....	1,000	30	70	100
<b>IV. SCIENTIFIC:</b>								
Agricultural and Mechanical College, Kentucky University.....	Lexington.....	11	67	181	273,000	165,000	9,900	7,089
								*20,000

an increase of 16 since 1870. Of these, 10 were dailies, having an aggregate circulation of over 40,000; 2 tri-weekly, circulation about 3000; 5 semi-weekly, circulation about 1,000; 76 weekly, circulation about 119,000; 12 monthly, circulation about 33,000. By far the greater part were political, at least four-fifths, but 8 were religious, having a circulation of over 25,000, and 3 professional, with a circulation of over 8000.

*Churches.*—According to the census of 1870, there were at that time in the State 2969 churches or congregations of all denominations, 2696 church edifices, 878,039 sittings, and \$9,824,165 of church property. The following table gives the statistics of the principal denominations, according to the census, and also later statistics, generally of 1874, where attainable, showing in this short time a great increase over the previous numbers:

Denominations.	CENSUS OF 1870				STATISTICS OF 1874					
	Churches and congregations.	Church edifices.	Sittings.	Value of church property.	Churches, edifices, and congregations.	Church edifices.	Ministers.	Members or communicants.	Adherent population.	S.S. teachers and scholars.
Baptists.....	1094	969	288,936	\$2,023,975	1367	1287	723	147,041	588,124	200
Disciples and Christians.....	400	446	141,585	1,046,075	515	502	313	51,372	205,000	300
Congregationalists.....	.....	.....	.....	.....	5	5	9	.....	1,854	487
Protestant Episcopal Church.....	38	35	15,800	570,300	30	27	41	2,277	17,000	344
Evangelical Association.....	5	5	3,000	150,000	8	7	6	1,000	5,000	10
Jewish synagogues.....	3	2	1,500	154,000	4	4	4	800	2,400	.....
Lutherans.....	7	7	1,650	16,000	10	8	5	1,008	5,000	.....
Methodist (Ch. South, mostly).....	978	818	244,918	1,854,565	1097	89	1132	120,303	480,000	400
Trinity (Gen. Assembly).....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
" " " South.....	289	270	97,150	1,275,400	327	301	231	27,188	118,000	.....
Presbyterian, other.....	17	15	3,000	17,000	.....	.....	.....	.....	.....	.....
Roman Catholics.....	130	125	72,550	2,604,900	203	11	175	.....	135,000	.....
Shakers.....	2	2	1,600	23,000	2	2	8	500	1,000	.....
Unitarian.....	1	1	700	75,000	2	2	2	250	1,200	.....
Universalist.....	2	2	400	5,500	4	4	5	175	800	.....
Union churches.....	3	15	4,650	28,750	25	20	21	2,500	10,000	.....

*Charitable Institutions.*—There is an institution for deaf mutes at Danville, Ky., organized in 1823, being one of the earlier institutions, the fourth organized in this country. In 1873 it had 5 instructors, 87 pupils (48 males, 39 females); the value of its buildings and grounds was \$100,000, and its annual expenditure \$20,312, of which nearly \$18,000 was appropriated by the State. There is an institution for the education of the blind at Louisville, founded in 1812, having 19 instructors and other employes, 59 pupils, property valued at \$90,000, and receiving from the State annually \$10,000, which covers its expenditures. There are 3 orphan asylums, all at Louisville, having in all 13 teachers, 152 children, and expending annually about \$15,000. Of 7 other orphan asylums in the State there is no recent report. There is an institution at Frankfort for feeble-minded children, but we have been unable to obtain any recent report of its condition. The house of refuge at Louisville is a municipal not a State institution; it has 16 teachers, 174 inmates (150 boys and 24 girls), its annual cost is about \$20,000, and the inmates earn about \$5000 per annum. There are two insane hospitals in the State—the Western, at Hopkinsville, and the Eastern, at Lexington—both well managed. The Kentucky penitentiary is at Frankfort. It has room for about 600 prisoners. It has not the reputation of being a model institution. The penal institutions of the State generally are susceptible of very great improvement. In 1870 there were 603 persons convicted of crimes which are punishable by death or imprisonment in the State penitentiary, and 1067 in prison charged with such crimes and awaiting trial. Of these, 968 were of native birth and 99 of foreign.

*Constitution, Government, Representation in Congress, etc.*

\* The University Library.

† There are no data for making a correct statement of the numbers of these two denominations in the State; the "Disciples" are by far the most numerous, but both denominations have been very negligent in collecting their statistics.

—The present constitution of the State was adopted in 1850. The governor, lieutenant-governor, auditor, attorney-general, and superintendent of public instruction are elected by the people for the term of four years. The governor is ineligible for the four years succeeding the expiration of his term. If a vacancy in the office of governor occur during the first two years of the term, it is filled by a new election; if during the last two years, the lieutenant-governor, and after him the Speaker of the senate, acts as governor. The treasurer is elected by the people every two years. The secretary of state is appointed by the governor, by and with the advice and consent of the senate. Senators, 38 in number, are elected from single districts for four years, one-half every two years. Representatives, 100 in number, are elected from single districts for two years. Sessions of the assembly are biennial, and cannot continue longer than 60 days without a two-thirds vote of all the members elected to each branch. The members are paid \$4 a day and 15 cents a mile for travel. Every male citizen who has resided two years in the State, one year in the county, and sixty days in the precinct in which his vote is offered, is entitled to vote. The court of appeals is the supreme court of the State, and has appellate jurisdiction over the final orders and judgments of all other courts of the State in civil cases, except where the amount in controversy is less than \$50, or in cases of judgment granting divorce, or on a judgment of an inferior court from which an appeal is given to the quarterly or circuit court. It has appellate jurisdiction in criminal cases where the fine is \$50 or more. The circuit courts have original jurisdiction in civil cases where the amount in controversy is \$50 and upwards, except where exclusive jurisdiction is given to other courts; appellate jurisdiction in certain cases specified; and criminal jurisdiction for the trial of all offences which may be prosecuted by indictment, and all prosecutions and final actions except where exclusive jurisdiction is given to other courts. There are also county

courts and justices' courts. All judges are justices of the peace. Judges of the court of appeals are elected by districts for a term of eight years, one every second year, and the judge having the shortest term to serve is chief justice. The circuit court judges are elected by districts for six years, and justices of the peace for four years. Under the apportionment of 1872, Kentucky is entitled to 10 Representatives in Congress.

**Counties.**—Kentucky is divided into 116 counties. The following was their population, divided into white and colored, in 1870, population in 1860, and valuation in 1870:

Counties.	Pop., 1870.	Whites, 1870.	Colored, 1870.	Pop., 1860.	Val., 1870.
Adair.....	11,065	9,229	1,835	9,509	\$1,768,973
Allen.....	10,296	9,192	1,104	9,187	1,818,615
Anderson.....	5,449	4,751	698	7,404	1,511,100
Ba Lard.....	12,576	11,099	1,477	8,692	2,190,588
Barron.....	17,780	14,157	3,623	16,665	3,353,784
Bath.....	10,115	8,143	2,702	12,113	2,694,168
Boone.....	10,896	9,684	1,012	11,196	5,006,325
Bourbon.....	14,863	8,186	6,677	14,860	11,982,490
Boyd.....	8,573	8,282	291	6,044	2,239,177
Boyle.....	9,515	5,836	3,679	9,304	4,123,535
Bracken.....	11,409	10,773	636	11,021	3,900,888
Breathitt.....	5,672	5,491	181	4,980	489,848
Breckinridge.....	13,440	11,758	1,682	13,236	3,784,286
Bullitt.....	7,781	6,587	1,194	7,289	2,419,859
Butler.....	9,494	8,761	733	7,927	1,566,207
Caldwell.....	10,826	8,748	2,078	9,318	2,206,472
Calloway.....	9,410	8,594	816	9,915	1,976,765
Campbell.....	27,066	27,123	282	20,909	8,724,696
Carroll.....	6,189	5,649	540	6,578	2,207,236
Carter.....	7,509	7,409	100	8,516	1,535,033
Casey.....	8,884	8,340	544	6,466	1,432,361
Christian.....	23,227	13,415	9,812	21,627	5,294,945
Clark.....	10,882	7,167	3,715	11,484	6,296,610
Clay.....	8,297	7,802	495	6,652	886,808
Clinton.....	6,497	6,205	292	5,781	870,279
Crittenden.....	9,381	8,572	809	8,796	1,769,651
Cumberland.....	7,690	6,181	1,509	7,340	1,254,948
Daviess.....	20,714	17,111	3,603	15,549	7,825,750
De Kalb.....	4,459	4,233	226	4,645	874,224
Elliot.....	4,433	4,411	22	.....	353,683
Estill.....	9,198	8,599	599	6,886	1,520,726
Fayette.....	26,656	14,142	12,513	22,599	14,790,457
Fleming.....	13,398	11,842	1,556	12,489	4,337,841
Floyd.....	7,877	7,706	171	6,388	685,255
Franklin.....	15,300	10,637	4,663	12,094	4,923,176
Fulton.....	6,161	5,224	937	5,317	1,434,348
Gallatin.....	5,074	4,474	600	5,056	1,862,731
Garrard.....	10,376	6,972	3,404	10,531	3,836,809
Gentry.....	9,529	9,020	509	8,356	2,841,682
Graves.....	19,398	17,069	2,329	16,233	3,732,053
Grayson.....	11,580	11,173	407	7,382	1,606,960
Green.....	9,379	7,142	1,937	8,806	1,219,875
Greene.....	11,463	11,002	461	8,760	2,949,187
Hancock.....	6,591	5,861	729	6,213	1,752,390
Hardin.....	15,705	14,129	2,276	15,189	3,728,882
Harrison.....	4,415	4,394	21	5,494	405,596
Hart.....	12,903	10,615	2,288	13,779	6,720,970
Hart.....	13,687	11,495	2,192	10,348	2,535,910
Henderson.....	18,457	12,467	5,990	14,262	6,151,182
Henry.....	11,066	8,028	2,438	11,949	5,262,399
Hickman.....	8,453	6,818	1,635	7,008	1,788,027
Hopkins.....	13,827	11,958	1,869	11,875	2,477,296
Jackson.....	15,417	4,496	51	3,087	355,385
Jackson.....	118,953	99,806	19,146	89,404	76,414,971
Jessamine.....	8,625	5,199	3,426	9,465	4,049,576
Johnson.....	7,494	7,373	21	5,506	684,049
Josh Bell.....	3,731	3,620	111	.....	264,914
Kenton.....	36,096	33,449	1,657	25,467	14,229,850
Knox.....	8,204	7,737	557	7,707	965,231
Lane.....	8,285	7,270	965	6,891	1,542,217
Laurel.....	8,016	5,872	1,144	5,448	864,922
Lawrence.....	6,197	8,376	121	7,601	1,152,310
Lee.....	3,055	2,924	131	.....	495,290
Leech.....	4,608	4,479	129	3,904	310,502
Lewis.....	9,115	8,887	228	8,361	2,319,310
Letcher.....	10,947	7,871	3,076	10,647	4,483,920
Letcher.....	8,200	7,147	1,052	7,213	1,509,182
Logan.....	20,429	14,706	5,723	19,021	12,001,459
Lyon.....	6,243	4,814	1,419	5,307	937,571
Madison.....	19,543	13,271	6,272	17,207	8,177,420
Madin.....	4,681	4,505	176	3,485	908,846
Martin.....	12,848	9,495	3,353	12,593	3,223,991
Marshall.....	9,455	9,070	385	6,882	1,487,155
Martin.....	new county	.....	.....	.....	.....
Mason.....	18,126	11,414	3,582	18,222	5,171,205
Meade.....	13,988	10,699	3,289	10,369	5,284,816
McLean.....	7,614	6,800	814	6,444	1,584,823
Meade.....	9,185	8,191	1,294	8,898	2,165,548
Menifee.....	1,386	1,970	16	.....	120,773
Meigs.....	13,141	9,834	3,310	15,791	4,129,231
Menard.....	7,934	7,073	861	6,745	1,301,995
Monroe.....	9,231	8,142	789	8,551	1,217,072
Montgomery.....	7,557	4,858	2,699	7,339	3,546,927
Morgan.....	5,675	.....	11	9,237	718,267
Muhlenberg.....	12,438	11,995	1,643	10,725	2,462,757
Nelson.....	11,804	10,886	3,918	15,799	5,339,210
Nicholas.....	9,129	7,885	1,244	11,030	3,090,359
Ohio.....	15,561	11,168	1,393	12,209	3,433,696
Oldham.....	9,927	6,217	2,810	7,283	3,194,252
Owen.....	14,300	13,143	1,156	12,719	2,588,130
Owsley.....	3,889	3,812	75	5,345	617,691
Pendleton.....	11,040	13,859	611	10,443	2,894,389
Perry.....	4,274	4,173	96	3,600	330,603

Counties.	Pop., 1870.	Whites, 1870.	Colored, 1870.	Pop., 1860.	Valuation, 1870.
Pike.....	9,562	9,460	102	7,384	\$1,100,000
Powell.....	2,599	2,360	239	2,247	343,819
Polk.....	17,670	16,595	1,075	17,201	2,258,090
Robertson.....	5,399	5,142	257	.....	1,025,147
Rockcastle.....	7,145	6,776	369	5,433	1,033,551
Rowan.....	2,991	2,959	32	2,282	388,688
Russell.....	5,809	5,516	293	6,024	1,057,697
Scott.....	11,607	7,651	3,955	14,417	6,722,370
Shelby.....	15,733	10,350	5,383	16,461	8,569,908
Simmons.....	9,573	7,405	2,167	8,146	2,333,749
Spencer.....	5,956	4,477	1,479	6,188	2,693,561
Spencer.....	8,226	6,376	1,850	7,481	1,402,094
Taylor.....	12,612	7,752	4,860	11,575	2,803,846
Tell.....	13,686	9,880	3,806	11,051	2,498,423
Tipton.....	5,577	5,114	465	5,880	1,739,680
Trimble.....	13,640	11,066	2,574	12,791	3,396,183
Union.....	21,742	15,375	6,367	17,320	7,072,222
Warren.....	12,464	10,354	2,110	11,775	3,364,004
Washington.....	10,602	9,927	675	10,259	1,419,585
Wayne.....	10,937	9,582	1,355	7,533	1,578,643
Webster.....	8,278	8,140	138	7,762	988,852
Whitley.....	3,693	3,575	18	381	381,255
Woodford.....	8,240	4,415	3,825	11,219	5,981,130
Totals.....	1,321,011	1,098,692	222,319	1,176,881	409,544,244

**Principal Towns.**—Louisville is the chief city of the State, and had in 1870 a population of 100,753; Covington in Kenton co., opposite Cincinnati, has nearly 30,000 inhabitants; Newport, Campbell co., and Lexington, Fayette co., have each between 15,000 and 20,000 inhabitants; Paducah, Franklin (the capital of the State), Mayville, and Bowling Green have from 5,000 to 10,000; Henderson, Owensboro', Versailles, Hopkinsville, Paris, Shelbyville, Danville, and Harrodsburg have less than 5,000. Russellville, Richmond, Lebanon, Cynthiana, Columbus, Franklin, Bardonia, and Elizabethtown are thriving towns.

**History.**—The territory now included in the State of Kentucky was during the greater part of the eighteenth century, and probably for several hundred years previously, the favorite hunting-ground and home of powerful and warlike tribes of Indians, who had given it the name of Kentucky, signifying "the dark and bloody ground." In 1769, Daniel Boone, an enterprising hunter and pioneer, came thither and established himself where now is Boonesboro'. Within the next six or seven years other pioneers settled in the territory, and among them such men as Knox, Bellin, Harrod, Henderson, Kenton, Calloway, and Logan, all of whom identified themselves with the subsequent history of the State. Virginia claimed this whole region as a part of her territory, and most of the pioneer settlers were from that colony, but they purchased their lands from the Indians. On May 23, 1775, the settlers met at Boonesboro', and in convention organized themselves as the "Assembly of Transylvania." They established courts, enrolled a militia force, and passed laws; but when their doings came to the knowledge of the Virginia legislature they were pronounced null and void, though grants of land were made to these pioneers. In 1776 the legislature of Virginia erected its territory S. of the Ohio into the county of Kentucky, embracing all the country lying between the Big Sandy River and the Mississippi. In 1783 this county was constituted a district, and the decisions of its civil and criminal courts were declared to be subject to appeal to the State courts of Virginia. Harrodsburg had been founded in 1774, and Lexington probably in the autumn of 1775. During the Revolutionary war the number of settlers rapidly increased, although, owing to the continual hostilities of the Indians, they were obliged to go constantly armed, and had numerous and fierce conflicts with the Cherokees and other Indian tribes. On Aug. 19, 1782, a bloody and desperate battle took place between the whites, who numbered only 182, and an Indian force of about 600, near Blue Lick Springs. Col. Boone was prominent in the battle, and lost a son in it. The Kentuckians were finally defeated with the loss of 60 of their number. In 1784 the people of the district urged that they might be recognized as a State and admitted into the Union of States. They held repeated conventions in 1784, 1785, and 1787, and the Virginia legislature passed an ordinance in 1784 granting a separate organization, but with conditions which caused delay and discontent. In Jan., 1787, the people in convention agreed to form a State and adopt a constitution, but there were hindrances on the part of Virginia; and intrigues on the part of the Spanish governor in Louisiana and of emissaries from Canada, both trying to draw away the district from its allegiance to the United States in turmoil, while the Indian hostilities and depredations were making the lives of the settlers wretched. At length, when the difficulties with Virginia seemed about to be settled, the American people made that the Constitution of the U. S. had been accepted and ratified, and the whole controversy in regard to the organization of the district was



a State was handed over to the general government. In 1790 it was made a separate Territory of the U. S., and on Apr. 19 the delegates of the people assembled once more in convention (the tenth of these assemblies, we believe at Danville, and reported a State constitution, which was soon after ratified, and under which Kentucky was admitted into the Union as a State on June 1, 1792. Its population was at that time about 75,000. For the next twelve or fourteen years the young State was often in an agitated condition. She had a vital interest in the free navigation of the Mississippi, and in its being at least in the hands of a friendly power. The treaty with Spain in 1795, and its subsequent violation by that power, and the repeated transfers of the territory bordering on the Gulf to and from France, its final purchase by the U. S., the intermeddling of the British government and the French minister with the matter, and the wild and treasonable schemes of Aaron Burr and his confederates, all tended to keep the people at fever-heat. In the war of 1812, Kentucky bore an honorable part, though she suffered severely at the battle of Frenchtown and in the barbarous massacre which followed it, and some of her best citizens were sacrificed in the unfortunate and ill-managed attempt to relieve Fort Meigs. Somewhat later a civil contest in the State, known as the "Old Court and New Court controversy," which virtually involved the question of the repudiation of a debt of doubtful legality by the State, was decided, greatly to her honor, by the maintenance of all her obligations, though they had been obtained by fraud. In the Mexican war the State sent more than her quota of volunteers to the conflict, and their gallant conduct in the field won them lasting renown. In the late civil war the State declared at first her strict neutrality in regard to both parties to the war, but as it proved

impossible to maintain this condition, the legislature, after the invasion of the Southern troops in Aug., 1861, engaged in correspondence with the opposing forces, and finally, after a very exciting discussion, gave in its adhesion to the Union, Nov. 27, 1861. The State was a recruiting-ground for both armies, and its people were almost equally divided in sentiment. It furnished in several instances the battle-fields in severe and hotly-contested actions, such as those of Mill Spring, Perryville, and Richmond, as well as in the minor conflicts of Cynthiana, Elizabethtown, Greensburg, Lebanon, London, Mount Sterling, Mumfordsville, Pound Gap, Prestonburg, Somerset, and Tobb's Bend, and suffered not only from the passage of large hostile forces across its territory, but from repeated raids to and through the State. It refused to ratify the fourteenth and fifteenth amendments to the Constitution, and is the only one of the border States which has remained constantly under Democratic control since the close of the war.

Governors of the State.—

	Term.		Term.
Isaac Shelby.....	1792-96	Charles A. Wickliffe	.....1839-40
James Garrard.....	1796-1804	Robert P. Letcher.....	1840-44
Christopher Greenup.....	1804-08	William Owsley.....	1844-48
Charles Scott.....	1808-12	John J. Crittenden.....	1848-50
Isaac Shelby.....	1812-16	John L. Helm (acting).....	1850-51
George Madison.....	1816-16	Lazarus W. Powell.....	1851-55
Gabriel Slaughter (act- ing).....	1816-20	Charles S. Morehead.....	1855-59
John Adair.....	1820-24	Bernab H. Magoffin.....	1859-61
Joseph Desha.....	1824-28	James F. Robinson.....	1861-63
Thomas Morehead.....	1828-32	Thomas E. Bramlette.....	1863-67
John Breathitt.....	1832-34	John L. Helm.....	1867-67
James T. Morehead (act- ing).....	1834-36	John W. Stevenson	.....1867-68
James Clark.....	1836-37	John W. Stevenson.....	1868-72
		Preston H. Leslie.....	1872-75

Electoral and Popular Votes for President and Vice-President.

Candidates.		Elect. Vote.	Pop. Vote.	Year.	Candidates.		Elect. Vote.	Pop. Vote.		
1792	George Washington P. ) George Clinton V.-P. )	4	1824	Andrew Jackson P. ) J. C. Calhoun V.-P. )	7	6,153	1852	Winfield Scott P. ) W. A. Graham V.-P. )	12	57,068
1796	Thomas Jefferson P. ) Aaron Burr V.-P. )	4	1828	Nathan Sanford V.-P. ) Andrew Jackson P. )	14	39,084	1856	Franklin Pierce P. ) W. R. King V.-P. )	...	53,806
1800	Thomas Jefferson P. ) Aaron Burr V.-P. )	4	1832	J. C. Calhoun V.-P. ) John Quincy Adams P. )	...	31,172	1860	James Buchanan P. ) J. C. Breckenridge V.-P. )	12	74,642
1804	Thomas Jefferson P. ) George Clinton V.-P. )	8	1836	Richard Rush V.-P. ) Henry Clay P. )	...	31,172	1864	John C. Fremont P. ) W. L. Dayton V.-P. )	...	314
1808	James Madison P. ) George Clinton V.-P. )	7	1840	John Sergeant V.-P. ) Andrew Jackson P. )	15	49,396	1868	Millard Fillmore P. ) A. J. Donelson V.-P. )	...	67,416
1812	James Madison P. ) Elbridge Gerry V.-P. )	12	1844	Martin Van Buren V.-P. ) W. H. Harrison P. )	...	33,247	1872	Abraham Lincoln P. ) Hannibal Hamlin V.-P. )	...	1,364
1816	James Monroe P. ) D. D. Tompkins V.-P. )	12	1848	Francis Granger V.-P. ) Martin Van Buren P. )	15	58,955	1876	J. C. Breckenridge P. ) Joseph Lane V.-P. )	...	53,143
1820	James Monroe P. ) D. D. Tompkins V.-P. )	12	1852	R. M. Johnson V.-P. ) W. H. Harrison P. )	...	33,435	1880	John Bell P. ) Edward Everett V.-P. )	12	66,058
			1856	John Tyler V.-P. ) Martin Van Buren P. )	15	58,489	1884	Stephen A. Douglas P. ) Herschel V. Johnson V.-P. )	...	25,651
			1860	R. M. Johnson V.-P. ) James K. Polk P. )	...	32,616	1888	Abraham Lincoln P. ) Andrew Johnson V.-P. )	...	27,786
			1864	George M. Dallas V.-P. ) Henry Clay P. )	...	51,988	1892	George B. McClellan P. ) G. H. Pendleton V.-P. )	11	64,301
			1868	T. Frelinghuysen V.-P. ) Zachary Taylor P. )	13	61,253	1896	Ulysses S. Grant P. ) Schuyler Colfax V.-P. )	...	39,566
			1872	Millard Fillmore V.-P. ) Lewis Cass P. )	12	67,141	1900	Horatio Seymour P. ) Francis P. Blair, Jr., V.-P. )	11	115,889
			1876	W. O. Butler V.-P. ) W. O. Butler V.-P. )	...	49,720	1904	Ulysses S. Grant P. ) Henry Wilson V.-P. )	...	88,970
							1908	Horace Greeley P. ) B. Gratz Brown V.-P. )	12	100,208
							1912	Charles O'Connor P. ) Charles O'Connor P. )	...	2,374

For most of the data concerning the topography, geology, etc. of Kentucky we are indebted to Prof. N. S. Shaler, State geologist of Kentucky and professor in the Lawrence Scientific School, Cambridge, Mass.

L. P. BROCKERT.  
**Kentucky**, tp. of White co., Ark. Pop. 443.  
**Kentucky**, tp. of Jefferson co., Kan. Pop. 1976.  
**Kentucky**, tp. of Nicholas co., W. Va. Pop. 615.

**Kentucky River** rises in the mountains of Letcher co., flows in a tortuous north-westerly course some 250 miles, reaching the Ohio at Carrollton. Its middle and S. forks join the main stream in Owsley co. Its head-streams flow through a rough region, abounding in iron, coal, and salt. Great amounts of money have been expended in improving the navigation of this beautiful stream, which steamboats now ascend to Frankfort, 60 miles, and flat-boats for 150 miles. At high water cargoes are floated down from its head-streams.

**Kentville**, post-v., cap. of King's co., Nova Scotia, on the river Cornwallis and on the Windsor and Annapolis Railway, 59 miles N. E. of Annapolis. It contains the principal offices, car-shops, and engine-house of the railway, and has 1 weekly paper. The scenery is fine, the soil fertile, the mineral wealth great. Pop. of sub-district, 1779.

**Ken'yon**, post-tp. of Goodhue co., Minn., 14 miles E. of Faribault. Pop. 633.

**Kenyon** (JOHN), b. in Jamaica about 1783, son of a wealthy planter; was educated at the Charter-house, London, and at Peterhouse College, Cambridge; cultivated the friendship of Coleridge, Southey, and Wordsworth, and published two or three volumes of verses, not without merit; but will be chiefly remembered for the generosity with which he distributed his large fortune among eighty legatees, many of whom were distinguished in literature. B. W. Procter (Barry Cornwall) received £6500; Dr. Henry Southey, £8000; Robert and Elizabeth B. Browning (the latter his cousin), £10,000. D. at Cowes, Isle of Wight, Dec. 3, 1846.

**Kenyon** (LLOYD), LORD, b. at Gredington, Flintshire, Wales, Oct. 5, 1732; studied at the Middle Temple; was called to the bar in 1756; was associated in practice with Dunning; became attorney-general in 1782; master of the rolls in 1784; and on the retirement of Lord Mansfield was by Pitt made chief-justice of the king's bench, with the title of Lord Kenyon, Baron Gredington—a post which he held till his death, which occurred at Bath in 1802. He made an immense fortune at the bar, but was disliked for his arrogance. His grandson, George J. Kenyon, published a *Life* (Lon., 1873), for the purpose of justifying his character.

**Kenyon College**, situated at Gambier, O., comprises three distinct schools—the theological seminary, Kenyon College, and the grammar school. It was founded in 1826 under the corporate name of the Theological Seminary of the Protestant Episcopal Church in the diocese of Ohio, and opened at Worthington, near Columbus, with the purpose of rearing up ministers of the gospel in the midst of the habits and circumstances and with all the facilities of economy of the Western country. As pupils in elementary science and the classics increased, an act of the legislature was obtained by which the president and professors were constituted the faculty of a college by the name of Kenyon College, and the institution, thus modified and enlarged, was transferred to Gambier in 1828. The growth of the institution is shown by the institution of its professorships: Latin and Greek in 1825; intellectual and moral philosophy in 1829; mathematics, natural philosophy, and chemistry in 1830; logic and rhetoric in 1834; mathematics and civil engineering, separate from natural philosophy and chemistry, in 1854; English literature and history in 1856; and in the theological department: systematic divinity in 1830; ecclesiastical polity, pastoral divinity, and sacred literature in 1833; ecclesiastical history in 1837; and pastoral theology in 1860. In 1839 the seminary and college faculties were organized separately by an act of the legislature, which conferred upon the former power to confer degrees in divinity, and upon the latter power to confer degrees in the arts and sciences. The situation of the college is beautiful and healthy, on a headland to the N. of the valley of the Kokosing, and in easy communication with Cleveland, Sandusky, Columbus, and Cincinnati. Its buildings are elegant and comfortable. Its property—real-estate, buildings, farmlands, and endowments for professorships—amounts to \$450,000. According to the constitution adopted in 1824, recognized by the act of incorporation, and modified in 1870, the board of trustees consists of the bishops of all dioceses which may embrace territory now within the limits of the diocese of Ohio, the assistant bishop of the diocese in which the seminary is situated, the president of Kenyon College, 4 clerical and 4 lay trustees chosen for terms of ten years by the board of trustees, 3 clerical and 3 lay trustees elected for terms of three years by the diocesan conventions, and 2 clerical and 2 lay trustees chosen by the alumni for terms of four years. At the publication of the triennial catalogue in 1873 the number of graduates was 553—namely, from Kenyon College 453, and from the theological seminary 170; 68 were graduates of both schools.

ELI T. TAPPAN.

**Ke'okuk**, county of S. E. Iowa. Area, 576 square miles. It is well watered, and consists of prairie lands with groves of trees. The soil is good. There are productive mines of coal. The county is traversed by a branch of the Chicago Rock Island and Pacific R. R. Cattle, grain, and wool are staple products. Carriages and wagons are leading articles of manufacture. Cap. Sigourney. Pop. 19,134.

**Keokuk**, city, cap. of Lee co., Ia., on the W. bank of the Mississippi River, near its confluence with the Des Moines, about midway between Burlington and Quincy, 136 miles S. E. of Des Moines, and 200 miles above St. Louis. It lies at the foot of the lower rapids, which are 12 miles long with a fall of 24 feet, and is at the head of navigation for the larger class of steamboat navigation; is a port of delivery, and being in the extreme S. E. corner of the State, has received the name of "Gate City." Keokuk is built on limestone bluffs 150 feet high, overlooking the river, and surrounded by a rich and productive district; is well built, chiefly of brick, Main street, the principal thoroughfare, being 100 feet wide and more than a mile in length. A magnificent iron railroad and highway bridge, 2300 feet in length, spans the Mississippi; 6 lines of steam packets ply daily to and fro; 6 railroads are completed and 3 others are projected. It has 20 churches, 4 banks, 2 daily and 3 weekly newspapers, 1 religious monthly in Swedish, 1 medical college, 1 large public-school buildings (brick, costing \$125,000), a U. S. court-room, a public library, gasworks, a loan and building association, and several large pork packing establishments. A large wholesale business is done in dry goods, groceries, boots and shoes, and all kinds of merchandise. The U. S. government is constructing a ship-canal, 9 miles long and not less than 300 feet wide, around the lower rapids at a cost of about \$8,000,000. By it a first-class water power will be secured for manufacturing purposes. Pop. in 1850, 2478; in 1860, 8136; in 1870, 12,766.

EMIL J. LEECH, Sec. of Citizens' Association.

**Keokuk**, tp. of Wapello co., Ia. Pop. 700.

**Keokuk Junction**, post v. of Adams co., Ill., at the junction of the Galesburg and Quincy division of the Chicago Burlington and Quincy R. R. and the Keokuk branch of the Toledo Wabash and Western R. R.

**Ke'osauqua**, post v., cap. of Van Buren co., Ia. It has 1 weekly newspaper. Pop. 869.

**Keo'wee**, post tp. of Geonce co., S. C. Pop. 1129.

**Kepler**, or **Kepller** (JOHANN), b. at Magstadt, near Weil, Württemberg, Dec. 27 (or 21), 1571. His father, Henry Kepler, was a soldier in the Netherlands under the duke of Alva; his mother, Catherine Guldenmann, was daughter of an innkeeper, and was unable to read or write. Johann came into the world by a premature birth, and experienced a severe attack of smallpox at six years of age, and another nearly mortal illness at thirteen, which left permanent traces upon his constitution, so that he was a sufferer through life from fevers and periodical diseases. In early childhood he was taken from school to serve as waiter in a miserable inn his father had set up at Ehrendingen, but as the business did not prosper, the father enlisted as a soldier against the Turks and was never heard from again. Young Kepler, having had to suffer from the severities of his mother, sought refuge with an only sister married to a Protestant minister, and the latter, finding the boy too feeble to work in the fields, obtained for him in 1586 admission to a Protestant monastic school at Maulbronn; and having shown aptness for learning, he was sent in 1588, at the expense of the duke of Württemberg, to the University of Tübingen to prepare for the ministry, and took his degree of M. A. in 1591. His theses on theological topics exhibited too great freedom to merit the approbation of that faculty, and, abandoning his studies in that department, he turned with eagerness to the astronomical theories of Copernick (Copernicus) as expounded by Mästlin. His proficiency was such that in 1594, at the age of twenty-two, he was appointed professor of mathematics at the University of Grätz in Styria, where the same year he published an almanac, and in 1596 a cosmographical treatise filled with crude fancies drawn from a mixture of theology with mathematics. In 1597 he married a beautiful widow of noble birth, Barbara Muller von Mulech, and was required by her to produce proofs of his own nobility, which he is said to have done, but the evidences furnished by the innkeeper's son could scarcely have been very satisfactory; at all events, the union was not a happy one. In 1599 a series of religious persecutions began in Styria, and culminated two years later in the expulsion of the Protestant professors from the University of Grätz. Kepler had visited Tycho Brahe, the most eminent astronomer of the time, at Benach, near Prague, in 1600, and joyfully accepted an invitation to aid him in the calculation of a new set of "Rudolphine" astronomical tables ordered by the emperor Rudolph II., who was ambitious of scientific honors and wished to replace the Ptolemaic and Copernican tables by others bearing his own name. Unfortunately, Kepler, who entered upon his new labors in Sept., 1601, as assistant imperial mathematician, found it impossible to live in harmony with Tycho. The latter doled out a niggardly salary florin by florin, and Madame Kepler had to make personal solicitations in order to collect anything. Tycho died the following month (Oct. 24), and Kepler succeeded to his post, with a nominal salary of 1500 florins per annum, but the imperial treasury being low and payments rare and irregular, he had to eke out a livelihood by casting nativities. Astrology was then an admitted branch of astronomy, and in a treatise on that subject, *De Fundamentis Astrologie* (1602), Kepler expounded the influence of planetary conjunctions upon human destinies. A treatise on optics, *Paropticonum ad Vitellionem* (1604), exhibited accurate researches into the structure of the eye, and furnished the formulas which have been ever since employed in the calculation of eclipses. In a work published in 1606, *De Stella Nova in pede Serpentarii*, etc., Kepler, besides describing a new star in the constellation of the Serpent, made the correction of four years in the date of the birth of Christ which has since been accepted. In 1609 appeared his greatest work, the *Astronomia Nova*, compiled from the observations of Tycho Brahe, supplemented by his own, in which the motions of the planet Mars were made the basis for two of the important corrections of the received astronomical theories known as Kepler's Laws—namely, the ellipticity of the planetary orbits, and the fact that the RABBIT VECTOR (which swept every planet passes over equal areas in equal times. These brilliant discoveries were, as Kepler truly said in his title-page, "wrought out by persistent research extending over many years" (*plurimum annorum pertractata studii et laboris*), the mathematical calculations having been ten times repeated for every opposition of Mars, and each filling ten pages of figures. All this was without the aid of logarithms, which were not invented until five years later (by Napier in 1614). Kepler's worldly position was not improved by these wonderful researches; his salary was 12,000 crown in arrears; the emperor refused him permission to accept a professorship



elsewhere; he lost his wife and three sons by the smallpox; a conflict arose between Rudolph and his brother Matthias for the crown of Bohemia; Prague was attacked by the troops of the former (1611), and was devastated by the plague. Rudolph, having resigned the crown the same year, died at Prague soon after (Jan. 20, 1612), and Matthias having become emperor of Germany, as well as king of Bohemia, confirmed Kepler as imperial astronomer, allowed him to accept the professorship of mathematics at the University of Linz, and in 1613 summoned him to the diet at Ratisbon to persuade the Protestant princes of the necessity of accepting the Gregorian correction of the calendar, for which purpose he wrote a short treatise. In 1615 he married his second wife, Susanna Rettinger, after a careful scrutiny of the comparative advantages of an alliance with no less than eleven ladies, an estimate of whose characters he has left on record in a letter to Baron Strahlendorf. About the same time his aged mother, who still lived in the duchy of Würtemberg, became a victim of her son's scientific reputation. She was formally accused of "having learned magic from an aunt, who was burned as a witch, of having frequent interviews with the devil, of being unable to shed tears, of killing the pigs in the neighborhood by riding them at night, of not being able to look in the eyes of persons with whom she talked, and of having hired the gravedigger to exhume her husband's skull to make of it a cup for a present to her son Kepler." This trial lasted five years, and only a personal appeal (in 1620) made by Kepler to the grand duke saved his mother from the flames. She was released only after every ignominy short of actual torture, though bravely maintaining her innocence, and d. in 1622. At Linz, Kepler was now denounced by the Catholic priests as not only a heretic, but as the son of a witch. During these sufferings he had worked out the third and greatest of his immortal laws—namely, "that the squares of the periods of revolution of any two planets are to each other as the cubes of their mean distances from the sun." This discovery was made, as Kepler was careful to record, on May 15, 1618, after seventeen years of study upon the observations of Tycho; it was published in 1619 at Linz, in a folio volume, *Harmonices Mundi Libri V.*, dedicated to King James I. of England, the father-in-law of the elector palatine, who had just become king of Bohemia, and whose claims to the imperial crown gave rise the same year to the Thirty Years' war. The rival candidate, Ferdinand II., deposed as king by the states of Bohemia in the same month that he was elected emperor of Germany (of the Romans), desired to conciliate the favor of men of science; he offered to pay Kepler's arrears of salary and to enable him to issue the "Rudolphine Tables," but the breaking out of the great war postponed for years the fulfillment of the promise. At last, after a delay of a quarter of a century, they were published at Ulm in 1627. At the invitation of Wallenstein, Kepler removed in 1629 to Sagan in Silesia, and soon after received an appointment as professor at the University of Rostock. Having gone to Ratisbon in 1630 to negotiate in vain for the payment of his long arrears of salary, he d. there Nov. 15, and was buried in St. Peter's churchyard, the spot being now covered by a temple monument erected to his memory in 1803. He composed his own epitaph in the following striking words:

"Mensus eram cœlos, nunc terræ motior umbras;  
Mens cœlestis erat, corporis umbra jacet."

("I have measured the heavens: I now measure the shades of the earth. The mind was of heavenly origin; only the shadow of the body lies here.") Kepler published, besides the works already specified, an abstract of the Copernican system, *Epitome Astronomicæ Copernicæ*, in VII. *Libros digesta*, etc. (Linz, 2 vols., 1618-22; a treatise on *Dioptries* (Frankfort, 1611; London, 1653), which in the opinion of Sir David Brewster laid the foundation of optics; a small work on *Comets* (1619); several series of *Ephemerides*, and numerous minor productions on astrology or other subjects, written chiefly for bread. His total published works were 33 in number, and he left 22 volumes of MSS., of which those containing the correspondence were printed in 1718, and the remainder were included in a new edition of all his works published at Frankfort in 8 vols. (1858-70).

PORTER C. BLISS.

**Keppel** (Augustus), Viscount, b. Apr. 2, 1725, was a son of the second earl of Albemarle; entered the navy in 1740; circumnavigated the world with Lord Anson; was made rear-admiral in 1762. For many years he was very successful in isolated naval engagements, commanding a single vessel or a small squadron. In his only general engagement with the French, which took place near Ushant in July, 1778, the victory remained uncertain, and Keppel was tried by court-martial, but acquitted, and his conduct approved. He was several times first lord of the admiralty;

was in 1782 made Viscount Keppel of Elvedon, and d. in Suffolk Oct. 2, 1786.

**Keppel** Sir Henry, K. C. B., a younger son of the earl of Albemarle, and an admiral in the English navy, b. June 14, 1809; entered the navy at an early age; was lieutenant in 1829, commander in 1833, captain in 1837, commodore in 1856, vice-admiral in 1867, and full admiral in 1869. His early service was on the East India, Mediterranean, and Cape of Good Hope stations, and on the coast of China, where he commanded the *Dido* 1841-45; in the Crimean war he commanded the naval brigade before Sebastopol; was again (1856-57) in command on the Chinese waters, and created K. C. B. for the destruction of a Chinese war-fleet; naval commander-in-chief at Cape of Good Hope 1860, from whence he was transferred to the Brazilian station; vice-admiral and commander-in-chief on the China and Japan station 1867-69, returning to England in the latter year as admiral. Author of *Expedition to Borneo and Visit to the Indian Archipelago*.

**Keratine** (Gr. *κερας*, "horn") (another name that has been proposed is **Elastine**), a chemical term which has been introduced to designate a supposed specific substance forming the basis of a large class of animal substances, such as horns, hoofs, nails, claws, wool, hair, feathers, cuticle, etc. No sufficient correspondence has yet appeared, however, in analyses of preparations made by any of the methods yet tried upon these substances, to justify the establishment of a specific name for all. The entire insolubility of all of them in all solvents yet tried—except alkalis, which show chemical change by evolving sulphuretted hydrogen—has been the obstacle to their purification. After boiling them in fine shavings with water, alcohol, ether, concentrated acetic acid, and dilute soda, until all is removed soluble in these agents, Scherer found mean results about as follows:

	Buffalo horns.	Human nails.
Carbon .....	51.23	50.94
Hydrogen .....	6.66	6.77
Nitrogen .....	17.18	16.80
Oxygen .....	24.23	24.99
Sulphur .....	0.70	0.50
Ashes .....	100.00	100.00

Another chemist, named Lear, found, as a mean of two analyses of human hair, calculated without the ashes—

Carbon .....	50.42
Hydrogen .....	6.34
Nitrogen .....	17.33
Oxygen .....	20.91
Sulphur .....	5.00
	100.00

Lear made also some examinations of the ashes of hair of different colors:

	Percentage of ashes.	Peroxide of iron
Brown hair .....	From 0.32 to 1.10;	from 0.06 to 0.39
Black hair .....	" 1.02 " 1.15;	" 0.08 " 0.21
Red hair .....	" 0.54 " 1.87;	" 0.17 " 0.27
Gray hair .....	" 0.75 " 1.00;	" 0.23

Other constituents of the ashes were chloride of sodium, sulphates of lime and magnesia, phosphate of lime, and silica. Comparing the composition of hair with that of the proteids (see article on **ALBUMEN**), it appears that its carbon and hydrogen are somewhat less, its nitrogen somewhat less, and its oxygen about the same; but the main difference appears to be in the sulphur, which is four or five times as large. According to some fashionable notions of the day, as that of phosphoretted food to nourish the brain and bones, and so forth, sulphuretted food should possibly stimulate the growth of the hair; but there is as yet little probability, and less evidence, of the validity of such notions.

HENRY WURTZ.

**Kératry, de** (Auguste HILARION), b. at Rennes Oct. 28, 1769. After the restoration of the Bourbons he was a warm and courageous supporter of liberal measures, and contributed very much to the revolution of 1830. Louis Philippe made him a peer of France in 1837. He opposed Napoleon strongly, and after the *coup d'état* he lived in retirement. D. in Nov., 1859. Besides a great number of pamphlets and minor essays, among which was *Questions à l'ordre du jour* (1837), he wrote several large novels and books of art-criticism: *Frédéric Scudall* (1827), *Saphira* (1835), *Du beau dans les arts d'imitation* (1822).

**Kératry, de** (EMILE), Count, son of Auguste, b. in Paris Mar. 20, 1822. From an old feudal family of Brittany, he abandoned its legitimist traditions, served as a volunteer during the Crimean war, then as a French guerillero in the Mexican campaign 1863-65, and published afterwards in several reviews some articles denouncing the frauds and impolicy of the imperial intervention in Mexico. He thus gained some celebrity, and in 1869 was returned to the Corps Législatif as an opposition deputy by the Brest electoral district. When the revolution of 1870 burst out, Kératry



was made at first prefect of police of Paris; then as general of division he organized nearly fifty battalions in Bretagne; came into conflict with Gambetta and the lawyers, whom he accused of incapacity; and was prefect of Toulouse and of Marseilles under the Thiers government (1871-72).

FÉLIX AUCAGNE.

**Kerbe'la**, or **Meshe'd-Hosse'in**, a city of Asiatic Turkey, province of Irak Arabi, 50 miles S. W. of Bagdad. Pop. estimated at 20,000. It has five gates, a well supplied bazaar, and 7 caravanseries, and derives great sanctity in Mohammedanism from the magnificent tomb of Hossein, who was killed there. It is a place of pilgrimage, largely inhabited by Persians, and much coveted by Persian monarchs.

**Ker'foot** (JOHN BARRETT), LL.D., b. Mar. 1, 1816, at Dublin, Ireland, and educated at Flushing Institute and St. Paul's College, N. Y., whence he graduated in 1834; was ordained deacon Mar. 1, 1837; priest, Mar. 1, 1840; and bishop of the diocese of Pittsburgh Jan. 25, 1866; received the degree of D. D. from Columbia College, N. Y., in 1850, and from Trinity College, Conn., in 1865; and the degree of LL.D. from the University of Cambridge, England, in 1867; was president of St. James's College, Md., 1812-64, and of Trinity College, Hartford, Conn., 1864-66; and published baccalaureate and other college addresses, sermons, episcopal addresses, and charges.

**Kerguelen Land**, an island in the Indian Ocean, taking its name from the French navigator who discovered it in 1772, 100 miles long and 50 miles broad, is situated in lat. 49° 54' S. and lon. 70° 10' E. It has many bays and inlets, and a harbor at the northern extremity was one of the stations for American and British observers of the transit of Venus in Dec., 1874. Seals formerly abounded, but are now extinct; large flocks of wild fowl still remain. The island is barren, covered with moss, and has but a few flowering plants, the most important of which is the so-called "Kerguelen's Land cabbage," the *Pringlea anti-scorbutica*, a cruciferous plant, having a head somewhat like that of the cabbage. It has pungent qualities, like those of horse-radish and mustard, and abounds in a volatile oil. It is antiscorbutic, and is valued as food by mariners.

**Kerkook'**, a large town of Koordistan, Asiatic Turkey, 100 miles S. E. of Mosul and 130 miles N. of Bagdad. Pop. 13,000. The town stands on a commanding eminence nearly perpendicular on all sides; it has numerous mosques and three Catholic churches. Near by are inexhaustible supplies of naphtha, which is the principal commodity.

**Kerlerec, de** (LOUIS BILLOUET), CHEVALIER, b. at Quimper, France, in 1704; entered the marine corps at seventeen years of age; was in fourteen campaigns, distinguishing himself on board the Neptune in the memorable combats of Aug. and Oct., 1746, and Oct. 21, 1747, in the latter of which he was in command after his superiors had been killed or wounded. In 1752 he was appointed governor of Louisiana, and remained at that post for ten years, comprising the whole period of the Seven Years' war. Returning to France in 1764, he was charged with pecculation and undue severity, and thrown into the Bastille. Sentence of exile was pronounced in 1769, but he was about to submit new evidences to the tribunal when he d. at Paris Sept. 9, 1770. He wrote memoirs upon Louisiana, never published and supposed to be lost.

**Kerman'**, the ancient *Caramania*, a province of Persia, extending along the Gulf of Persia, from Farsistan in the W. to Beloochistan in the E. It comprises an area of about 65,000 square miles, with only 600,000 inhabitants. The northern part is a desolate plain, where no life can exist, and even the southern mountain-land, though interspersed with fertile and beautiful valleys, is mostly barren and rugged rocks. The province is very little known, however, with the exception of the route from Beloochistan along the southern border of the desert, and that from the capital, Kerman, to the sea-coast. The province has a breed of camels and goats which are famous for their long, silky hair.

**Kerman**, town of Persia, the capital of the province of Kerman, in lat. 29° 18' N. and lon. 56° 30' E. It was formerly much more flourishing than now, which is apparent from the fields of ruins that surround it, but its manufactures of shawls and carpets are still celebrated, and it has some importance as a fortress. Pop. 30,000.

**Kermaushah'**, town of Persia, the capital of a district of the same name in the province of Irak Ajem, in lat. 34° 30' N. and lon. 46° 37' E. It is a flourishing town, with elegant mosques and palaces and beautiful promenades, and is noted for the manufacture of Persian carpets. In the vicinity is the celebrated rock of Behastan, whose trilingual inscription furnished the key to the Assyrian and old Persian languages. It carries on a very brisk trade with Bagdad, Teheran, and Ispahan. Pop. 35,000.

**Ker'mes** [Arab., "little grub"], or **Scarlet Grain**, a dyestuff formerly once used extensively for producing a blood-red. It is still employed in Spain, Africa, and the East, but is to a great extent replaced elsewhere by Cochenille, which see. Kermes is the dried bodies of *Coccus ilicis*, an insect inhabiting the kermes oak, an evergreen shrub-oak of Spain and the Levant. Kermes furnishes a more durable but less brilliant color than cochineal.

**Kermes Mineral**, amorphous trisulphide of antimony, essentially Sb<sub>2</sub>S<sub>3</sub>. The preparation used in medicine contains oxide of antimony, and is hence called oxysulphide of antimony. The mode of preparation for this purpose is simply to boil the commercial gray sulphide of antimony with an alkaline carbonate, filter, and cool for twenty-four hours, when a brown-red powder is found to have deposited, which is washed and dried. The pure amorphous trisulphide is obtained by fusion, and sudden cooling in water, of the native crystalline trisulphide, also by dissolving the latter in caustic potash, and precipitating with an acid. It is harder than the native sulphide, and its powder is red-brown, but lighter in color than the impure compound containing oxide used in medicine under the name of *mineral kermes*.

H. WERTZ.

**Ker'messe** [Flem. *kermess*, from *kerk*, "church," and *mass*], formerly religious and parochial festivals, but now more exclusively ordinary and secular enjoyments. These are nearly the same in Flemish countries, Belgium and Holland, as in any other country of old Europe; but the kermesses of Flanders are more extensively known, because the custom was more strictly adhered to, and because attention was called to them through some celebrated paintings of Teniers and other great Flemish artists. Dances, banquets, target-shooting, all sorts of comical and even clerical processions, formed the bulk of popular amusement during the kermesses, which were sometimes rather licentious affairs—a motive which induced Joseph II., then ruler of Flanders, to order that they should all of them be celebrated on the same day. That rule disappeared with the Austrian domination.

FÉLIX AUCAGNE.

**Kern**, county of S. California. Area, estimated at 7500 square miles. It is partly mountainous, being traversed by the Sierra Nevada, and having the Coast Range on the W. On the N. W. of the Sierra Nevada is the basin whence flow the head-streams of the San Joaquin. Here is some tule-land which may be made very productive. S. E. of the mountains there is a basin which has no connection with the sea. Wool is the staple product. Cap. Havilah. Pop. 2925.

**Kern**, a v. of White Pine co., Nev. Pop. 36.

**Kern** (JEAN CONRAD), LL.D., b. at Berlingen, Switzerland, in 1803; studied at the gymnasium of Zurich, at the universities of Bale, Berlin, Heidelberg, and Paris, devoting himself first to theology, and afterwards to law, in which latter branch he took the degree of doctor. He sat in the diet of 1833; became in 1837 president of the supreme court of his native canton, Thurgau; aided in revising the Swiss constitution in 1848; and became distinguished for eloquence as a member of the National Assembly. In 1857 and 1861 he was sent as plenipotentiary to Paris for the management of vital interests, and in 1875 he became president of the Swiss Confederation.

**Kern'an** (FRANCIS), b. at Tyrone, Steuben co., N. Y., Jan. 14, 1816; graduated at Georgetown College, D. C., and immediately thereafter began the study of law, entering upon practice at Utica in 1839; was reporter of the court of appeals 1854-57, and in 1862 was elected by the Democratic party to Congress. In 1872 he was the candidate of the same party for governor of New York, but was not elected; in 1875 was chosen U. S. Senator by the legislature of New York.

J. B. BISHOP.

**Kern Lake**, in Kern co., Cal., is connected with Kern River by a slough. It is full of fish, and is in part overgrown with tule (*Scirpus validus*). All kinds of game-birds, otter, beaver, raccoons, and other game, are found in the tule around it. It is in a very fertile region. Its size varies with the rainfall.

**Kern River** rises in Tulare co., Cal., flows S. and S. W. through a grandly picturesque region, and finally divides into two parts—one flowing N. W. and N. into Tulare Lake, and one into the tule-region about Kern and Buena Vista lakes, with which it is connected. Its upper waters abound in fine trout. Its waters are finally discharged into Tulare Lake.

**Kern River Slough**, a channel by which at high water the surplus contents of the Tulare Lake in California flow northward into San Joaquin River. At ordinary stages Tulare Lake has no communication with the ocean.

**Ker'osene** [from *Græc.*, "wax," and *εξωον*, "oil"]



a term applied by Abraham Gesner in 1816 to oil distilled from coal in Prince Edward's Island. It has since become the general term for those hydrocarbon oils which are suitable for burning in lamps, from whatever source obtained. Most of the kerosene now used is refined petroleum. (See OIL FROM COAL, SHALE OIL, and PETROLEUM.)

**Kerr**, county of S. W. Central Texas. Area, 818 square miles. It is partly mountainous, but has much fertile land. Stock-raising and timber-cutting are the principal industrial pursuits. The cypress timber is of excellent quality. Cap. Kerrville. Pop. 1042.

**Kerr**, tp. of Champaign co., Ill. Pop. 361.

**Kerr** (JOHN BOZMAN), son of John L. Kerr, b. at Easton, Md., Mar. 5, 1809; graduated at Harvard in 1830; admitted to the bar in 1833; was elected a member of the general assembly of Maryland in 1836; Representative in Congress in 1848; and was sent in 1851 as chargé d'affaires to Guatemala, where he saved the lives of some prominent citizens during a revolution, and received the thanks of the government of that republic. On his return he resumed the practice of law at Baltimore, and was afterwards deputy solicitor of the court of claims at Washington. D. Jan. 27, 1878.

**Kerr** (JOHN L.), b. at Greenbury Point, near Annapolis, Md., Jan. 15, 1780; graduated at St. John's College in 1799; became distinguished at the Maryland bar; was Representative in Congress from 1825 to 1829 and from 1831 to 1833, and U. S. Senator from 1841 to 1843. D. at Easton, Md., Feb. 21, 1844.

**Kerr** (MICHAEL C.), b. near Titusville, Pa., Mar. 15, 1827; studied law at the University of Louisville; settled at New Albany, Ind.; was elected to the State assembly in 1856; reporter to the State supreme court in 1862, and published 5 vols.; in 1864 was elected as a Democrat to Congress, and re-elected in 1866, 1868, 1870, and 1874, and in 1875 was chosen Speaker of the House. D. at Rock-bridge Alum Springs, Va., Aug. 19, 1876.

**Kerr's Creek**, tp. of Rockbridge co., Va. Pop. 1833.

**Kerr'sville**, post-v., cap. of Kerr co., Texas, 83 miles W. by S. of Austin.

**Ker'ry**, county of Ireland, in the province of Munster, bounded N. by the estuary of the Shannon and W. by the Atlantic. Area, 1853 square miles, with 196,014 inhabitants; 201,800 in 1861, and 238,239 in 1881. The surface is mountainous; the highest mountain of Ireland, Carran Tual, 3410 feet, is found here, and the scenery is often very beautiful, as, for instance, around the lakes of Killarney. But the soil is rather inferior, and still more so is its cultivation. Oats, potatoes, and turnips are the chief crops; dairying and fishing the chief occupations. The population is very poor. The principal towns are Tralee and Killarney.

**Ker'seymere** [originally the same as cassimere, and probably derived from *Cashmere*], a thin, fine-wool fabric manufactured chiefly in the W. of England, and often called *kersey*, for brevity. Also a coarse-twilled, long-wool fabric for men's wear, made mostly in the N. of England; this also is called *kersey*. The modern *cassimeres* are plain or figured woollen or cotton-and-woollen goods, made in the U. S. and Europe, and designed for men's wear.

**Ker'shaw**, county of N. South Carolina. Area, 756 square miles. It is traversed by the Wateree River and a branch of the South Carolina R. R. It has an uneven surface and a soil generally fertile. Cotton, corn, and rice are staple products. Cap. Camden. Pop. 11,754.

**Kershaw** (J. B.), b. in South Carolina; was a prominent actor in the American civil war from the first battle of Bull Run, July, 1861, where he commanded a regiment of South Carolina volunteers which was raised principally by himself; subsequently, as brigadier-general, he commanded a brigade throughout the Virginia Peninsula campaign of 1862; at the second battle of Bull Run; engaged in the capture of Harper's Ferry, Sept. 15, 1862, and in the battle of Antietam two days later; at the battle of Fredericksburg, where his command held the strong position of Marye's Heights, so fatal to their opponents; at Chancellorsville and at Gettysburg; transferred to the West with the corps of Longstreet, he was engaged in the battle of Chickamauga and the subsequent siege of Knoxville. Returning to Virginia in 1864, now major-general, he commanded a division in the final campaign of Lee's army, terminating at Appomattox Court-house. Since the war he has acted a prominent part in the politics of South Carolina.

**Kertch** [the ancient *Ponticapeum*], town of Russia, in the government of Taurida, on the eastern side of the Crimean peninsula, on the Strait of Kaffa. It was a flourishing town, with an extensive trade and 23,000 inhabitants, when in 1855 it was taken by the allied French and English in the Crimean war, and sacked by the soldiery. *Ponticapeum* was founded by the Greeks of Miletus in the

sixth century B. C. It was the capital of the ancient kingdom of Bosphorus, was annexed to the Roman empire by Pompey 63 B. C.; conquered successively by the Huns (375), the Genoese (1280), the Turks (1475), and the Russians (1771). It is alleged to have been a residence of Mithridates, the ruins of whose palace are found on a hill adjoining Kertch.

**Ker'ton**, tp. of Fulton co., Ill. Pop. 504.

**Ker'tyn de Let'tenhove** (JOSEPH MARIE BRUNO CONSTANTIN), b. at St. Michel, Flanders (now Belgium), Aug. 17, 1817; engaged in historical researches in early life, and became one of the most distinguished authorities upon the antiquities of Belgium. Among his works are *Étude sur les Chroniques de Froissart* (1856), *Histoire de Flandres* (6 vols., 1847-50), both which obtained premiums for distinguished merit; *Jacques d'Artois* (1863), an edition of the *Lettres et Négociations de Philippe de Commines* (1867), and numerous memoirs published by the academies of France and Belgium.

**Keshe'na**, post-tp. of Shawanaw co., Wis. Pop. 49.

**Kes'trel**, called also **Windhover**, from its habit of maintaining itself in one place in the air, with its head to the wind, one of the smallest and most abundant of European hawks, the *Falco tinnunculus*. It is a great devourer of mice and other vermin.

**Kes'wick**, market-town of Cumberland, England, 22 miles S. S. W. of Carlisle, at the foot of Skiddaw Mountain, and beside Lake Derwentwater, is noted for its picturesque scenery and as the residence of the poet Southey. Pop. in 1871, 2777.

**Keswick Dépôt**, post-v. of Albemarle co., Va., on the Washington City Virginia Midland and Great Southern R. R., 110 miles S. W. of Washington, D. C., and on the Chesapeake and Ohio R. R., 90 miles W. N. W. of Richmond, Va.

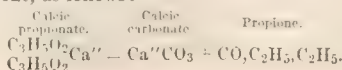
**Keszthely'**, town of Hungary, is situated on the western side of Lake Balaton, on which it carries on a very important fishing business. Its breed of horses is celebrated, and its trade in corn and wine extensive. Pop. 7150.

**Ketch'o**, or **Cacha'o**, town of Anam, in Farther India, the capital of the province of Tonquin, on the Tonquin. Although this river is navigable only for small craft, the trade of Ketcho is considerable. Bullion, lacquered wares, and fine silks are exported. Pop. 150,000.

**Ketch'um** (WILLIAM SCOTT), b. July 7, 1813, at Norwalk, Conn.; graduated at West Point July 1, 1834, and entered the army as second lieutenant of infantry; prior to the civil war he served in Florida against the Seminoles, upon the Western frontier, and on the Pacific coast, having in 1860 arrived at a majority in the 4th Infantry. In Nov., 1861, he became lieutenant-colonel in the 10th Infantry, brigadier-general of volunteers the following February, and colonel of the 11th Infantry May 6, 1864. After eight months' service in the West as acting inspector-general, he was in Aug., 1862, placed upon special duty in the war and treasury departments in Washington. Brevetted brigadier-general and major-general Mar. 13, 1865; retired from active service Dec. 15, 1870; d. at Baltimore, Md., June 28, 1871. G. C. SIMMONS.

**Ket'ones**, or **Acetones** (see ACETONE). This large class of bodies, though no member of it has as yet obtained any practical application of importance, is of great interest to chemical science and the chemical student; and we may expect to find practical uses for its members in the future if we prosecute their study. The ketones have the same empirical generic formula as the fatty aldehydes,  $C_nH_{2n}O$ , and each ketone has therefore its metamere among the aldehydes. The view that they are derivable from the aldehydes, by the replacement of hydrogen by an alcohol-radical, does not seem substantiated by synthesis so far; and their relations to the aldehydes, exhibited in the following table, do not appear to lend it any support. Chancel seems first to have hypothetically pointed out that the ketones are *carbonylides*, containing a nuclear molecule of carbonic oxide or *carbonyle*. Gerhardt's and Williamson's researches supported this view, and Wanklyn demonstrated it by showing that carbonic oxide and its ethylide of sodium react as follows, producing the ketone which is called *propione*, from being originally formed by the destructive distillation of calcic propionate:

$C_2H_5Na + CO = Na_2 + (C_2H_5O) = (CO.C_2H_5.C_2H_5)$ ; and we may represent the ordinary method of making ketones, by distilling the fatty acid salts of dyad metals, in the case of propione, as follows:



On the homologic theory (see article *HOMOLOGIES*), the ketones, as a series of homologues, must have a nuclear molecule or radical  $\text{HCO}$  or  $\text{H}_2\text{CO}$ ; and their *homologenic formula* is  $\text{H}_2\text{CO} + n\text{H}_2\text{C}$ : the consideration of which excites very curious suggestions and speculations.

The last column in the accompanying table shows the system of notation assigned to the ketones here tabulated, by Wanklyn, who has been the most distinguished investigator of this class of bodies. There have been placed at the end of this table two ketones of high equivalents, discovered near forty years ago by Bussy, but which have

Fatty Aldehydes: Names and Formulas.		Fatty Ketones.		Wanklyn's Formula.
Formic.....	$\text{CH}_2\text{O}$	Di-hydrogen ketone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{H} \\ \text{H} \end{array} \right.$
Common.....	$\text{C}_2\text{H}_4\text{O}$	(unknown)		$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{H} \end{array} \right.$
Propionic.....	$\text{C}_3\text{H}_6\text{O}$	Hydrogen-methyl ketone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_3 \end{array} \right.$
Butyric.....	$\text{C}_4\text{H}_8\text{O}$	(unknown)		$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_3 \end{array} \right.$
Valeric.....	$\text{C}_5\text{H}_{10}\text{O}$	Common acetone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_3 \end{array} \right.$
Caproic.....	$\text{C}_6\text{H}_{12}\text{O}$	Methyl-ethyl ketone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_3 \end{array} \right.$
(Enanthylic.....	$\text{C}_7\text{H}_{14}\text{O}$	Propione.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$
Caprylic.....	$\text{C}_8\text{H}_{16}\text{O}$	Methyl-butyl ketone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$
	$\text{C}_9\text{H}_{18}\text{O}$	Butyrene.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$
	$\text{C}_{10}\text{H}_{20}\text{O}$	Ethyl-amyle ketone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$
	$\text{C}_{31}\text{H}_{62}\text{O}$	Valerone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$
	$\text{C}_{35}\text{H}_{70}\text{O}$	Di-amyle ketone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$
		Palmitone, or margarone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$
		Stearone.....	$\text{CO}$	$\left\{ \begin{array}{l} \text{CH}_3 \\ \text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_2\text{CH}_3 \end{array} \right.$

been so nearly forgotten that they are scarcely mentioned in the textbooks. They were compared by their discoverer to *spermaceti*, and are easily prepared by distilling the crystallized fatty acids with lime. They should be re-examined with a view to determine their practical or economic value for making candles or otherwise. HENRY WURTZ.

**Ket'teler, von** (WILHELM EMANUEL), b. at Münster, Westphalia, Dec. 25, 1811; studied first law, and entered the civil service of his native city; then theology, and was ordained a priest in 1844. In 1849 he was made provost of the Hedwigskirche of Berlin, and in 1850 bishop of Mentz. The energy of his character and his talents as a debater and controversialist have made him one of the leaders of the Ultramontane party, and one of the most prominent members of the Roman Catholic Church in Germany.

**Ket'tell** (SAMUEL), b. at Newburyport, Mass., Aug. 5, 1800; was an accomplished linguist, and mastered no less than fourteen languages. He assisted Mr. Goodrich in preparing the "Peter Parley" books, and was (1818-55) chief editor of the *Boston Courier*. He was a clever writer, and published a number of works, of which the best known is *Specimens of American Poetry* (3 vols., 1829). D. at Malden, Mass., Dec. 3, 1855.

**Ket'tering**, town of England, in the county of Northampton. It has some manufactures of silk and plush. Pop. 5198.

**Ket'tle River**, tp. of Pine co., Minn. Pop. 74.

**Keu'per, The**, the uppermost of the three groups into which the Triassic or New Red Sandstone period is divided. It is represented in Europe in different localities by two very different sets of strata, supposed to be of contemporaneous origin—the one a series of red and yellow fresh-water marls and sandstones, and the other a more recently recognized series of marine strata, known as the Hallstadt and St. Cassian beds. About the true position of these latter there is still, however, much dispute, and where these are absent the Keuper is capped by a bone-bed of especial interest, as in it have been found the remains of the earliest known mammals *Microlotus*, etc., etc. Whether any portion of the American Trias is equivalent to the European Keuper is an open question.

**Kew**, village and parish of England, county of Surrey, opposite Brentford, in Middlesex, 8 miles from London. Kew Gardens and the pleasure-grounds extend along the Thames from Kew Green to the borders of Richmond. It was in these grounds that Bradley's observations upon the fixed stars were made about the middle of the seventeenth century, with a telescope constructed by Mr. G. Molyneux, then the owner of Kew House, which was leased by the prince of Wales, son of George II., by whom the "pleasure-grounds" were first laid out, and further embellished by his widow. Kew Palace, an unpretending brick house of moderate size, became royal property in the early days of George III., who here played his favorite part of "Farmer George." A cottage, secluded in the upper part of the park or pleasure-grounds, is still preserved with its furniture as it was left by Queen Charlotte. This and the untenanted palace remain in the possession of the Crown. While the

life of the royal family at Kew will be remembered through Madame d'Arbly's (Miss Burney's) memoirs, the later interest of Kew centres in its gardens and botanical collections. The large and choice collections of living plants, maintained for 70 or 80 years as the private property of the sovereign, under the administration of the two Aitons, father and son, were of much botanical importance. In 1838 the grounds became national property, under the control of the commissioners of the woods and forests, and the now celebrated establishment was founded. It was placed under the charge of Sir William Hooker, and since his death in 1865 that of his son, Dr. Joseph D. Hooker, now president of the Royal Society. Under these administrators and the liberal support of Parliament the royal gardens at Kew have become the largest and most important, as well as the most popular, botanical establishment in the world, both as respects the conservatories and collections of living plants, and in the herbarium and noble museum of vegetable products founded by Sir William Hooker. The whole establishment is freely open to the public every day after one o'clock. The annual number of visitors, commencing with 9000 in 1841, has risen to nearly 700,000. ASA GRAY.

**Kewa'nee**, post-v. and tp. of Henry co., Ill., on the Chicago Burlington and Quincy R. R., 132 miles W. of Chicago; has 7 churches, 5 public-school buildings, 1 national and 1 private bank, 1 weekly newspaper, 2 flour-mills, 2 foundries and machine-shops, several wagon and carriage shops, manufactories of agricultural implements and of house-heating apparatus, a distillery, and the usual complement of stores. In the immediate vicinity are rich farming-lands and inexhaustible beds of bituminous coal. Pop. 1225. C. BASSETT, Ed. "INDEPENDENT."

**Kewas'kum**, tp. of Washington co., Wis. Pop. 1309.

**Kewau'nee**, county of Wisconsin, having Lake Michigan as its eastern boundary. Area, about 340 square miles. It is chiefly covered with forests, and lumber is the principal export. The soil is productive. Grain and potatoes are the staple crops. Cap. Kewaunee. Pop. 10,128.

**Kewaunee**, post-v. and tp., cap. of Kewaunee co., Wis., on Lake Michigan, at the mouth of the Kewaunee River, 27 miles E. of Green Bay City. It has several churches, hotels, 2 saw-mills, and 1 weekly newspaper. Pop. 1684.

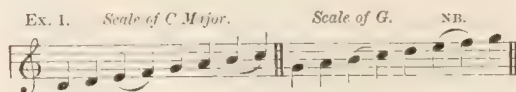
**Kewee'naw**, county of N. Michigan, consisting of the extremity of the peninsula known as Keweenaw Point in Lake Superior, by which it is surrounded except on the south-west side. Area, about 360 square miles. It is cold, elevated, and unproductive, but abounds in valuable argentiferous copper, the mining of which is the principal employment. Cap. Eagle Harbor. Pop. 4205.

**Kew-Kiang**, or Kiu-Kiang [Chinese, "Nine Rivers"], one of the largest cities of China, situated in the province of Kiang-Si, on the Yang-tze River, near the N. extremity of Poyang Lake, 237 miles S. W. of Nanking. It is the emporium of the great tea-districts S. of Poyang Lake, and the shipments have reached 20,000,000 pounds in a single year. The city has two suburbs nearly as large as itself, the united population of all three being calculated at over 1,000,000, notwithstanding a great loss of population



and partial ruin incurred during the Taeping rebellion. There is an English settlement and several American houses of commerce, one of which, Russell & Co., maintains a large number of steamers on the river, the arrivals of steamers having numbered over 400 in 1871. The trade is chiefly in connection with Shanghai.

**Key.** In modern music every regular composition is written, or purports to be written, in one or other of the major or minor scales. The scale chosen is said to be the *key* of the piece; and the first or root-note of that scale, from which all its steps or degrees are reckoned and derive their character, is called the *keynote* or tonic. These scales or keys are either major or minor, no other "modes" being recognized in what is distinctively known as modern music. The normal form of a scale in the *major* mode is that of C; and the scale of A gives the normal form of the *minor* mode. But under certain conditions scales similar to those of C and A may take their rise from any point or degree of the diatonic-chromatic scale—i. e. we may form a scale commencing on D, E, F, etc., or on B $\flat$ , E $\flat$ , C $\sharp$ , etc.; and as there are twelve degrees in the original scale (viz. C), the number of possible scales will be twelve in the major mode and twelve in the minor. The composer has therefore a choice of twenty-four keys, differing both in acuteness and in certain peculiarities of expression. It will be found, however, that every one of those additional scales is imperfect in its natural order of tones and semitones, differing more or less in form from the pattern scales of C and A, and therefore requiring an adjustment of certain intervals to render it fit for use. Thus, on comparing a scale commencing on G with that of C, as in Ex. 1, we perceive that the place of the semitone at *nb*. (as indicated by the slur) does not correspond with that in the key of C; thus rendering the new scale imperfect and practically useless:



To remedy this it becomes necessary that the F in the scale of G should be raised a semitone by means of a sharp, by which alteration the two scales will now be brought into agreement. In music written in the scale of G major every F will therefore become *F sharp* (unless when contradicted occasionally by a  $\flat$ ); and for convenience' sake in writing, a sharp on F is placed once for all near the clef at the beginning, and called the *signature*. The case may be further illustrated by comparing the distances of the letters in the following example:

EX. 2. Scale of C.  
C—D—E—F—G—A—B—C.  
Scale of G.      *a*  
G—A—B—C—D—E—F—G.

Now, to bring the latter into correspondence with the former, it is evident that we must move the F at *a* half a space nearer to G, which is the office of a sharp when expressed in notes. In the key of D major there are needed *two* such rectifications of the scale, and accordingly two sharps—viz. F and C—are placed at the commencement. In A major three sharps are required; and all the other keys, major and minor, need similar adjustment by the use of sharps or flats, even to the number of seven, the object being simply to bring them into conformity with the established order of the scale. The succession of the keys, both major and minor, with the sharps or flats required for the rectification of their scales, is shown in Ex. 3:

EX. 3. KEYS WITH SHARPS.

Maj. Min. Sharps.

C. A. —  
G. E. F.  
D. F. F—C.  
A. F $\sharp$ . F—C—G.  
E. C $\sharp$ . F—C—G—D.  
B. G $\sharp$ . F—C—G—D—A.  
F $\sharp$ . D $\sharp$ . F—C—G—D—A—E.  
C $\sharp$ . A $\sharp$ . F—C—G—D—A—E—B.

KEYS WITH FLATS.

Maj. Min. Flats.

F. D. B.  
B $\flat$ . G. B—E.  
E $\flat$ . C. B—E—A.  
A $\flat$ . F. B—E—A—D.  
D $\flat$ . B $\flat$ . B—E—A—D—G.  
G $\flat$ . F $\flat$ . B—E—A—D—G—C.  
C $\flat$ . A $\flat$ . B—E—A—D—G—C—F.

The signatures of these keys or scales are written as in Ex. 4, where the *keynotes* of the respective scales are also added, the upper note being the major, and the lower one its relative minor, or that having the same signature:

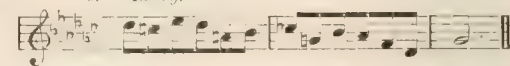


Though there are in reality only twelve major and twelve minor scales, corresponding in number with the degrees of the diatonic-chromatic scale, yet in the example just given it will be noticed that the number is *fifteen* of each mode, or *thirty* in all, instead of twenty-four. This is explained by observing that there are in the example three major and three minor keys or scales which are in *sound* identical with certain others, though they are differently *written*. These are called the "binominous" keys—i. e. keys having two names, and written variously or indifferently in sharps or in flats. They are F $\sharp$  and G $\flat$ , B $\sharp$  and C $\flat$ , and C $\sharp$  and D $\flat$ , with their relative minors. It is evident that F $\sharp$  and G $\flat$ , though different to the *eye*, are the same to the *ear*, when played on ordinary keyed instruments; and therefore the same *sounds* are produced, and the same finger-keys are used on the organ or pianoforte, whether a piece is written and performed in the key of F $\sharp$  or in that of G $\flat$ . From which it follows that a given strain or movement may be written by a composer in either of those keys at pleasure, the effect on the ear being precisely the same whether written in six sharps or six flats. In Ex. 5, for instance, the notes at *a* are in sound (and under the fingers) identical with those at *b*:

EX. 5.—a. In F $\sharp$ .



b. In G $\flat$ .

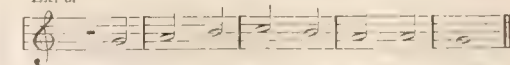


While, therefore, there are in reality (*i. e.* to the *ear*) only twenty-four keys, yet as three of the major and three of the minor keys may be expressed in two ways—viz. in sharps or in flats—it follows that the number of keys when *written* (but not otherwise) is thirty, as shown in Ex. 4.

To find the tonic or *keynote* of any piece or movement, it is ordinarily sufficient to refer to the *last note* in the *bass* (which is almost always the tonic), and then to ascertain from the *signature* whether the key is major or minor. Should the final bass-note, for instance, be C, and no sharps or flats be found at the clef, the key is that of C *major*; but if we find three flats at the clef, we know from this signature that the key is C *minor*. This, however, is only a general rule, to which there are several exceptions, as when in old music a movement in B $\flat$  is written with the signature belonging to F—i. e. with *one* flat only—the second flat being inserted before each E in the piece as an accidental. Also, in discursive pieces, digressions into new keys often occur, including whole movements, without any change of the signature, the necessary flats, sharps, or naturals being inserted before the notes themselves where necessary. Occasionally also in ecclesiastical compositions the last note of the bass is not the *keynote* or tonic, but the *dominant* with its major triad. With these and similar exceptions kept in view, the *keynote* and the scale and mode of a composition may be generally ascertained by reference to the final bass-note and the signature.

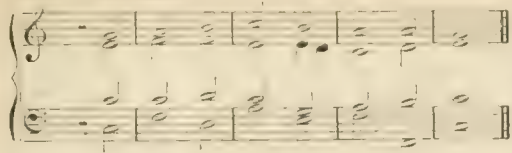
It is far more difficult, however, to find the key of a given melody than of a piece comprising two or three parts in *harmony*, because a melody may be founded on certain notes which are common to several scales or keys, and will necessarily be equivocal until settled by the addition of harmony. In demonstration of this see the melody or theme in Ex. 6, which at first appears to be in G major:

EX. 6.



But though this may readily and very naturally be harmonized in G major, yet the key in which the composer conceived it may possibly prove to be C major or E minor, as illustrated by the harmony in Ex. 7:

Ex. 7. In C major.



In E minor.



The keynote of a given melody cannot therefore be fully ascertained unless that melody includes in its range all the notes of a scale, thereby identifying itself with that scale by elements and progressions which would be foreign to any other.

Respecting keynotes, it may also be remarked that in keys with sharps the keynote in major is always on that letter which is *one semitone above the last sharp* of the signature. Thus, if there are two sharps,  $F\sharp$  and  $C\sharp$ , the keynote is  $D$ . When  $F$ ,  $C$ , and  $G$  are sharped, the keynote will be  $A$ , and so on. In keys with flats the keynote in major is on the letter *a fourth below (or a fifth above) the last flat* at the clef. Thus, in two flats,  $B\flat$  and  $E\flat$ , the keynote is  $B\flat$ . In three flats,  $B\flat$ ,  $E\flat$ , and  $A\flat$ , the keynote will be  $E\flat$ , and so throughout. The keynote in *minor* is always a minor third below the major, as  $A$  below  $C$ ,  $G$  below  $B\flat$ , etc. In keys with sharps the minor keynote is also one whole tone below the last sharp of the signature. Thus, in two sharps,  $F\sharp$  and  $C\sharp$ , it is  $B$ ; in three sharps,  $F\sharp$ ,  $C\sharp$ , and  $G\sharp$ , it will be  $F\sharp$ , and so on. In keys with flats the minor keynote is a sixth below the last flat. Thus, in two flats,  $B\flat$  and  $E\flat$ , it is  $G$ , and in three flats,  $B\flat$ ,  $E\flat$ , and  $A\flat$ , it will be  $C$ . To recollect the order of major keys in sharps, reckon *upward by perfect fifths*, as from  $C$  to  $G$ , then  $G$  to  $D$ ,  $D$  to  $A$ , and so onward. This gives the succession of major keys in regular order from one to seven sharps. In major keys with flats, reckon *downward by perfect fifths*, as from  $C$  to  $F$ ,  $F$  to  $B\flat$ , etc., and the succession of keys in regular order from one to seven flats will be found. This rule applies also to minor keys. WILLIAM STAUNTON.

**Key**—FRANCIS SCOTT, b. in Frederick co., Md., Aug. 1, 1779, and was educated at St. John's College. He practised law in Frederick, Md., and in Washington, D. C. He is chiefly remembered as the author of *The Star-Spangled Banner*, which he composed while a prisoner in the British fleet during the bombardment of Fort M'Henry. D. at Baltimore Jan. 11, 1843. A volume of his poems, edited by H. D. Johns, appeared in 1857. Mr. Key was a brother-in-law of Chief-Justice Taney.

**Key**—THOMAS HEWITT, M. A., F. R. S., b. at Southwark, England, Mar. 20, 1799; graduated at Trinity College, Cambridge, in 1824; studied medicine, and was appointed professor of mathematics in the University of Virginia on the first organization of that institution in 1824. Returning to England in 1827, he was for thirteen years professor of Latin in the newly-organized University of London, after which he became professor of comparative grammar and head-master of the preparatory school, which positions he retained to the time of his death, Nov., 1877. He published a *Latin Grammar* (1833-46), *Philological Essays* (1868), *Language, its Origin and Development* (1874), and many philological essays in the magazines. His greatest work, a *Latin-English Lexicon*, is still unpublished.

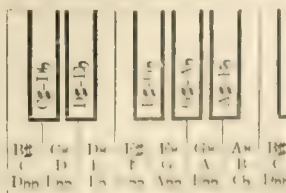
**Key**—THOMAS MAISHALL, b. in Kentucky about 1818; graduated at Yale College in 1838; studied law; settled at Cincinnati, and took a high position at the bar. He was repeatedly elected to the Ohio senate; was in 1861 sent as commissioner to the government of Kentucky in the interests of the Union; was a member of the staff of Gen. McClellan; author of the first bill passed by Congress for the emancipation of slaves, and also of that for the emancipation of the slaves in the District of Columbia. D. at Lebanon, Ky., Jan. 15, 1869.

**Key-board, or Finger-board**, in an organ, piano-forte, or other similar instrument the series or range of short levers, usually covered with ivory and ebony, on which the fingers of the performer operate. Each of these levers is called a *key*, the longer or white ones representing the diatonic scale of C major in several successive octaves, and the shorter or black ones furnishing the intermediate sharps and flats requisite for the other scales. The key-board is

frequently denominated a *bank*, *row*, or *set* of keys, and in organs of considerable size there are two, three, and sometimes four, such sets. The clavichord, virginal, spinet, and harpsichord of former days were also furnished with keys, the latter frequently having two sets, and in some cases four and even more. Dr. Rimbault remarks that "the author of a rare volume published at Bologna in 1590, under the title of *Il Desiderio*, mentioning some curious instruments in the palace of the duke of Ferrara, says, 'There was a harpsichord invented by Don Nicola Vincentino, surnamed *Accordato*, in the year 1555. It had *six rows* of keys, comprehending in their division the three harmonic genera.' He adds that the multitude of strings on this astonishing instrument rendered it very difficult to tune, and more so to play." (*The Pianoforte, its Origin, &c.*) Besides the key-boards for the fingers, organs are usually provided with a set of keys for the feet, the former being distinguished as the *manuale*, and the latter as the *pedale*. The key-board has reached its present perfect form only after several centuries of experiment and improvement. In its rudest elementary form we may trace its existence in the small and roughly constructed organs of the eleventh and twelfth centuries. It appears to have comprised at that period only a few parallel levers of much larger size than our present keys, and requiring a strong pressure to move them. Anterior to that period we have no distinct traces of this mechanical device. "Guido," says the author just quoted, "is said to have invented the *clavier* or key-board, and it is not at all improbable that he was the first to apply it to the mediæval instrument of many strings, . . . which seems to have been the same with the clavichord, and, as such, was the progenitor of the harpsichord, the spinet, the virginal, and the pianoforte of modern times. . . . The first stringed instrument to which the key-board was applied was probably the *clavichethium* or *keyed cithara*. In its early stages it was a small oblong box, with the strings arranged in the form of a half triangle." (*Ibid.*, pp. 28-35.)

The structure or plan of the key-board now in use is comparatively modern, and its very outline or conception presupposes such a knowledge of the diatonic-chromatic scale as was not attained till many years after the time of Guido. The probability, therefore, is, that for a long period the early key-boards consisted merely of two or three octaves of short levers operating on pipes tuned in the natural order of the scale, with, possibly, an extra key in each octave for a flat seventh or other needed interval. The adjustment of the key-board so as to comprise *all* the intervals would, from the necessity of the case, be dependent on the regulation of the elements of the chromatic scale; and for this reason we cannot date the formation of our present key-board farther back than about the close of the twelfth century or the beginning of the thirteenth, when the structure of the scale began to be more clearly apprehended.

The ordinary key-board comprises tones and semitones, but excludes all lesser or enharmonic intervals. Each black key is the *sharp* of the white key on its *left*, and the *flat* of the white key on its *right*. From this it follows that every black key serves two distinct purposes, being a sharp in one relation, and a flat in another. This apparently defective arrangement is unavoidable, on account of a certain irregularity in the scale, which if strictly met would require us to have one black key for  $C\sharp$ , and another for  $B\flat$ ; and so with  $F\sharp$  and every other black key. In *reality*,  $C\sharp$  and  $B\flat$  are not the same sounds, nor are  $B\sharp$  and  $B\flat$  the same; but to avoid the complexity of mechanism which would arise from the use of quarter-tone keys, and the multiplication of pipes or strings, the scale is so "tempered" as to make each black key give a middle or compromise tone, which shall sufficiently answer for a sharp in the one case and a flat in the other, though not truly or exactly representing either. This same "tempering" takes place also on the white keys for a similar reason. Hence, all the finger keys on the board, whether white or black, come to be representative of two or more different intervals or sounds according to the place and relation they may occupy in a musical composition, or the scale in which such composition is written. Thus, the white key ordinarily named  $C$  may also be either  $B\sharp$  or  $B\flat$  when used in certain scales; and so of every other finger-key throughout the octave, as will be seen in the example following:





On the pianoforte it would not be possible to express the minute differences here referred to without a multiplicity of additional strings and corresponding changes in the arrangement of the key-board. But several organs have been built with key-boards and extra pipes to give quarter-tones or enharmonic intervals. In those instruments each black key is divided into two portions, one of which is used for sharps, and the other for flats, thereby securing much richer and purer harmony than can be obtained from organs tuned on either the equal or the unequal temperament. Harpsichords, as already noticed, were constructed centuries ago with additional strings and rows of keys, for the purpose of obtaining *without* temperament the advantage of quarter-tones. (See TEMPERAMENT.)

WILLIAM STAUNTON.

**Keyes** (ERASMUS DARWIN), b. at Sturbridge, Mass., June, 1810; removed in boyhood to Maine; graduated at West Point in 1832; was instructor at the Military Academy from 1844 to 1848; was engaged in Indian wars on Puget Sound in 1856; commanded a brigade at the battle of Bull Run; was appointed brigadier-general, to date from May 17, 1861; was in the battles before Richmond in command of the 4th corps, and made major-general of volunteers and brevet brigadier-general U. S. army for gallant conduct in the field.

**Key Islands**, a group of islands in the Malay Archipelago, S. of New Guinea, in lat. 5° 25' S., lon. 132° E., consists of two large and a number of small islands. Great Key comprises an area of 294 square miles, with 21,000 inhabitants; Little Key, of 283 square miles, with 10,000 inhabitants. They are of volcanic origin, mountainous, fertile, and rich in timber, cocoanuts, tortoise-shells, sago, and different kinds of fruits. The inhabitants, who are partly Christians, partly Mohammedans, are described as hospitable, industrious, and honest.

**Keynote**. See KEY, by REV. WILLIAM STAUNTON, S. T. D.

**Keyport**, post-v. of Raritan tp., Monmouth co., N. J., on Raritan Bay, 25 miles from New York City and 13 miles from Freehold. It has 4 churches, 1 graded-school building (costing \$30,000), 1 weekly newspaper, 2 saw-mills, 2 flour-mills, 3 large hotels, and numerous boarding-houses for summer visitors. There is a fruit-canning factory, established in 1868, employing 150 hands. Two steamers ply daily between Keyport and New York, connecting with stage-lines to several towns of New Jersey. Keyport is an important centre of the oyster, clam, and fish trade, the oysters being generally brought from Virginia and planted in beds until they attain their growth. Pop. 2366.

McKINNEY & SON, EDS. "WEEKLY."

**Keysburg**, post-v. of Logan co., Ky., 6 miles from Allensville, a station on the Louisville and Nashville R. R. Pop. 133.

**Keyser** (PETER D.), M. D., b. Feb. 8, 1835, at Philadelphia; studied at Delaware College until 1851; entered the chemical laboratory of Prof. F. A. Genth at Philadelphia; went to Europe in 1854; graduated in the medical department of the University of Jena, Germany, in 1864; returned home same year and entered the army hospitals as acting assistant surgeon U. S. A. In 1868 he became surgeon in charge of the Philadelphia Eye and Ear Infirmary; in 1870 also ophthalmic surgeon to the medical department of the German Society of Philadelphia; and in 1872 one of the surgeons to the Wills Eye Hospital in Philadelphia. In 1853 he published his chemical analyses of the allanites from Reading, Pa., Bethlehem, Pa., and Orange co., N. Y.; also analyses of thalite and of owenite (thuringite) from Harper's Ferry, Va., and in 1854 the analysis of thuringite from Germany, and the analysis of barnhardtite from Cabarrus co., N. C. To the medical journals he has contributed *The Use of Calabar (Physostigma) in Paralysis of Accommodation* (1865); *On Persistence of Pupillary Membranes* (1867); *Injury and Destruction of an Eye, with Bone formation in the Iris* (1869); *Removal of a Canceroid Tumor from the Surface of the Eye* (1869); *On Impairment of Vision the result of Dental Irritation* (1870); *On the Recovery of Sight after Gray Atrophy of the Optic Disks* (1871); *On the Use of Chloral Hydrate after Eye Operations* (1871); *Report on Operations for Cataract* (1874); *On Congenital Hereditary Dislocations of both Lenses; Ruptures of the Crystalline; Phosphatic Degeneration of the Cornea* (1874).

**Keys, House of** (*Claves Insula*), a body of twenty-four members constituting the lower house of Tyndwald Court, the legislature of the Isle of Man. All vacancies are filled by the house itself.

**Keys of Florida**. See FLORIDA KEYS.

**Keytesville**, post-v. and tp., cap. of Chariton co., Mo., on the St. Louis Kansas and Great Northern R. R., 174 miles W. N. W. of St. Louis; has 3 churches, 2 hotels,

a large public school, 1 bank, 1 weekly newspaper, 1 flour-mill, 2 agricultural implement manufactories, and the usual number of stores and shops. Pop. of v. 529; of tp. 1663.

THOMAS D. BOGHE, ED. "HERALD."

**Key West** [a corruption of the Spanish *Cayo Hueso*, "bone reef"], post-v., cap. of Monroe co., Fla., is the extreme southern boundary of the U. S., and forms the entrance to the Gulf of Mexico, being distant about 68' from the coast of Cuba. It is situated on an island of the same name, 7 miles long by 1 to 2 wide, of coral formation, elevated only 11 feet above the level of the sea, and covered with a thin layer of soil, on which tropical fruits are successfully cultivated. The town is a naval station, has a large dépôt for U. S. stores, etc.; it possesses a good and spacious harbor; is in connection with the Northern States by Mallory's line of steamers, and with New Orleans by a line of steamers running from that place weekly *via* Cedar Keys, where it connects with the railroad. Key West has a fine marine railway, where ships of 300 tons may be hauled out for repairs. There are 7 churches of the various denominations, 2 weekly papers, 2 public and several private schools, a convent, 1 hotel, 3 large and extensive cigar-factories, where about 2300 Cuban refugees are employed in making cigars. On the S. W. point is a lighthouse, with a fixed light 72 feet above the water; situated in 24° 33' N. lat. and 81° 47.3' W. lon. The inhabitants proper are employed in mercantile pursuits, fishing, sponging (which is a source of wealth), and wrecking. The population has increased largely of late by emigration from the Bahamas and Cuba. Pop. about 9000.

E. J. FLEMING, ED. "KEY WEST DISPATCH."

**Khabour'** [Gr. *Chaboras*; Heb. *Habor* or *Chabar*], a river in Asiatic Turkey, tributary to the Euphrates, which it joins at Kerkesieh after a course from N. to S. of 190 miles. It is noted in biblical geography as the river along which the captive Israelites were settled, and is frequently mentioned in the cuneiform inscriptions. Another smaller river of the same name is a tributary of the Tigris.

**Khaldu'n** (IBN), otherwise called WALY EDIN ABU ZEID ABDALRAHMAN, b. at Tunis, Africa, in 1232; studied polite letters for some years in Granada; was then employed in the service of his own sovereign, and in that of the sultan of Fez; made the pilgrimage to Mecca in 1382, and settled at Cairo, Egypt, as instructor in several colleges; was sent as ambassador to the conqueror Timour at Damascus about 1400; was chief cadi at Cairo in 1384, and again in 1400, and d. there in 1406. He was one of the most distinguished of the Arab writers, and left a vast *History of the Arabs, the Persians, the Berbers, and the Nations among whom they have Lived*, which is one of the principal authorities upon Oriental annals.

**Kha'ted** (surnamed "The sword of God"), b. in Arabia in 582; commanded the cavalry of the Koreish against Mohammed at the battle of Ohud in 623; was converted to Islam in 629; saved the army of Mohammed at the battle of Muta the same year, gaining the surname by which he was ever afterwards known; invaded Persia in 632; took Bozrah, besieged Damascus, and defeated the generals of the emperor Heraclius at Aiznadin in 633; stormed Damascus in 634; took Aleppo in 638. D. at Emesa 642.

**Khalkas'**, the name of the northern part of Mongolia, a part of the Chinese empire, and extends between Siberia, the river Amoor, the desert of Gobi, and the Altai Mountains. It consists mostly of vast steppes, where the inhabitants lead a miserable, sluggish, and savage life. Ranges of mountains traverse the country, however, beautifully terraced and well wooded, and here are the seats of the immense Buddhist monasteries. The inhabitants are Mongolian Tartars, and profess Buddhism. The country was the birthplace of Genghis Khan. Cap. Ourga or Urga.

**Khallikan'** (IBN), also called SHEMS EDIN ABUL ABBAS AHMED, b. at Arbela, near the Tigris, in 1211; became profoundly versed in Arabic literature; lived for a time in Cairo, Egypt; was chief cadi at Damascus in 1261, and again in 1277, and d. in that city in 1282. He left a *Biographical Dictionary of the Illustrious Men of Islam*, which contains data upon several thousands of persons, and is invaluable to the student of Oriental history.

**Khan** [formerly spelled *cham* in many cases], a title given to many Tartar magnates and kings, also to East Indian princes under the Moguls. The old spelling *caion* (as in Jaffier Ally Cawn) fairly represents the true pronunciation.

**Khandeish'**, or **Candeish**, a district in the Bombay presidency, British India, E. of Guzerat and N. of the Nizam's dominions. Area, 12,000 square miles. Pop. about 80,000. Formerly a part of the Mogul empire, it was annexed in 1818.



**Khang-Hi**, or **Kang-Hi** [Manchu, "inalterable peace"], second emperor of China of the present Manchu dynasty, b. in 1654; was originally named *Hien-Ye* ("blue spark"); succeeded to the throne in 1662 on the death of his father, Chun-Chi, under the regency of four mandarins; assumed the government in 1667, and immediately put to death one of the regents; introduced the official teaching of the European system of astronomy (1667), studying it himself under the instruction of the Jesuit Father Ferd. Verbiest; suppressed a formidable revolt made by the prince of Yunnan (1673); annexed Kwang Tung (1680), Fo-Kien (1681), and Formosa to the empire; concluded with Russia a treaty of peace and limits at Nipchow (Sept. 3, 1689); was cured of a fever by Jesuit physicians (by the use of quinine), who thus gained the ascendancy at his court; annexed Tibet about 1700; authorized a persecution of Christians in 1717, and d. Dec. 20, 1722. Khang-Hi is esteemed the greatest of the Chinese sovereigns, and through the Jesuits became the best known in Europe; he caused the publication of important works on the language, history, and literature of China, and directed the topographical survey (1708) executed by Jesuits, by which Chinese geography is best known.

**Khania**. See CANEA.

**Khanpoor**, or **Khaunpoor**, town of British India, in the N. W. Provinces, the capital of a district of the same name, on the Ganges, is dirty and poorly built, but has extensive manufactures of jewelry and leather, and carries on an active trade. It is a military station, and the part of the city occupied by the barracks and their gardens has a very fine aspect. Pop. about 50,000.

**Kharkov**, government of European Russia, traversed by the Don and its affluents. Area, 20,737 square miles. Pop. 1,631,486. It is low, mostly level, but very fertile. Wheat, vine, and tobacco are raised in great quantities, and large herds of cattle reared. Manufactures are unimportant.

**Kharkov**, town of European Russia, the capital of the government of Kharkov, on the Kharkova, an affluent of the Don. It is a flourishing town, with several good educational institutions, and four annual fairs which are much frequented, especially the wool-fair in spring, at which the value of the wool sold generally amounts to £1,150,000. Pop. 59,968.

**Khartoom**, town of Egypt, in Upper Nubia, at the confluence of the Blue and the White Nile. It has a considerable trade, being the centre of several caravan-routes, especially in slaves and ostrich feathers. Pop. 30,000.

**Khatmandoo**, or **Katmandu**, the capital of Nepal, Hindostan, in lat. 27° 42' N. and lon. 85° 15' E. It is poorly built, many even of its temples being built of wood; the streets are narrow and dirty. It has no great commercial importance. Pop. 50,000.

**Khazars**, or **Chazars**, a powerful tribe of Finnic or Magyar stock, settled N. of the Caucasus, near the mouth of the Volga. They had kings of their own, and derived some celebrity by their conversion to Judaism in the eighth century.

**Khe'dive**, with the predicate of *altana* ("highness"), is, since 1867, the official title of the viceroy of Egypt. The viceregency is hereditary in the family of Mehmet Ali since 1841, according to the Turkish law of succession, and since 1866 in direct line—that is, from father to son. The first khedive of Egypt is Ismail, son of Ibrahim Pasha, b. in 1830; he succeeded his uncle, Said Pasha, Jan. 18, 1863. Ismail is an energetic and active man, always busy with plans of increasing his power. In 1869 he travelled in Europe like a sovereign prince in order to establish connections with the powers which could help him to acquire a greater independence of the sultan; he especially courted the aid of Napoleon III. But this journey excited great displeasure at the court of Constantinople, which by threats compelled him to deliver up the vessels of war and the guns which he had bought, and to repair personally to Constantinople in order to prove his submission. By judicious bribes, however, the khedive has succeeded in obtaining more influence at the court and greater advantages from the sultan. In 1873 he acquired the right of concluding commercial treaties with foreign powers, and in the internal government of the country he has complete autonomy. He has done much to introduce European civilization into his country. He has not attempted, however, to educate the people and raise it to a higher standpoint; he has only established European institutions in the country, without any preparations, completely, despotically; and thus in Egypt civilization covers barbarism like a varnish. There exists since 1866 a representation of the people, but the khedive rules, nevertheless, absolutely, and the poor representatives are only puppets. Magnificent buildings have been erected at Alexandria and Cairo; the great undertaking of building the canal

of Suez received great support from the khedive: French opera is established in a most splendid style; and on different occasions, especially at the opening of the Suez Canal, the khedive received his European guests with brilliant and prodigal hospitality. The army and fleet are in excellent condition, and provided with arms of the latest improvement; different expeditions have been undertaken to the S., in order to extend the authority of Egypt and suppress the slave-trade; but the taxes are very heavy, and are gathered with despotic severity from the poor people, exactly as in the time of the Pharaohs.

AUGUST NIEMANN.

**Kherson**, government of European Russia, bordering on the Black Sea, W. of the Dniester. Area, 28,666 square miles. Pop. 1,497,995. The northern and eastern parts are hilly, fertile, and often covered with splendid forests; the southern and eastern parts are a saline steppe. Agriculture is often impeded by lack of water, and by the immense change of climate, from the scorching heat of the summer to the piercing cold of the winter. Tobacco is extensively cultivated; cattle, sheep, and silkworms are reared.

**Kherson**, town of European Russia, the capital of the government of the same name, on the right bank of the Dnieper. It was founded in 1778 by Potemkin; has several good educational institutions, some manufactures of salt, leather, and rope, extensive shipbuilding, and a large trade in timber. Pop. 45,926.

**Khi'va**, khanate of Toorkistan, in Central Asia, which until recently was held to extend from the Sea of Aral on the N. to the Persian frontier on the S., and from Bokhara on the E. to the Caspian Sea on the W., thus comprising a vast region, mostly desert, with an area variously calculated from 195,000 square miles down to 54,000, and a population estimated with equal uncertainty from 2,600,000 down to 480,000. As the result of a war with Russia in 1873, the limits of Khiva were much reduced, and were in part defined by treaty, while more accurate data were obtained for the population. By the treaty the new E. boundary is the river Amoo, or Amu-Darya (the ancient Oxus), from Kukertli in lat. 40° N. to the Sea of Aral, and thence S. W. along the so-called "ancient bed of the Oxus" to the Caspian, in about lat. 40° N. The Khivan territory E. of the Amoo was ceded to Russia, and a portion was transferred by Russia to the khanate of Bokhara. The area and population of Khiva are still uncertain, owing to a conflict of jurisdiction as to territories claimed by Persia and by Afghanistan on the S., but as Khiva exercises no sovereignty over the disputed region, it may be considered as practically reduced to the oasis N. of the Desert of Toorkistan or Kharezm, and S. W. of the lower Amoo River, a district not exceeding 30,000 square miles in area, with a population of 280,000. The whole region of Toorkistan was probably once covered by a vast inland sea, of which the present Caspian and Aral are the remains. The oasis of Khiva is abundantly watered by irrigation from numerous natural and artificial canals fed by the Amoo, and by the employment of manures produces an abundance of wheat, rice, cotton, apples, peaches, pomegranates, melons, and vines. The climate is variable, frosts prevailing from October to April, while the heats of midsummer are excessive. In December the Amoo and the Aral are usually covered with ice. Manufactures of brass and earthenware, woollen goods, shawls, and silk are carried on to some extent, and domestic animals, especially horses, asses, and camels, are abundant. Trade is carried on by caravans, sometimes of 2000 camels, chiefly with the Russian cities of Orenburg and Astrakhan, the articles of importation including firearms, sugar, muslin, chintz, and fancy goods. A former traffic with Persia and Afghanistan has been interrupted by the hostilities of the Turkoman tribes, but a brisk trade is carried on with Bokhara by exchanging European for Chinese and other Oriental staples of merchandise. The population of Khiva is of several nationalities, representing the results of a long series of wars and irruptions. The ancient population called Sarts or Tujiks still form the large class, furnishing most of the laborers. They are of Persian affinities, and until recently there were many thousands of Persian slaves. The Turkomans or Yomuts, Kirghiz, and Karapalkas constitute the nomadic population of the desert, and are scarcely to be reckoned as Khivans, though some of them are adopting a more settled mode of life. The dominant race is that of the Uzbeks, of Turkish origin. Khiva in the widest geographical sense comprehends a great part of Chorasania, Sogdiana, and Bactria, which, as independent kingdoms or as provinces subject to the Persian and Parthian empires, filled a large space in early Asiatic history. During the Middle Ages it became an independent kingdom under the name of Kharezm or Khovarezm; was conquered by Genghis Khan in the thirteenth century, by Tamerlane in the fourteenth, and by



the Uzbeks early in the sixteenth century, the latter being the founders of the existing khanate. A Russian expedition, sent against Khiva by Peter the Great in 1717, was utterly defeated, and another similar undertaking in 1839 was successfully resisted. In 1873, however, the ill-treatment of Russian captives afforded a pretext for a campaign skilfully conducted by Gen. Kaufmann, who invaded Khiva with three corps of 5000 each simultaneously from the E., the N. W., and the S. W., took Kungrad May 20, and occupied the capital June 10. The khan, Seid Mohammed, had fled, but soon returned to tender his submission and arrange terms of peace. The boundaries were defined as before mentioned, slavery was abolished (July 25), and the slave-trade prohibited; an indemnity of 2,200,000 roubles was imposed, payable in yearly instalments for twenty years, the Russians meanwhile occupying Shurakhan and Kungrad; the right of making treaties with foreign powers was surrendered, and the Turkoman tribes were to be punished for their continued hostilities against Russia. The independence of Khiva was recognized, in conformity with promises made to England, but Khiva became really a Russian dependency. More recent events (1874 and 1875) having demonstrated the inability of the khan to comply with some of his engagements, the Russians occupied the capital anew by request of the native ruler, and the region extending from Bokhara to the Caspian, and S. to the Attrek River, was formally occupied as Russian domain under the name of "Trans-Caspian Territory," with the capital at Krasnovodsk, a newly-established port on the Caspian. The inhabitants of Khiva are Soomite Mohammedans; they have some taste in music and poetry, and a considerable literature. The capital is an irregular walled town, with a citadel and four gates, and some 6000 inhabitants. The houses are mud-built, the palace and bazaars are of rude construction, and the few edifices meriting notice are mosques and colleges. (See Spalding's *Khiva and Turkestan*, MacGahan's *Campaigning on the Oxus and the Fall of Khiva*, and Vambéry's *Central Asia and the Anglo-Russian Frontier Question*, all published in 1874.) A work by Hon. Eugene Schayler, American chargé d'affaires in Russia, who accompanied the Russian expedition, is in the press (1875).

PORTER C. BLISS.

**Khodavendigh'iar**, vilayet or province of Anatolia, Asiatic Turkey, S. of the Sea of Marmora, traversed by the Keshish-Dagh Mountains (ancient *Olympus*), and comprising parts of ancient Bithynia, Mysia, and Phrygia. Pop. about 1,100,000. Cap. Brusa.

**Khoi**, town of Persia, in the province of Azerbaijan, in lat. 36° 37' N., lon. 45° 15' E., is one of the best built cities of the country, with broad and straight streets traversed by canals and planted with trees. It has considerable trade, and the surrounding plain produces much fruit, grain, rice, and cotton; but the locality is somewhat unhealthy. Pop. about 30,000.

**Khojend'**, or **Kodjend**, the ancient *Jaxartes*, town of Khokan, Independent Toorkistan, Central Asia. It is a populous town, but decaying, important only on account of its transit trade. Duty has to be paid here on all merchandise entering Khokan from Bokhara. Pop. estimated at 20,000.

**Khokan'**, or **Kokan'**, one of the three independent khanates of Toorkistan in Central Asia, bounded on the S. W., W., N., and N. E. by the Russian province of Sir-Darya, E. and S. E. by Kashgaria or E. Toorkistan, and S. by the Pamir plateau and the Karateghin. The area was formerly calculated as high as 227,000 square miles, and the pop. as high as 3,000,000, but these estimates were much exaggerated. The western part of the khanate, comprising the lower basin of the Sir-Darya, with the important cities of Tashkend and Khojend, was annexed to Russia in 1864, and further annexations have so reduced the khanate that, according to Russian maps published in 1872, the area is only 28,270 square miles and the pop. 800,000. In the present aspect of affairs in Central Asia (1875) its speedy annexation to Russia may be anticipated. Khokan is at present chiefly comprised within the valley of the river Sir-Darya, the ancient *Jaxartes*, forming an almond-shaped district about 165 miles long and 65 miles wide. This was formerly known as the province of Ferghana. The average elevation above the sea is 1500 feet; the climate varies from extreme cold to extreme heat, according to location. The valley is bounded on the S. E. and S. by lofty mountains, the chains of Thian-Shan or Muz-Tagh and Asferab-Tagh forming watersheds between the basin of the Sir-Darya and those of the Kashgar and Amu-Darya rivers, which flow E. and W. from the Amir plateau. The country is abundantly watered by the numerous tributaries of the Sir-Darya, and, aided by an extensive system of irrigation, the fertile soil produces fine crops of rice, wheat, cotton, and barley, as well as hemp, flax, tobacco, sorghum,

and madder. Fruits of many kinds abound; silk of excellent quality is grown and manufactured. In 1872, 8,000,000 pounds of cotton and 200,000 pounds of silk were exported to Russia. Domestic animals, especially sheep, are reared in sufficient numbers; turquoise, iron, coal, naphtha, and petroleum are among the mineral products. The population consists of Uzbeks, of Tartar origin; the more numerous Tajiks or Sarts, of Persian or Aryan origin, once serfs, and still the principal agriculturists; and the Kara-Kirghiz and Kiptchak nomadic tribes, of Turkish blood, living chiefly in the eastern districts. The government has been of late years violently disputed between these three races. The present khan, named Khudayar, commenced his reign in 1843, and being by descent a Kara-Kirghiz, the Turkish tribes were in the ascendant during his minority. On succeeding to full power in 1849, Khudayar favored the peaceful and industrious Sarts in preference to the turbulent nomads, until the latter in 1857 made a successful rebellion, raising his brother Mollah to the government. A war with the Russians in 1864 led to the annexation of the greater portion of Khokan to Russia, to the return of Khudayar from exile in Bokhara, and the re-establishment of his government by Russian support. A commercial treaty was negotiated in 1868, but in 1874 the anti-Russian sentiment had gained the ascendant, fomented by a civil war, and furnishing pretexts for a new interference not likely to be neglected. The chief cities of Khokan are the capital, bearing the same name, a handsome place of 50,000 inhabitants; Marghilan, and Andijan.

PORTER C. BLISS.

**Khondistan'**, a district in the province of Orissa, India, about 200 miles in length by 170 in breadth, at the sources of the Nerbudda River, embracing the plateaux of the Vindhya and other mountains. The inhabitants, called Khonds, Khoonds, Konds, or Gonds, constitute one of the so-called "hill-tribes," supposed to be remnants of the earliest inhabitants of India, their physique, religion, manners, and customs being entirely non-Aryan and of an extremely low type. They are very black, with thick lips and woolly hair, but well proportioned, strong and athletic, living upon wild fruits and roots and such game as they can snare or kill by their rude devices. Their language is classed with the Uriya; it has many dialects and a "peculiar pectoral enunciation." Human sacrifice was formerly very prevalent, but since the English came in contact with the Khonds (1835) it has been suppressed through the long-continued efforts of the British agent, Col. (now Maj.-Gen.) John Campbell, whose *Personal Narrative* (1864) is a valuable source of information. The Khonds have recently attracted great attention from ethnologists on account of their very peculiar customs. (See the works of Hodgson, McPherson (1842), Tylor, Lubbock, Brace, Hunter, and McLennan.)

**Khonsar'**, town of Persia, in the province of Irak-Ajeme. It has a large trade in dried and preserved fruits. Pop. 12,000.

**Khooloom'**, or **Tashkurgan'**, town of Toorkistan, Central Asia, is on a river of the same name, in lat. 36° 40' N., lon. 68° 5' E. It consists of about 20,000 houses, one story high, built of clay or sun-baked brick, with conical roofs, and surrounded with walls; it is defended by two citadels. Melons are extensively cultivated in the vicinity.

**Khoondooz**. See KOONDooz.

**Khorassan'**, the ancient *Bactria*, a province of Persia, situated between lat. 34° and 38° N., and between lon. 53° and 61° E. Its southern part is a desert of shifting sand and salt waste, but in the northern part branches of the Elburz Mountains form beautiful valleys, whose natural fertility is still further increased by irrigation, artificial manures, and a most careful cultivation. Cotton, hemp, and tobacco are grown; wine, fruits, and silk are produced; aromatic and medicinal plants are cultivated, and gold, silver, and salt are found. The manufactures of silk and goat-hair fabrics and sword-blades are celebrated. Cap. Meshed.

**Khorsabad'** [corruption of *Khorsabad*, "the abode of Khorsu or Chosroes"], a v. of Asiatic Turkey, on the Tigris, 13 miles N. E. of Mosul, occupying the site of one of the royal cities of Assyria, the remains of which were discovered by E. Botta in 1843. The palace of Sargon, excavated at the expense of the French government, afforded the first historical inscriptions in cuneiform characters found in ancient Assyria, and led to the more famous discoveries of Layard on the site of Nineveh. The excavators of Khorsabad erroneously gave the name of Nineveh to that place. (See Botta and Flandin's magnificent publication, *Monuments de Ninive* (5 vols., chiefly of plates, Paris, 1849-50), and articles ASSYRIA and CUNEIFORM INSCRIPTIONS.)



**Khosru',** or **Chos'roes** [Gr. *Xosróēs*], the name of two Persian monarchs of the Sassanid dynasty: 1. **NIŠIRVAX** ("noble spirit"), called by historians **THE JUST**, one of the greatest of Oriental sovereigns, was third son of Kobad or Colabades, by whose will he succeeded to the throne at Ctesiphon Sept. 12, 531, to the exclusion of his elder brothers, whom he is said to have put to death as a measure of precaution. Unreliable legends give different accounts of the birth and education of Khosru. According to Firdousi, his mother was the daughter of a king of the Huns; while Eutychius and many Persian histories assert he was the offspring of a noble lady of Khorassan, born about 500, while his father Kobad was a refugee in that province. The Greek historian Procopius relates that Kobad solicited the Byzantine emperor Justin to adopt Khosru, in order to strengthen his title to the throne, and that the proposal was accepted, and the young prince was on his way to Constantinople, when a sudden rupture put an end to the project and implanted in the prince that hatred of the Greeks which he afterwards displayed. This tale is a puerile invention, though repeated by some modern writers. The hereditary war between Greeks and Persians had broken out afresh in 521, and was carried on languidly in Armenia, Syria, and Mesopotamia until the accession of Khosru. Justinian had come to the throne of Constantinople in 527, and being desirous of concentrating his energies upon the war with the Vandals in Africa, he concluded with Khosru an ignominious peace (532) by agreeing to pay an annual tribute of 140,000 pieces of gold. One of the conditions made by the Persian monarch was that seven Greek philosophers, who had been persecuted as pagans and had taken refuge in Persia, should be allowed to return to their homes and reside there under Persian protection. During the preceding reign a politico-religious sect, called after their founder Mazdak, had arisen in Persia, inculcating communistic or socialistic principles. Kobad had at one time favored, but at a later period endeavored to subdue them, seizing the leaders by stratagem and massacring many of the sectarians. A formidable civil war was the result, continuing into the reign of Khosru, who finally suppressed the sect. The actions of the two monarchs in this respect have been much confused with each other, many events, especially the execution of Mazdak, being attributed to both, and it is now impossible to recover the facts of the case. One of the earlier measures taken by Khosru was the administrative division of his vast empire into four viceregalities—Assyria, Media, Persia, and Bactriana. He is charged by the Byzantine historians with having incited one of his vassals, Almondar, the Arabian prince or king of Hira, to invade Syria, in violation of the peace. Be this as it may, the war broke out afresh. Khosru marched an army into Syria in 540, imposed enormous contributions upon the principal cities, took Antioch (June) after a gallant defence, and nearly destroyed that Eastern metropolis of the Byzantine empire. Belisarius, the conqueror of Africa, was sent to conduct the war (541), and by a bold irruption into Mesopotamia forced Khosru to return to the defence of his own states. Belisarius being recalled, the invasion of Syria was renewed (542); the return of that general to the field caused the Persians to recross the Euphrates, and his second recall for the Italian campaign (543) again gave the victory to Khosru. After a brief truce the war was renewed in Colchis and Lazica, provinces lying at the foot of the Caucasus, which had revolted from Persia by the aid of Justinian, and continued with numberless alternations of fortune until 562, when the Byzantine emperor consented to pay an annual tribute of 10,000 pieces of gold, and remained in possession of the disputed provinces. Southern Arabia was soon afterwards conquered by Khosru: the Armenians revolted from him in 569 with the support of the emperor Justin II., and the war between the two empires was renewed in 571, with the usual alternations of fortune. Syria was again ravaged by the Persians, but Khosru was completely defeated in a great battle at Meitene in Lesser Armenia in 576, and d. at Ctesiphon in Mar., 579, leaving the throne and the hereditary war to his son Hormuz (or Hormisdas) IV. The reign of Khosru is accounted by the modern Persians the most glorious period of their annals. All the Oriental virtues are ascribed to him, and there can be no doubt that the government was administered with vigor and sagacity. Learning was powerfully stimulated by the translation of the best Sanskrit and Greek works, agriculture and commerce received a powerful stimulus, and many magnificent cities were built. The boundaries of the empire were extended beyond the Indus and the Oxus, and diplomatic relations were maintained with all the realms from Africa to China.

II. **PERWIZ** or **PERWIS** ("the generous"), grandson of Khosru I., succeeded his father, Hormuz IV., who was deposed in 590 by a rebel general named Bahram, who reigned for a year. The young Khosru took refuge with the Greek

emperor Mauritius, by whose aid he regained the throne, and in recompense ceded a great part of Mesopotamia, besides paying a large sum of money. On the murder of Mauritius by Phocas (602), Khosru made war upon the usurper, nominally to avenge the death of his benefactor, and within a few years conquered Syria, Egypt, and Asia Minor. He took Antioch in 611, Damascus and Jerusalem in 614, Alexandria in 616, Chalcidion in 618, and Ancyra in 620, thus bringing the war to the gates of Constantinople. Heraclius had succeeded to the throne in 610, but the Persian conqueror was enjoying too great favors from fortune to listen to proposals for peace. With the wealth of so many kingdoms he built a palace of unparalleled magnificence at Dastagerd, 60 miles E. of Ctesiphon, in the midst of a park laid out upon a corresponding scale. After twelve years of defeats, the emperor Heraclius began in 621 a series of campaigns in which he recovered all his lost possessions, reduced Khosru to extremities, and even ravaged his palace at Dastagerd. In consequence of these misfortunes, Khosru was deposed and murdered by his son Shirweh (Siroes) in Feb., 628. It was during his reign that Mohammed proclaimed the doctrine of Islam. He summoned Khosru by letter to recognize him as the prophet of Allah, and when the former tore the letter in pieces, Mohammed predicted, "Thus will God tear his kingdom and reject his supplicants."

PORTER C. BLISS.

**Khotan',** or **Illitsi**, one of the four provinces of Kashgaria, formerly Chinese Toorkistan. The capital city, bearing the same name, is situated on the route between Yarkand and Lassa, in lat. 37° N., lon. 78° to 80° E. It was formerly, according to Albulfeda and other Mohammedan geographers, a city of great importance, and is still a large place, enclosed with earthen ramparts and with broad streets, though ill built. It has manufactures of silk fabrics, leather, and paper, and has a thriving trade in these articles and in *yu*, the Jasper of the ancients. The inhabitants are chiefly Uzbek Tartars, and the place is celebrated for its musk and for the beauty of the native population.

**Khotin.** See **CHOTYN**.

**Khuzistan',** the ancient *Susiana*, province of Persia, bordering on the Gulf of Persia. Its southern part is a low plain, sandy in some parts, swampy in others, but generally affording excellent pastures wherever it is well watered. The northern part is mountainous. Rice, maize, sugar, and indigo are cultivated, and large herds of goats, cattle, sheep, and horses are reared.

**Khy'ber Pass,** in the Khyber Mountains, a gorge nearly 30 miles long, enclosed by cliffs of slate, rising almost perpendicularly on both sides to the height of 1000 feet. It is the principal, and for artillery the only available, road between Hindostan and Afghanistan.

**Khyen' Country,** a semi-independent province of Farther India, N. W. of Burmah and E. of the British provinces of Aracan and Chittagong. It is a narrow strip some 200 miles in length, traversed by the large rivers Khyen-dwem and Khyoung.

**Khyerpoor',** town of Sind, the residence of the ameer of North Sind, near the Indus. It is an ill-built and insignificant place. Pop. 15,000.

**Kiabouc'ca, or Amboyne Wood,** a very expensive and beautiful wood, imported for veneering purposes. It is richly mottled, and is of a reddish hue. It is sawed in thin slips from knots and veins upon the *Pterospermum Indicum*, a tree of the East Indies. It is chiefly employed in inlaying.

**Kinch'ta, or Kiakh'ta,** town of Siberia, in the Russian province of Transbaikalia, near the Chinese frontier, 180 miles S. E. of Irkutsk. Pop. 3,000. It was established in 1727 as the exclusive mart for the trade between China and Russia, which was chiefly conducted by means of annual fairs. The trade sometimes amounted to \$8,000,000 per annum, but has decreased since the treaty of Peking (1860), which permitted commerce along the whole frontier of the two empires. Knehta has a fortress containing the government and customs buildings, and is the residence of many Russian merchants.

**Kiang'-Choo.** See **KIANG**.

**Kiang'-Si,** an inland province of China, between lat. 24° and 30° N., and between lon. 116° and 118° E. Area, 72,180 square miles. Pop. 14,844,800. It is mountainous and rich in minerals. Cap. Nan-Chang-Tow.

**Kiang'-Su,** province of China, between lat. 31° and 35° N., and between lon. 116° and 121° E., bordering on the Yellow Sea. Area, 44,000 square miles. Pop. 34,194,644. The ground is low and level, and the soil is exceedingly fertile. Rice and sugar are the principal products. Cap. Nan-King.



**Ki'antone**, post-v. and tp. of Chautauqua co., N. Y., 6 miles S. of Jamestown. Pop. of v. 62; of tp. 339.

**Kickapoo'**, post-tp. of Peoria co., Ill., 8 miles N. W. of Peoria. Pop. 1440.

**Kickapoo**, post-tp. of Leavenworth co., Kan. It contains the village of Kickapoo or Kickapoo City, on the Missouri River and on the Leavenworth Atchison and North-western R. R. Pop. 1855.

**Kickapoo**, post-tp. of Vernon co., Wis. Pop. 912.

**Kickapoos**, a tribe of Indians, of Algonquin stock, who in the seventeenth century lived on the Wisconsin River, and hunted, in company with the allied Miamis, over a vast territory. They came in collision with the French explorers in Illinois, whither they had migrated early in the eighteenth century, and in 1763 were found by the English on the Wabash River. They committed hostilities against the settlers in the Pontiac war (1763), and again in 1791, when their Wabash village was taken by Gen. Scott, and another burned by Wilkinson. After Wayne's victory over the allied Western tribes, the Kickapoos submitted, and by the treaty of Greenville (Aug. 3, 1795) they ceded part of their lands. They were again in arms in 1811 at Tippecanoe, and at Fort Harrison in 1812; as a consequence, several of their villages were burned, and by new treaties (1815, 1816, and 1819) they sold most of their lands, removing beyond the Mississippi to Osage River reservation to the number of 1800. Few of them would settle down to agriculture, but roved through what is now the Chickasaw and Creek country, committing depredations in Texas and other frontier states of Mexico, where many of them ultimately established themselves. They now reside in N. E. Kansas, where they are comfortably established, and in the Indian Territory, numbering in all about 1500.

**Kidd (WILLIAM)**, the "Robert Kidd" of popular tradition, was the son of a Scotch nonconformist preacher. He became a sailor, and in 1691 received an award of £130 from the council of New York for services in behalf of the colony. In 1696 he sailed from Plymouth, England, in command of the *Adventure* galley, fitted out for the suppression of piracy, but, according to the general belief, he became a pirate himself. He came in 1698 to New York with a large amount of treasure, which was seized by the earl of Bellomont; and an additional treasure which Kidd had buried on Shelter Island was also recovered. Kidd himself was sent to London, where he was hanged May 24, 1701—not for piracy, but for the murder of William Moore, a seaman. The trial was very unfair, and there is some reason for believing that Capt. Kidd was not guilty of the crimes which have made his name so notorious.

**Kid'der**, county of Northern Dakota, newly formed, crossed by the Northern Pacific R. R., occupied by the Plateau du Coteau du Missouri, and comprising an area of 1700 square miles.

**Kidder**, post-v. and tp. of Caldwell co., Mo., on the Hannibal and St. Joseph R. R., 163 miles W. of Hannibal. Pop. of v. 195; of tp. 922.

**Kidder**, tp. of Carbon co., Pa. Pop. 1417.

**Kidder (DANIEL PARISH)**, D. D., b. at Darien, N. Y., Oct. 18, 1815; studied in Lima, N. Y., and at Hamilton College, N. Y., and graduated at the Wesleyan University, Conn., in 1835. He preached in New Jersey conference 1840-44; was connected with the M. E. Book Concern; was professor of practical theology in Garrett Biblical Institute, Evanston, Ill., in 1855, and afterwards became professor at Drew Theological Seminary, Madison, N. J. *Brazil and the Brazilians*, *Mormonism and the Mormons*, *Homiletics*, and *The Christian Pastorale* were published by him.

**Kid'derminster**, town of England, in the county of Worcester, on both sides of the Stour, near its influx in the Severn. Its carpet manufactures are very celebrated. Pop. 20,803.

**Kid'doo (JOSEPH B.)**, b. in Pennsylvania; on the outbreak of civil war he enlisted, Apr., 1861, as private in the 2d Pennsylvania Vols., and was engaged at the siege of Yorktown, the battles of Williamsburg, Fair Oaks, Malvern Hill, etc.; promoted to be major 101st Pennsylvania Vols.; subsequently as lieutenant-colonel 137th Pennsylvania Vols. he was engaged in the battles of South Mountain, Antietam, and Fredericksburg; and as colonel at Chancellorsville. In Oct., 1863, he was appointed major 6th, and June, 1864, colonel 22d U. S. colored troops, operating during the siege of Petersburg with the Army of the James, being severely wounded Oct., 1864. For gallant conduct he was brevetted brigadier-general and major-general U. S. volunteers, and colonel and brigadier-general U. S. A. In July, 1866, he was appointed lieutenant-colonel 43d U. S. Infantry, but owing to disability arising from wounds re-

ceived in service, was retired Dec., 1870, upon the full rank of brigadier-general. G. C. SIMMONS.

**Kid'napping** [from Ger. *kind*, Prov. Eng. *kid*, "child," and Prov. Eng. *nep*, to "seize"] is a criminal offence, defined by Blackstone to be the forcible abduction or stealing away of a man, woman, or child from his own country and sending him into another. (*Comm.*, iv. 219.) The term is commonly employed to denote the stealing and carrying away of children, but in law it is applied to all persons. This offence was treated, at common law, as an aggravated kind of abduction or false imprisonment, and was punished by fine and imprisonment. (See ABDUCTION, FALSE IMPRISONMENT.) At the present day the nature of this crime is generally defined by statute, and the carrying of the person taken into another country is not usually made a necessary ingredient in the offence. Fraudulently inveigling, enticing, or decoying a person away, with intent to imprison or secrete him or detain him from his home, is frequently declared to be kidnapping as well as an abduction by the use of force. It is sometimes provided that the consent of a person to his abduction shall not be a defence to the party accused of the offence, unless it appear satisfactorily to the jury that such consent was not extorted by threats or duress. Such is the case in New York. There are frequently special statutory provisions in regard to the kidnapping of children. The consent of a child of tender years has been held at common law to render his abduction none the less a criminal offence. At what age a child would be capable of giving an assent which would be available in defence has never been precisely determined. His capacity in this respect must be ascertained from the circumstances of each particular case. In New York it is declared by statute that every person shall be guilty of kidnapping who shall forcibly seize and confine, or shall inveigle another, with intent to cause him either to be sent out of the State against his will, or to be secretly confined or imprisoned in the State against his will, or to be held in involuntary servitude. The offence is a felony, and is punishable by imprisonment in a State prison for a term not exceeding ten years. The statutes of other States must be specially consulted.

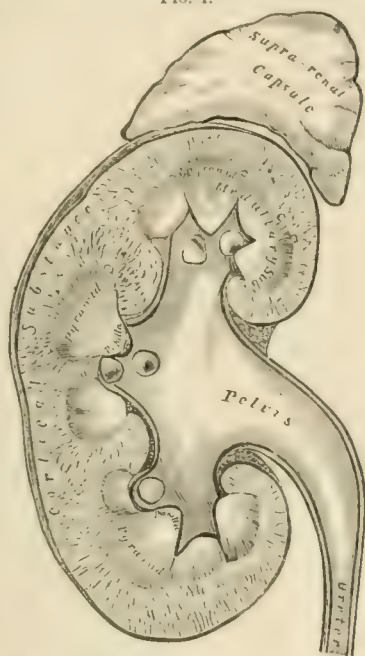
GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Kid'ney** [from Ang.-Sax. *cygne*, "genitals," and *neah*, "near;" Lat. *renes*; Fr. *reins*; Old English, "the reins"], an excretory organ in the body of vertebrates (an imperfect analogue being found in exceptional invertebrates), whose function is the elimination of the urine, an aqueous solution of various effete organic products and of inorganic salts, the débris of nutrition and metamorphosis of tissues. These excretory products—water, salts, and organic matter—are separated from the blood. In the kidney, therefore, arterial branches elaborately subdivided, their walls attenuated, are brought in close contact with a system of glandular bodies and tubules for the escape of the components of urine by transudation and secretion. In fishes the kidney presents a simple, rudimentary structure—one straight tube or ureter extending the entire length of the body, and giving off at right angles numerous tufts of tubules which interdigitate with blood-vessels. Reptiles have a more definite organ—a localized mass of tubules. Birds have relatively large kidneys. Mammals, especially man, have the most perfect development—namely, the greatest multiplication of tubular surface in a compact form.

The kidneys in man, two in number, are situated in the posterior part of the abdominal cavity, behind the peritoneum, one on either side of the spine in the lumbar region, and extending from the eleventh rib to near the crest of the ilium. The kidneys are retained *in situ* by their blood-vessels and by fat in which they are imbedded. A kidney is "bean-shaped," or ovoid, with a concave depression, notch, or "hilus" on one side; is of a brownish-red or maroon color; in consistency is dense, firm, but fragile; measures four inches long, two in width, and one in thickness; in weight varies from four and a half to six ounces in the adult male, and half an ounce less in the female. Relatively, the human kidneys are  $\frac{1}{250}$ th of the weight of the body. The kidney is invested by a strong fibrous capsule loosely attached by "areolar" or connective tissue. An organ so small, it contains so compact and elaborate an arrangement of vascular tufts and extensive multiplication of tubular structure, that the surface for excretory work is equal to six times the entire surface of the skin. (*Mapother*.) A vertical section of the kidney (see Fig. 1) displays a hollow organ, consisting apparently of a thick wall folded around the internal cavity at its hilus or concave side. Two distinct structures are noticeable: 1st, the cortex, or external peripheral portion, termed the "cortical substance," dark, homogeneous, granular; 2d, internally a series of pinkish, fan-shaped, or pyramidal masses, their bases towards the cortex, their apices converging upon the

central cavity. In the apparently homogeneous substance or granular matrix minute inspection reveals, imbedded, convoluted masses of capillaries—vascular tufts known as

FIG. 1.



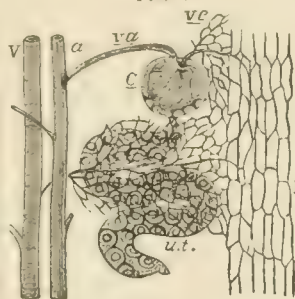
Vertical section of kidney, showing granular cortex and pyramids or fan-shaped groups of uriniferous tubules.

**Malpighian tufts.** These tufts are surrounded by flask-like capsules or membranous expansions of tubules. A tuft and its investing capsule constitute a "Malpighian body." Departing from the capsule of the tuft, the uriniferous tubule is tortuous or "convoluted." The cortex includes in its granular "matrix" or "stroma" the Malpighian bodies, and convoluted tubules which separate urine from the blood circulating in adjacent and intertwining capillaries, as well as from the tufts. The cortex is therefore the secretory or functional portion of the kidney, as distinguished from the pyramidal or medullary portion, which is termed "tubular." The cortex constitutes three-fourths of the kidney, being thin over the bases of the pyramids, but dipping deeply down between them to form columns of Bertin, and containing the vessels, nerves, and lymphatics, which, entering at the hilus, ramify towards the periphery of the organ. The pyramids vary in number from eight to eighteen, and collectively constitute the medullary substance of the kidney. A pyramid is a collection of straight urinary tubules, which communicate with the convoluted tubules of the cortex through intermediate "looped" tubules. One straight tubule collects the urine of several convoluted tubules. A pyramid contains about 1000 tubuli recti (straight tubules) converging at its apex, which presents a convex process or elevation on the surface of the cavity, designated a papilla. Several pyramids may coalesce near their apices, presenting a single papilla. The tubuli recti discharge by free apertures into the central cavity or reservoir, termed the pelvis of the kidney. The cavity is of irregular contour, having three sacculated recesses, termed infundibula. The pelvis, receiving the urine collected by the several pyramids from corresponding sections of the cortex, parts with it through the ureter, a tube communicating between the kidney and the bladder. In the human adult the kidney is a symmetrical organ, but in foetal life it is divided into distinct lobes, seven or eight in number, each consisting of a pyramid and corresponding section of cortex. The superficial depression and lobulated structure disappear later by

the growth of new, intermediate pyramids. In other mammals, the sheep, ox, bear, whale, the kidneys are distinctly lobulated,—externally nodulated. Although the visible distinction between lobules is obliterated in man, disease, as inflammation, is often limited by the primitive boundaries, leaving adjacent healthy parts to vicariously perform the function of the crippled ones. The kidney having but a single function, the excretion of urine, interest centres in the study of the microscopic, exact structure of the glandular apparatus of the cortex, and of the system of minute tubules which conduct the excreted fluid to the central reservoir of the kidney, thence to pass to the bladder and finally be voided from the body.

Our perfect knowledge of the histology of the kidney has resulted in part from the labors of Müller and Bowman in unravelling the tubules of the lower vertebrates, in part from the fine injections of vessels and tubules by Huschke, Gerlach, Henle, Ludwig, and others. The granular stroma, matrix, or substance of the cortex is studded with innumerable Malpighian bodies. The Malpighian body is spheroidal, and measures about the  $\frac{1}{100}$ th or  $\frac{1}{125}$ th of an inch in diameter. The renal artery, a branch of the aorta, enters the kidney at its hilus, extends its branches up between the pyramids to the cortex, and having divided and subdivided many times, its ultimate branches suddenly expanding into numerous capillaries rolled in a spheroidal form, a convoluted mass, or plexus, variously designated as a Malpighian (from Malpighi, who discovered it) "tuft," "glomerulus," or "knot." The vessel supplying or bringing blood

FIG. 2.



Relation of blood-vessels in the kidney to the glandular structure separating the urine: *a*, artery conveying blood by afferent vessel *va* to tuft of capillaries within the capsule *c*; *ve*, the efferent vessel removing blood to network of capillary veins *vn*, and into vein *v*; *ut*, uriniferous tubule.

to the tuft is termed the "afferent" vessel, and a companion vessel leaving the tuft, removing the blood which has parted with the urinary products, is the "efferent" vessel; it conveys its contained blood to the renal vein. This Malpighian tuft of capillary arteries and veins is surrounded by a spheroidal, flask-shaped, membranous capsule, which is the beginning of a uriniferous tubule. The thin-walled capillaries of the tuft or knot part with blood, serum, or water by simple transudation, and therefore excrete the chief ingredient of the urine, water being from 95 to 98 per cent. of its constituency. The capsule, being a mere receiver of water oozing from the vessels, performs no true secretory or glandular action, and therefore is not lined with epithelial or secretory cells except at its lower third, being merely a thin, translucent, structureless basement membrane. The epithelial cells at its lower third continue to line the uriniferous tubule which departs from it. This tubule is convoluted, at first about  $\frac{1}{100}$ th of an inch in diameter, later  $\frac{1}{500}$ th only, and its epithelium is "spheroidal" in shape. The tuft separates water by transudation. These convoluted tubes, by their glandular lining cells, separate or excrete from the adjacent capillary vessels the solid constituents of the urine, rarely as high as 5 per cent. of its entire volume. (In snakes, whose urine is nearly solid, the entire tract of capsule and tubule is lined with cells.) The convoluted tubules were discovered in the eighteenth century by Ferrein. They occupy the cortex between and around the Malpighian bodies, and continue in a transition state, as smaller, translucent, unlined, "looped" tubules, across the boundary of the cortex to the medullary or pyramidal portion, and empty into the larger, straight tubules (tubuli recti) which compose those radiating, fan-shaped masses—the pyramids. These straight tubules, discovered in the seventeenth century by Bellini, merely collect the urine and transmit it to the pelvis of the kidney. They are lined with "fossellated" or pavement epithelial cells, which are flat and polygonal, usually bicuspid. These tubules have a calibre of  $\frac{1}{100}$ th or even  $\frac{1}{200}$ th of an inch. The pelvis of the kidney is lined with oval cells, the outer with conoidal cells. The pavement epithelial cells of one of the several forms in excess in the urine is of service in indicating what part of the kidney is the seat of disease.

Early in foetal life the undeveloped kidneys are surmounted by the Wolffian bodies, having a structure like the kidney, a true urinary secretion, and a common duct. They disappear as the kidney develops, and replace them. Surmounting the kidneys in adult life are small masses, the

Sketch of the origin, course, and subdivisions of a single urinary tubule. Transition of the convoluted urinary tubule into the system of excretory tubules (tubuli recti) of the pyramids.



suprarenal capsules, ductless, glandular bodies of unknown function, and chiefly interesting on account of a peculiar pigmentary, granular degeneration they rarely undergo, disseminating pigment throughout the body, impoverishing the blood, and tinging the skin. (See Addison's Disease.)

An anatomical anomaly is the "horseshoe kidney," the two kidneys being united by an isthmus of fibrous and granular structure. Exceptionally, the kidney is "movable," and varies its position in the abdominal cavity. The nervous supply of the kidney is rich, derived from the sympathetic system. The nerves may be traced from their entrance at the hilus up to the afferent vessels of the tufts. The kidney is well known to be easily excited to action by emotion and all influences upon the sympathetic nervous system, and to have a direct and complementary relation to the functional activity of the skin. (For diseases of the kidney see RENAL DISEASES, by FREDERICK ZINSSER, M. D.) E. DARWIN HUDSON, JR.

**Kid'ron, or Cedron**, a small stream or "brook" in the valley E. of Jerusalem, and memorable in many scenes of biblical history.

**Kiel**, town of Prussia, in the duchy of Holstein, on the Kieler Fjord. It is well built and beautifully situated, has a university, some manufactures, and a considerable trade. Its harbor is one of the best on the Baltic, deep and safe, and now very strongly fortified; it will be the station of the German fleet in the Baltic, and the seat of all institutions belonging to the German navy. Kiel communicates daily with Copenhagen, Christiania, and Malmö. Pop. 31,764.

**Kiel'ce**, government of Poland, adjoining the frontier of Austrian Galicia. Area, 3623 square miles. Pop. 470,300. It is watered by the Vistula, produces good wheat and other grains, and has abundant iron-mines. The capital is a town bearing the same name, 96 miles S. W. of Warsaw, with 7295 inhabitants; seat of a Catholic bishopric and seminary, a mining-school, and a gymnasium or academy.

**Kienchow**. See KIONG-CHOO.

**Kien'-Lung** [Chinese, "celestial blessing"], fourth emperor of China of the present Manchu dynasty, b. in 1709; succeeded his father, Yung-Ching, in 1735; made war upon the Tartar tribes (1754-60) and upon the kingdom of Ava (1768); published an edict against Christianity (1753); received the first English embassy under Lord Macartney (1793); abdicated in favor of his son, Kia-King (1795), and d. Feb. 7, 1799. He was a protector of literature, wrote treatises in Chinese and Manchu, and edited a vast dictionary of the latter language.

**Kie'pert** (HEINRICH), b. at Berlin July 31, 1818; devoted himself from early age to the study of geography; enjoyed the instruction of Ritter; explored Asia Minor in 1841-42; was director of the geographical institute of Weimar 1845-52; returned to Berlin and became professor at the university in 1859. His *Atlas von Hellas und den hellenischen Colonien* (Berlin, 1840-46; revised ed. 1866), and his maps to Robinson's *Palestina* (Halle, 1843), attracted the attention of the scientific world. His *Historisch-geographische Erklärung der Kriege zwischen dem ost römischen Reiche und den persischen Königen der Sassaniden-Dynastie*, was awarded a prize in 1844 by the French Institute. Of his numerous other publications, *Neuer Hand-atlas der Erde*, 40 maps (Berlin, 1857-61), is very extensively used and much appreciated; also his *Atlas der alten Welt* (1818), etc.

**Kier'kegaard** (SÖREN AABYE), b. at Copenhagen in 1813, spent his whole life, almost without any exception, in his native city, living in elegant retirement, at last almost in seclusion, and d. there in 1854. His works are very numerous, some of them also very large, and comprise two series of writings, published simultaneously—one pseudonymously, the other under his name. In the former, *What is—Or, Stages of Life, Bits of Philosophy, The Idea of Horror*, etc., he gives a sketch and a criticism of those different views of life with which people try to live in our times, and shows that outside of Christianity there is a chance for dazzling heroism, for brilliant vices, for mediocrity, and for nonsense, but none for the deepest impulses of human nature. In the latter, *Exercises in Christianity, Deeds of Love, Sermons*, etc., he develops his own conception of Christianity, partly in positive form, partly polemically, criticising the ruling theological systems. His conception is very austere. Intellectually, Christianity is a paradox, which can be grasped only by faith: it is the characteristic of every truly Christian idea that it is a cross to the understanding, and yet absolutely imperative in its form. Morally, it is love—not charity, or benevolence, or honesty, but a love which knows no choice and makes no preference, but embraces the whole human race with the same sympathy, blotting out all those differences which arise from the natural

relations between parents and children, man and wife, etc. Æsthetically—that is, in its effect on natural life—it is suffering; he whose life is not one continuous suffering is not a Christian. He was a most powerful stylist, though his style was more seducing than convincing. CLEMENS PETERSEN.

**Kie'sewetter** (RAPHAEL GEORGE), b. Aug. 29, 1773, at Hollerschau, Moravia; studied philosophy and law at Olmütz and Vienna; held since 1794 different government offices in Vienna; retired in 1845, and d. Jan. 1, 1850. His writings are of great interest for the scientific study of music, especially *Geschichte der europ. abendl. Musik* (1834) and *Darstellung des Gesangs vom frühen Mittelalter bis zur Einführung des dramatischen Stils* (1841).

**Kies'ter**, tp. of Faribault co., Minn. Pop. 61.

**Kiev', Kiev, or Kiew**, government of European Russia, bordering on the Dnieper. Area, 1942 square miles. Pop. 144,276. The northern part is low and marshy; the southern, hilly, covered with branches of the Carpathian Mountains. The soil is fertile, and the climate very mild. Wheat, maize, tobacco, hemp, and vines are cultivated; excellent timber is grown and many cattle reared.

**Kiev**, town of Russia, the capital of the government of Kiev, on the right bank of the Dnieper. It is one of the oldest and most beautiful cities of Russia. It consists, properly speaking, of three towns, each with its own walls and fortifications—namely, Petcherski, with the famous monastery of Petcherskoi, containing the tombs of many Russian saints; Kiev proper, with the celebrated cathedral of St. Sophia, built in 1037; and Podol, which is occupied by the middle and lower classes. Kiev has a university frequented by 1500 students, and several other educational institutions. Its manufactures are not considerable, but its trade is extensive and important. Pop. 70,591.

**Kikin'da, Nagy-Kikinda, or Gross-Kikinaa**, town of Austria, in the Temesvar banat, has an important annual fair and a large trade in cattle. Pop. 17,462.

**Kilauea**, a celebrated volcano in Hawaii, one of the Sandwich Islands, one of the largest in the world. It is in constant activity, and in the eruption of 1840 sent forth for three weeks a river of molten lava which varied from a few hundred feet to 3 miles in width. The crater is 8 miles in circumference, and varies from 800 to 1500 feet in depth. Manna Loa, another famous volcano, is only 16 miles distant.

**Kil'bourn City**, post-v. of Newport tp., Columbia co., Wis., on the Wisconsin River and the Chicago Milwaukee and St. Paul R. R., 108 miles N. W. from Milwaukee. It has 8 churches, 1 bank, 4 hotels, 1 newspaper, 33 stores, 3 harness, 5 boot, 4 blacksmith, and 3 wagon shops; also saw and flour mills, sash, door, and blind factories, and a tannery. There are extensive public schools and a fine institute. Kilbourn City is surrounded by a rich farming district, is the centre of the hop-trade of the North-west, and noted as a place of summer resort, being at the foot of the famous "Dells of the Wisconsin." Three elegant little steamers ply on the river for the accommodation of the pleasure-seeker. Pop. about 1100.

FRANK O. WINNER, ED. "WISCONSIN MIRROR."

**Kil'bourne** (JAMES), b. at Farmington, Conn., Oct. 19, 1770; was a mechanic, a merchant, and a manufacturer; in 1800 was ordained as deacon, and at times officiated in the pulpit. Having attained considerable wealth, he was a liberal benefactor to various public institutions, and in 1802 removed to Ohio with a numerous following, and founded the town of Worthington; was a member of Congress 1813-17, and again 1839-41; was frequently elected to the State legislature; was surveyor of public lands, commissioner to settle the boundary-line between the public lands and the great Virginia reservation; and was colonel of a frontier regiment; president of the board of trustees of Worthington College for thirty-five years. D. at Worthington, O., Apr. 9, 1850.

**Kildare'**, an inland county of the province of Leinster, Ireland. Area, 653 square miles. Pop. 83,614, of whom 28,359 cannot read or write. The ground is mostly level or slightly undulating, consisting largely of reclaimed bog; the soil is a deep and fertile loam; wheat, oats, and barley are the principal crops. The chief towns are Athy, Maynooth, and Kildare. In the centre of the county is the famous Curragh of Kildare, consisting of a plain of about 5000 acres, used for military encampments, and famous for athletic sports of all kinds. From 1851 to 1872, 21,614 persons emigrated from this county.

**Kildare**, market-town and parish in the county of the same name in Ireland, famous as the seat of one of the oldest Catholic bishoprics (said to have been founded about 500), for the Parliament held there in 1309, and for the Curragh races, held in Apr., June, Sept., and Oct. Pop. 2654.

**Kildare**, post-tp. of Juneau co., Wis., on the La Crosse division of the Milwaukee and St. Paul R. R., 8 miles N. W. of Kilbourn City. Pop. 385.

**Kil'deer**, the *Charadrius virginicus*, a North American plover, common in summer on the interior plains, and in winter frequenting the seacoast from Texas to Massachusetts. It is named from its cry, which is constantly repeated. Its flesh is not prized very highly.

**Kil'ham** ALEXANDER, b. at Epworth, England, July 19, 1762; joined the Wesleyan Conference in 1789, and in 1796 was expelled for advocating too fervently ecclesiastical reforms, especially a more equal distribution of powers among laymen and preachers. The next year was organized "the Kilhamites" or "New Connection of Wesleyan Methodists." D. in 1798.

**Kil'lia**, town of European Turkey, in the province of Bessarabia, on a branch of the Danube. It carries on considerable fishing, and its preparation of caviare is celebrated. Pop. 6400.

**Kil'ian**, SAINT, b. in Ireland early in the seventh century; devoted himself to missionary labors in Thuringia, Germany, where he was murdered with many companions in 689, being afterwards canonized. Much of the history of Saint Kilian and his companions is admitted to be legendary, but there seems to be no good reason to doubt the facts above stated.

**Kilimandjaro'**, a mountain of Africa, situated on the western border of Zanzibar, in lat. 3° 40' S., lon. 36° E., is supposed to be the highest mountain on the continent. Its top is covered with perpetual snow, and its height is estimated at about 18,700 feet above the level of the sea.

**Kilken'ny**, an inland county of the province of Leinster, Ireland. Area, 796 square miles. Pop. 109,379, mostly Roman Catholics. The surface is undulating, in some places rising to the height of 1000 feet; anthracite coal and black marble are found. The soil is light, but fertile, and crops of wheat, oats, and barley are raised. The only city of any importance is Kilkenny. From 1851 to 1872 the emigration from this county was 48,146.

**Kilkenny**, town of Ireland, in the county of Kilkenny, on the Nore. It has several interesting buildings, a college, a grammar school in which Swift, Congreve, Farquhar, and Berkeley received the first part of their education. Pop. 15,609.

**Kilkenny**, post-tp. of Le Sueur co., Minn. Pop. 730.

**Killar'ney**, market-town and parish of Ireland, Kerry co., 44 miles N. N. W. of Cork, situated in the midst of the most beautiful scenery, and within about a mile of the celebrated lakes to which it gives its name. The town contains several hotels, churches, and chapels, and a magnificent Roman Catholic cathedral, a dispensary and fever hospital, a poorhouse, etc. Pop. 5187. The lakes, three in number, are connected with each other; the lower lake is about 4½ miles long by 2 miles broad; the middle, 1½ miles long by ½ mile broad; the upper, 3 miles long. They receive several streams, and are interspersed with numerous islands. On a projecting peninsula which divides the middle from the lower lake stand the picturesque ruins of Muckross Abbey and Ross Castle. The lovely and picturesque scenery abounding is unsurpassed, and in the summer is a famous attraction to tourists, who resort here in large numbers.

**Kill'back**, tp. of Holmes co., O. Pop. 1121.

**Killbuck**, tp. of Allegheny co., Pa. Pop. 1919.

**Kill'er**, a name applied to cetaceans of the genus *Orca*, family Delphinidae, or dolphins, and given in allusion to their sanguinary and ravenous habits. They are noted enemies of the right whales, as well as other delphinoids, seals, fishes. The killer of the Atlantic I. S. coast is *Orca gladiator*, and that of the Pacific coast, *O. orca*.

**Killiecrankie**, a celebrated pass through the Grampian Mountains, in Perthshire, Scotland, about 15 miles N. W. of Dunkeld. At the N. extremity the revolutionary army, under Gen. Mackay, was defeated on July 17, 1689, by the royalists, under Graham of Claverhouse, Viscount Dundee, who was killed at the moment of victory.

**Kill'ingly**, tp. and post-v. of Windham co., Conn. The township is traversed by the Norwich and Worcester R. R., and contains several manufacturing villages, one of which is the borough of Danielsonville. Killingly has a national bank. Pop. 5712.

**Kill'ington Peak**, in Sherburne tp., Rutland co., Vt., 9 miles E. of Rutland, is the third in height of the Vermont mountains. It is a noble landmark, and the view from its top is very fine. Its height is 4180 feet.

**Kill'lingworth**, post-v. and tp. of Middlesex co., Conn., 23 miles E. of New Haven. Pop. 806.

**Kil'ton**, tp. of Jackson co., Ill. Pop. 293.

**Kilmaine'** (CHARLES JENNINGS, b. at Dublin about 1750; entered the French army in 1765; served under La Fayette in the American war; became brigadier-general in 1792; was distinguished at the battle of Jemappes, in the Vendean and Italian campaigns, and was appointed in 1797 general-in-chief of the army for the invasion of England. D. at Paris Dec. 15, 1799.

**Kilmar'nock**, town of Scotland, in the county of Ayr. It is famous for its calico-printings, and has some tanneries and distilleries. Pop. 22,952.

**Kilns** [Ang.-Sax. *cylu*, from *cylene*, "a furnace or kitchen"], a name given to various kinds of furnaces or ovens constructed of brick or stone, in which a high and uniform heat can be applied to bodies for the purpose of drying, baking, or charring them, such as brick-kilns, pottery-kilns, charcoal-kilns, etc. etc. The best kiln for any special purpose is that in which the requisite intensity of heat can be produced and maintained under the most perfect control at the least expense for fuel. Intermittent kilns are those in which the fire is allowed to go out after each burning, to be again started after the kiln is recharged. For burning lime with wood-fuel the upright kiln is the simplest. It may be built of brick; if of other masonry, it should have a brick lining. On the inside it is circular in horizontal section, tapering slightly, by a curve both up and down, from the circle of largest diameter, which is from 4 feet to 6 feet above the bottom. A kiln of 10 to 11 feet in largest diameter may be about 2½ to 28 feet high, 5 to 6 feet diameter at top, and 7 to 8 feet at bottom. There is an arched opening on one side at the bottom, 5 to 6 feet high, through which the wood is introduced and the burnt lime removed. It is advantageous to have a horizontal grating 1 to 2 feet above the bottom, on which to maintain the fire. These kilns are usually located on a hillside, so that the top is easily accessible for charging the kiln, and the bottom for supplying fuel and drawing out the lime. In charging, the largest pieces of stone to be burnt are first selected, and formed into a rough, dome-like arch, with large open joints, springing from the bottom of the kiln to a height of five or six feet. Above this arch the kiln is filled in from the top, taking the larger stones for the lower layers, and topping off with those that are smaller. When starting a fire under the dome, the heat should be raised gradually to the required degree, in order to prevent a sudden expansion and probable rupture of the stone forming the dome, which might either cause a downfall of the entire mass above, or choke the draught by the stone breaking up into numerous small fragments. After a bright red heat is once reached through the mass of stone, it should be maintained to the end of the burning, as indicated by a large shrinkage in the volume of the contents, the choking up of the voids between the fragments, and the ease with which an iron rod can be forced down through the stone from the top. A better form of intermittent wood-burning kiln than the one described is shown in Fig. 1, in which the fireplace *b* rests on a permen-

FIG. 1.



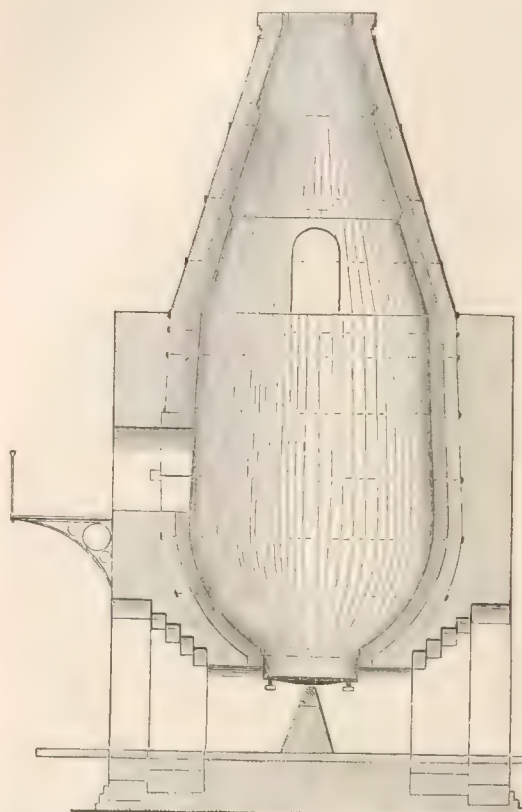
brick arch, through which there is a sufficiently free circulation of air to secure the requisite draught. The interior should be lined with brick, leaving a thin space between the lining and the outside masonry, to be filled with ashes or other non-conductor. This enables the inside to expand and contract without serious injury to the kiln, and to a great extent prevents the transmission of heat to the outside masonry, an important consideration when the latter is made of stone not able to withstand great heat. In the intermittent kilns one great defect is the enormous waste of heat which takes place at each burning, the quantity of fuel expended in raising the contents of the kiln as well as its thick masonry walls, to the degree of heat necessary to burn lime, has to be repeated each time the kiln is charged. Another special defect is that the stone nearest the dome is liable to become injured by overburning before the top portions become thoroughly calcined.

Intermittent bell-shaped kilns, using gas-coke or coal for fuel, are extensively employed in England, France, and Germany for burning Portland cement. The German kiln is usually about 50 feet high and 10 feet in diameter at the top. It is filled, for burning, with alternate layers of the raw cement and coke or coal, in the proportion of about one



part by weight of fuel to two parts of raw cement, and then ignited at bottom. Three to four days are required for burning, and fully five days, and sometimes more, for the

FIG. 2.



single grate-bars rest upon two cross bars. By knocking out the cross-bars the grate-bars can be removed and the cement drawn. The kiln is charged, for burning, with alternate layers of raw cement and coke or coal—about 2 of cement to 1 of fuel by weight—through two man-holes placed on different levels. These holes are tightly closed during the burning. Sometimes, with a view to increase the draught, the top is carried up higher with a sheet-iron stack. The Coplay Cement Company are beginning to use kilns of this form for making Portland from argillaceous limestone, near Allentown, Pa. The raw stone is first finely ground between millstones, then tempered stiffly with water, and formed into lumps of irregular shape of from 3 to 5 pounds weight. These, after partial drying, are burnt in the kiln in layers, alternating with layers of anthracite coal, about sixteen days being consumed in charging, burning, cooling, and drawing a kiln.

**Continuous or Perpetual Kilns.**—Materials such as common lime, Roman cement, and the argillomagnesian cements of the U. S., that do not, like Portland cement, require prolonged intense heat, can be burnt in upright kilns (either bell-shaped, cylindrical, or ovoidal) without intermission in the fires. The kiln is filled with alternate layers of coke or coal and the stone to be burned, and then fired from below with light wood. As the combustion is completed in the lower portion, the burnt stone is drawn out from time to time, allowing the entire mass above to settle down. New layers of fuel and stone are then added at top. The layers of stone should not exceed six inches in thick-

ness. It is usual to draw the burnt stone at least twice every twenty-four hours. Fig. 4 gives a vertical section of the kilns in Ulster co., N. Y., for burning Rosendale cement. The fuel (anthracite coal) is broken up very fine. What is technically known as "second screenings" from the mines of the Delaware and Hudson Canal Co. and the Pennsylvania Coal Co. have been found to be entirely suitable. The dotted line shows the interior form of kiln preferred at Balcony Falls on the James River, Va.: 3500 pounds of anthracite or semi-bituminous coal have been found sufficient to burn 100 barrels of cement of 300 pounds each. A continuous kiln of the upright form may be operated with either wood, peat, or coal fuel, without interstratifying the latter with the limestone, by maintaining the fires in furnaces at the side of the shaft. The heat and flame are conducted into the shaft, which contains nothing but the material to be burnt. Indeed, this method is necessary when wood, which cannot be subdivided into convenient size for intermixture with the stone, is the fuel employed. Figs. 5, 6, and 7 represent a flame-kiln of this kind for anthracite coal, in which Q are holes through which the progress of the burning can be watched; R the feed-ovens for heating the coal before it passes through the dampers S into the furnaces T; U the ash-pits; V the draw-pits; W a platform in front of the furnaces; and O a division-wall to prevent the meeting of opposite draughts from the furnaces T. These kilns are sometimes called *water-flame* kilns, from the fact that the fuel before ignition is made wet with hot water, the steam from which, by its decomposition, aids the expulsion of the carbonic acid gas, and therefore, it is claimed, facilitates the burning. When designed for wood-fuel the furnaces are larger and somewhat differently arranged. These kilns are used in the U. S. for burning both common lime and cement, but are not considered adapted to the manufacture of Portland cement. Soft wood is used in them for burning lime in Rockland, Me., about 4 cords being required to burn 100 barrels of 230 to 240 pounds each, at an average saving of about three-sevenths of the fuel that would be necessarily consumed in ordinary intermittent kilns. When first starting the fire in these kilns, the portion below the level of the grate, called the thimble, is filled with light wood. The interior of the kiln, nearly up to the top, is also lined with one layer of wood set on end. The first precaution is neces-

Fig. 2 represents a vertical section and elevation through the draw-pits of a Portland-cement kiln, of the form generally used upon the Thames and elsewhere in England, Fig. 3 being a sectional plan through the draw-pits. These kilns are from 37 feet to 40 feet high from the draw-pit floor to the top of the upper cone, and from 12 feet to 15 feet in largest diameter. They are built of brick, with an interior lining, 9 inches thick, of firebrick, reaching to within 5 feet of the top, properly bonded to the exterior masonry, except in the lower portion to the height of about 12 feet, which is not so bonded, and can therefore be renewed with ease whenever necessary. There are two draw-pits, opening on opposite sides, and separated from each other by a wedge of brick-work, finished in firebricks on top, which divides the descending contents of the kiln when drawing. At the bottom of the kiln, just above the wedge, a number of

FIG. 3.

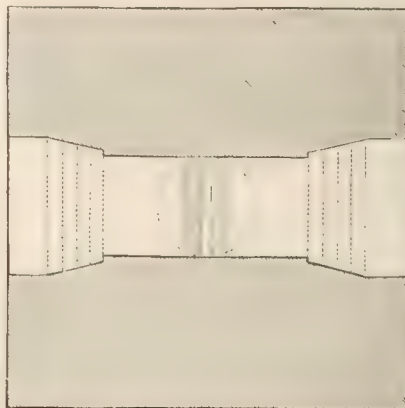
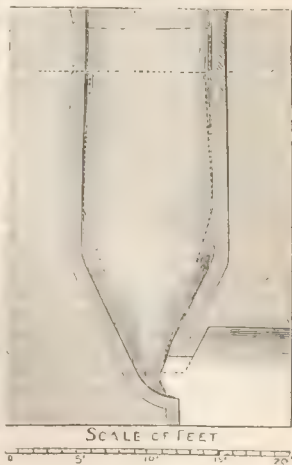


FIG. 4.



ness. It is usual to draw the burnt stone at least twice every twenty-four hours. Fig. 4 gives a vertical section of the kilns in Ulster co., N. Y., for burning Rosendale cement. The fuel (anthracite coal) is broken up very fine. What is technically known as "second screenings" from the mines of the Delaware and Hudson Canal Co. and the Pennsylvania Coal Co. have been found to be entirely suitable. The dotted line shows the interior form of kiln preferred at Balcony Falls on the James River, Va.: 3500 pounds of anthracite or semi-bituminous coal have been found sufficient to burn 100 barrels of cement of 300 pounds each. A continuous kiln of the upright form may be operated with either wood, peat, or coal fuel, without interstratifying the latter with the limestone, by maintaining the fires in furnaces at the side of the shaft. The heat and flame are conducted into the shaft, which contains nothing but the material to be burnt. Indeed, this method is necessary when wood, which cannot be subdivided into convenient size for intermixture with the stone, is the fuel employed. Figs. 5, 6, and 7 represent a flame-kiln of this kind for anthracite coal, in which Q are holes through which the progress of the burning can be watched; R the feed-ovens for heating the coal before it passes through the dampers S into the furnaces T; U the ash-pits; V the draw-pits; W a platform in front of the furnaces; and O a division-wall to prevent the meeting of opposite draughts from the furnaces T. These kilns are sometimes called *water-flame* kilns, from the fact that the fuel before ignition is made wet with hot water, the steam from which, by its decomposition, aids the expulsion of the carbonic acid gas, and therefore, it is claimed, facilitates the burning. When designed for wood-fuel the furnaces are larger and somewhat differently arranged. These kilns are used in the U. S. for burning both common lime and cement, but are not considered adapted to the manufacture of Portland cement. Soft wood is used in them for burning lime in Rockland, Me., about 4 cords being required to burn 100 barrels of 230 to 240 pounds each, at an average saving of about three-sevenths of the fuel that would be necessarily consumed in ordinary intermittent kilns. When first starting the fire in these kilns, the portion below the level of the grate, called the thimble, is filled with light wood. The interior of the kiln, nearly up to the top, is also lined with one layer of wood set on end. The first precaution is neces-

sary, because otherwise the stone near the grate would be insufficiently burnt: and the second because the expansion of the stone when heated would injure the kiln if filled to

walls by several feet. They should, however, terminate in a wedge, so as not to impede the downward movement of the contents of the kiln.

FIG. 5.

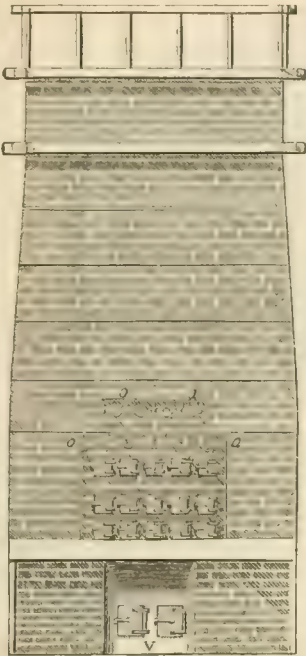
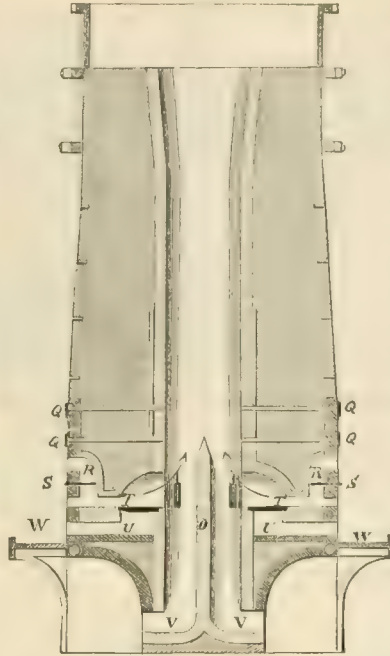


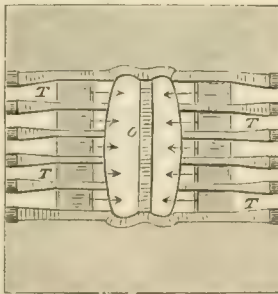
FIG. 6.



**Brick-Kilns.**—Bricks are burnt either in special permanent kilns, charged with the ware and emptied at each burning, or they are piled up in regular systematic layers, with openings between them, so as to form of themselves a temporary kiln, called a *clump*. (See article **BRICK**.) Permanent brick-kilns are of various forms, generally rectangular, and they may be arched over on top, when they are termed *close kilns*, or they are left *open*. In *close kilns* the fires are maintained in furnaces at one end, permeate through the bricks in the body of the kiln, and escape through a chimney at the other end. In *open kilns* the fires are maintained under the ware to be baked, and penetrate through the mass upward, escaping on the top. In both kilns the bricks are piled up in courses on their edges, in such manner that the bricks in the different layers cross each other, and are so far separated from each other that the flame finds a free passage between them. In the open kilns, in order better to retain the heat, the entire top of the pile is covered over during the burning with a layer of brick-dust or loam, and while the bricks are cooling off this is further covered with moist clay or sand. Kilns for burning firebrick should have a firebrick

its entire capacity. The stone should be broken into pieces not exceeding 8 inches to 10 inches in diameter. In these kilns the stone is exposed to the heat from 42 to 48 hours, and the burnt lime is drawn every 6 or 8 hours, raw stone being added at the top, while the fires are steadily maintained in the furnaces. A kiln holding enough raw stone to make 175 barrels of lime should yield, when well under way, about 100 barrels every 24 hours. When the amount of work to be done is very great, several of these kilns are ranged in juxtaposition side by side, each having its furnaces on one side

FIG. 7.

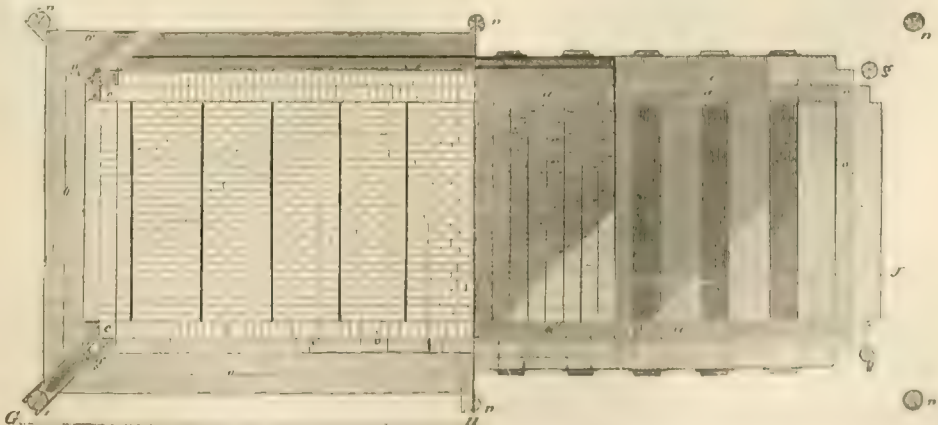


and its draw-pit on the other. With this arrangement a great deal of masonry is saved, as the walls separating contiguous kilns need not be very thick, and need not be carried as high as the side-

lining, and are in all respects constructed and operated with more care than is usual for manufacturing common brick.

The intermittent kiln used by Messrs. A. Hall & Sons, Perth Amboy, N. J. (Figs. 8 and 9), for baking firebrick, is rectangular in plan, about 32 feet long, and 14½ feet wide inside. It is remarkable for the comparative thinness of its walls, and by being open on top. The walls above the level of the fires consist of two distinct shells, not bonded together; the inner one, *a, a*, of firebrick, 9 inches thick and 12 feet high above the fires; and the outer one of common brick, 8 inches thick. In one of the long sides an opening of about 4' 8" wide is left for charging and emptying the kiln. Before the baking is commenced this opening is closed with old firebrick put in close-jointed, but dry, its outer surface only being coated over with a layer of fire-clay mortar. An air-space, 2 inches wide at bottom, is left between the inner and outer walls, but the walls are gradually drawn together, so that they touch each other at top. The side-walls and end-walls of the outer shell are not bonded together at the corners, and do not overlap each other. The firebrick lining is therefore exposed to view at these points. The outer wall is built with a groove *f, f* about 2 inches deep and 3½ inches high. When the inner wall begins to expand by the effect of the heat, the

FIG. 8.



Sectional plan, on line A, B, C, D, E, F.

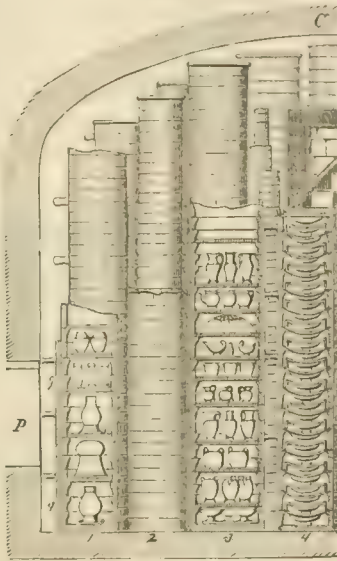
interior space permits it to do so without hindrance, while it prevents a sensible loss of heat by transmission. As the heat increases the inner wall may exert some pressure against the outer one without any injurious effect on the





baking biscuit or seggars, and then escapes through the chimney F. G, G are the doors through which the wares are introduced and removed; *t, t, t* are the openings

FIG. 12.



Pottery kiln.

through the floors C, there being only half as many such openings in the upper as there are in the lower floor. The flue from the furnaces to the lower chamber are each divided into three channels, *p, p, p* of plan. Small openings *w, w* are made through the wall of the chamber B for observing the color and intensity of the heat, and for introducing small samples of biscuit covered with glaze, in order to ascertain the progress of the baking. These holes are closed on the outside with a tube-stopper carrying a plate-glass disk or diaphragm, and a sliding damper. These kilns are usually at least 20 feet in interior diameter and 40 feet high. They are built of ordinary brick masonry, with a firebrick lining, and are surrounded by a system of iron bands, *m, m, m*. When starting the fires, coals of burning charcoal are first put into the space *c*, and light wood introduced through the aperture *b* until the space *f* is completely full. The downward draught through *b* creates a long flame in *f*, which reaches through the flues *p, p, p* into the chamber B. The aperture *o*, for stirring the fire, is generally kept closed with a clay stopper; *d* is the ash-pit. The draught is regulated by the movable lid of the aperture *b*. The piling of the seggars one above the other for baking is shown in Fig. 12, some in section and others in profile; *g, g* are plates of refractory clay called fireguards, set in front of the flues to prevent the flame coming in direct contact with the seggars, and to exclude ashes and dust. Light wood-fuel split up small is almost universally used for baking porcelain. Those kinds which burn with a long and vigorous flame, and discharge but little ash and dust into the kiln, are preferred. At Sèvres poplar is used, and generally in Germany pine. These kilns can be operated at the rate of about one firing per week, and the average endurance of the Sèvres kilns is about 300 firings, or six years. In other places several have been known to last from twenty-five to thirty years. During the baking the heat in the lower chamber reaches from 120° to 160° of Wedgwood's pyrometer (equivalent to from 11,000° to 12,000° C. and from 19,830° to 21,632° F.). On the upper floor the temperature varies from 30° to 60° Wedgwood. Articles of common stoneware and pottery are baked in kilns of much simpler construction than the Sèvres kiln. The ware is not placed in seggars piled up in columns, but the flame is allowed to come in direct contact with it. In form they somewhat resemble the ordinary baker's oven, consisting essentially of an ellipsoidal dome of brick, with a brick or earthen floor, and having at one end a furnace and at the other a chimney-flue. In some cases the floor ascends from the furnace to the chimney-flue, in others it is horizontal. The larger kilns, which are 50 to 60 feet in length, are usually divided into two compartments by a transverse vertical wall constructed with numerous openings to allow the heat to pass freely through. The compartment next the furnace, being the most intensely heated, is used for baking stoneware. In this the heat frequently attains 120° Wedgwood. The other compartment is used for baking common pottery. With the large kilns about five

days of preliminary fire and three days of baking fire are required at each burning. The fuel employed, which may be either wood or coal, determines the details of the furnace.

The Hoffmann Kiln: Figs. 13 and 14.—Imagine a railroad tunnel 8 to 9 feet high by 10 to 12 feet span, built of

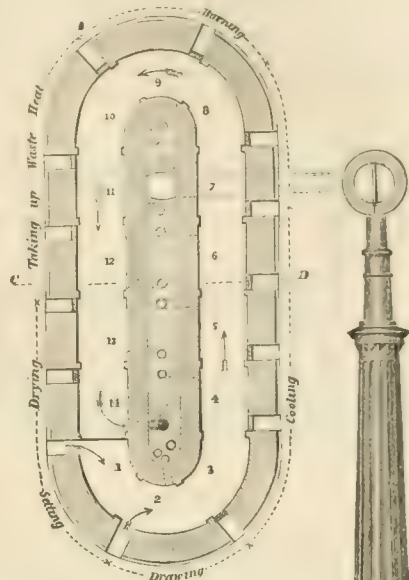
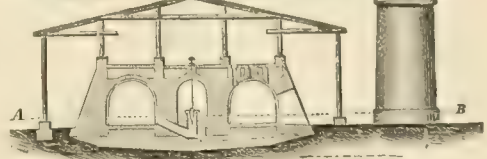
FIG. 13.  
Section on line A, B.

FIG. 14.



Section on line C, D, Hoffmann kiln.

brick continuously around a long oval of such dimensions that the central line of the annular chamber thus formed is about 350 feet long. This annular chamber is called the burning chamber. In the centre of the narrow space enclosed by the ring is a long flue called the smoke chamber, leading to a high chimney. Fourteen flues lead at equal intervals from the lower inner side of the burning chamber into the smoke-chamber, entering it vertically from the bottom, each provided at its end in the smoke chamber with a damper that can be opened and closed at pleasure by means of a vertical rod operated on top of the arch. There are also fourteen doorways, each about 5 feet high, through the outer wall of the burning chamber, placed at regular intervals. The arched top of the burning chamber is pierced at intervals of 3 to 4 feet each way with vertical holes about 5 inches in diameter, called feed-holes, which are used for supplying the fires with fuel and watching the burning. These holes are kept habitually closed with dampers on top. It is customary to call each portion of the burning chamber between two consecutive doorways, including one of them, a compartment, although there is no permanent division of the burning chamber into smaller chambers. Each compartment is therefore 25 feet in length along the axis, and has one doorway at its left-hand outer angle, and one smoke-flue at the floor in the inner angle diagonally opposite to the doorway, the observer being supposed to be entering a doorway.

Manner of Using the Kiln. Let the compartment, and also the doorways and flues corresponding thereto severally, be numbered from 1 to 14. When the kiln is in operation all the compartments but two or, exceptionally, three, are filled with the material to be burnt. Suppose Nos. 1 and 2 are empty, and all the others filled. All the doorways except Nos. 1 and 2 are temporarily closed with brick-work, and all the flues except No. 11 are closed with their dampers. Workmen are filling compartment No. 1 with raw limestone, and removing burnt lime from compartment No. 2. Compartment No. 11 contains limestone put in twelve days ago. Compartment No. 1 that put in eleven days ago, and soon around to No. 14, which was filled yesterday. A sheet iron movable partition, called the cut-off, separates No. 14 from No. 1. Yesterday it was between No. 1 and



No. 14; to-morrow it will be between No. 1 and No. 2. Yesterday, all the flues except No. 13 were closed; to-morrow, only flue No. 1 will be open. Yesterday, men were setting limestone in No. 14, and removing burnt lime from No. 1; to-morrow they will be filling No. 2, and emptying No. 3. Every day, therefore, the *setting, drawing, cut-off, and open flue* advance one compartment. The compartments not yet fired are heated by the hot gases passing through them to the chimney, the stone in the compartment next in advance of the fire being at a full red heat, while that farthest off, in No. 14, which was put in yesterday, is only warm. No fuel is put in with the ware when charging the kiln. It is all supplied through the

feed-holes. A serious objection to the Hoffmann kiln is that the force of the draught and the progress of the combustion cannot always be regulated with certainty, even by the most experienced and careful burner. For instance, the draught through the chambers 7 and 8 is longitudinal entirely, and can only be changed by opening the flues in these chambers, giving a cross draught towards the inner wall, which may or may not be desirable. It would operate very badly if the combustion next the outer wall was too slow, in which case a flue in the outside wall would be advantageous.

The *Morand Kiln* (Figs. 15, 16, 17, 18, and 19), for burning by successive chambers, is an improvement on Hoff-

FIG. 16.

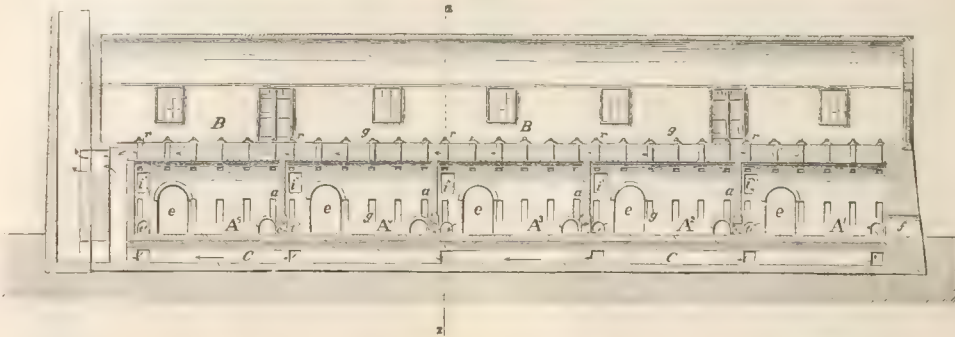


FIG. 15.

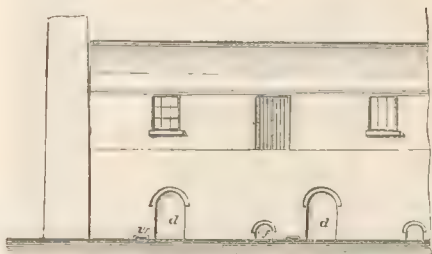


FIG. 18.



FIG. 17.

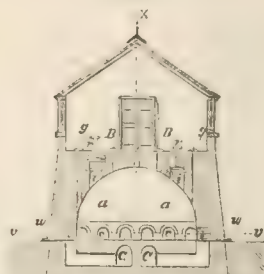
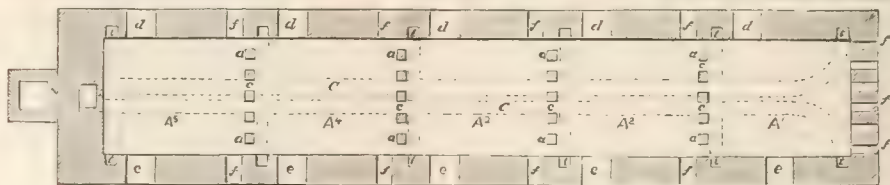


FIG. 19.



Morand kiln.

mann's, inasmuch as it has longitudinal flues both above and below the burning chamber, with branch flues fitted with dampers leading into them at the top and bottom of each chamber, so that the direction and force of the draught and the progress of the burning are under better control. Fig. 15 is a side elevation of a portion of a kiln of five chambers built of bricks; Fig. 16 is a longitudinal section and elevation through the dotted line *x, x* of Fig. 17; Fig. 17 is a transverse section on line *z, z* of Fig. 16; Fig. 18 is an end elevation; and Fig. 19 is a sectional plan, showing the horizontal bottom-flues in dotted lines. *A*<sup>1</sup>, *A*<sup>2</sup>, etc. are the drying and burning chambers, separated from each other by brick partition-walls, perforated at the bottom with openings *c, c*. In kilns for burning bricks these walls, except their lower portion to the height of about 2 feet, are usually formed of the green bricks to be burned. Each chamber is provided with doorways, *d* and *e*, through which it is filled and emptied, and with small fireplaces, *f, f*, placed at the floor level. In chamber *A*<sup>1</sup>, where the firing begins, there are six fireplaces in the end-wall of the kiln. In the other chamber there are only two, placed opposite each other in the end of the chamber nearest to chamber *A*<sup>1</sup>. In the haunches of the arch above the chambers there are two longitudinal steam and smoke draught-flues, *B, B*, and below the chambers there are two others, *C, C*, called hot-air flues, all four leading from chamber *A*<sup>1</sup> to the chimney at the other end of the kiln. In each chamber in the end farthest from chamber *A*<sup>1</sup> there are four corresponding branch flues, two at top, *i, i*, and two at bottom, *t, t*, leading respectively into the four longitudinal flues. These branch flues are provided with dampers, *r, r, r* and

*w, w, w*, for opening and closing them at pleasure. The two lower flues, *C, C*, may be replaced by a single flue. There are numerous feed-holes, *g, g*, through the arch for supplying fuel, arranged substantially as in the Hoffmann kiln. This kiln is operated as follows: All the chambers, *A*<sup>1</sup>, *A*<sup>2</sup>, etc., are first suitably filled with the articles to be baked. The doorways and feed-holes are then closed, as are also the branch flues leading to the lower longitudinal flues. The branch flues *i, i* leading from *A*<sup>1</sup> into the upper longitudinal flues *B, B*, are open. Fires are then started in the fireplaces *f, f*, of chamber *A*<sup>1</sup>. As the wares in this chamber are gradually dried and heated, the steam and vapor which they give off escapes through the flues *B, B* to the chimney at the far end of the kiln, without passing through and injuring or discoloring the wares in *A*<sup>2</sup>. When the wares are sufficiently dried in *A*<sup>1</sup> the top branch flues in that chamber are closed, and those in chamber *A*<sup>2</sup> opened, so that the waste heat from *A*<sup>1</sup> passes through *A*<sup>2</sup>, and dries and heats the green wares therein before it passes into the upper flues *B, B*, and thence to the chimney. Or, if chamber *A*<sup>2</sup> is not charged ready for drying, the surplus heat from *A*<sup>1</sup> may be carried to *A*<sup>3</sup>, or to any other chamber, through the lower longitudinal flue *C*, by a suitable adjustment of the dampers; so that the surplus heat from one chamber is utilized in drying and heating the next or any following chamber, until *A*<sup>5</sup> is reached. When the wares in any chamber are sufficiently dried, fires are started in the fireplaces *f, f*, and stoking from the feed-holes at top follows at the proper time, or when there is heat enough in the chamber to ignite the fuel thus supplied. When the wares in *A*<sup>5</sup> are sufficiently dried, the upper dampers in

that chamber are closed and the lower ones opened, so that the surplus heat, instead of entering the chimney, is thus conveyed back through the flues C, C' to A<sup>1</sup>, or to any other chamber by a suitable adjustment of dampers, for drying the green wares with which that chamber has in the mean time been freshly charged. The steam and vapor from a drying chamber always pass directly to the chimney through the upper flues B, B, creating a draught quite sufficient to draw the heat through the lower flues C, C' from any burning chamber into any drying chamber. It will thus be seen that the operation of this kiln is completely under the control of the burner. The fuel used for stoking from above is finely pulverized coal, such as *smudge* or re-

fuse coal. In the fireplaces either coal or wood will answer. In economy of fuel, simplicity of management, and uniformity of burning, whether for bricks, firebricks, cement, or pottery, this kiln seems to combine every essential feature of excellence.

*Charcoal Kilns* are of a variety of forms and sizes. Those used in the U. S. for making charcoal on a large scale for smelting-furnaces are made of brick, some being rectangular in plan and covered on top with a flat brick arch, while others, known as the beehive kiln, are circular in plan and dome-shaped. A rectangular kiln 40 feet by 16 feet in plan (Figs. 20 and 21), with side-walls 13 feet high, covered over with an arch of 4-feet rise, will hold nearly 90 cords

FIG. 20.

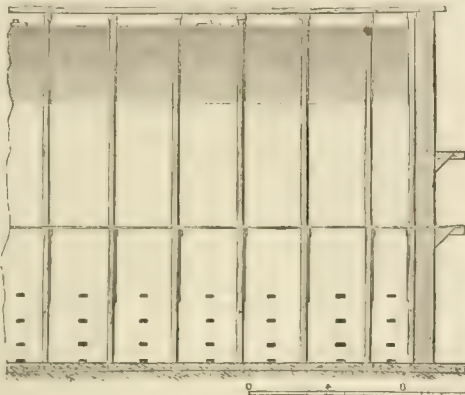
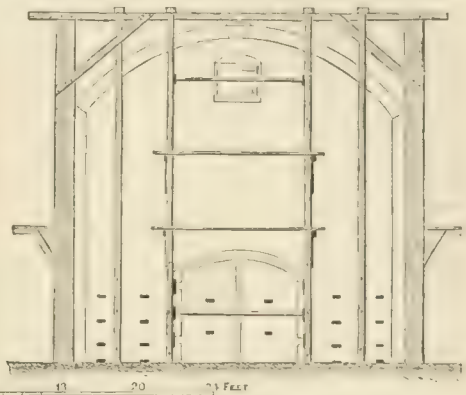


FIG. 21.



Charcoal kilns.

of merchantable wood. As the side-walls and arch are habitually made only 8 inches (or one brick) thick as a measure of economy, they are always supported by a timber framework on the outside to prevent their being thrown down by alternate expansion and contraction when in use. The end walls are generally 1 foot thick. The supporting frame consists of upright timbers 4 inches by 12 inches, and 19 feet long, placed about 3 feet apart, with their edges against the side-walls and end-walls. They are tied together at top by 4-inch by 6-inch horizontal cross-ties. For a kiln of the above dimensions fourteen of these frames, each consisting of two uprights and one cross-tie, embrace the kiln transversely, and four of them longitudinally. The transverse frames are stiffened at the angles by diagonal braces, spiked to the uprights and cross-ties. In the side and end-walls numerous vent-holes are left, each of the width and thickness of a brick (about 4 inches by 2 inches). There are 152 of these holes, arranged in four horizontal rows of 38 holes each, the upper row being 4 feet from the bottom of the wall, the next row 2½ feet, the next 1 foot, while the lowest row is placed just about the level of the floor of the kiln. In one end of the kiln there is an opening about 6 feet by 6 feet at the level of the floor, through which most of the wood is introduced and the charcoal removed. Above this, near the crown of the arch, there is a smaller opening, 2 feet by 2 feet, for completing the filling of the kiln. Both openings are fitted with boiler-iron doors, and are tightly closed during the burning. There are three vent-holes on top through the crown of the arch, about 10 feet apart, each 1 foot by 1 foot, closed with iron dampers. The kiln having been compactly filled to the crown of the arch with wood, cut and split into the usual merchantable sizes, the two end-doors are then closed, and fires are then started in the three vent-holes on top. These holes are then at once closed with the dampers, all the small vent-holes below being open. The fire slowly and gradually works its way downward through the mass of wood, its progress being known to a skilful burner by the color and volume of smoke issuing from the lower vent-holes. From 6 to 7 days are required to completely char the contents of a kiln of the dimensions above given. The lower vent-holes are closed from time to time, one after the other, as the burning is completed in their vicinity, and finally, when they are all closed, the kiln is whitewashed all over in order to close all the pores through which the air could enter, and it is allowed to stand four or five days for the fire to go out. When skilfully operated, these kilns will yield 45 bushels of charcoal to the cord of wood. With wood costing \$2.50 per cord at the kiln, the cost of the charcoal will not vary much from 9½ to 10 cents per bushel. This covers filling, coaling, whitewashing, and current repairs of kiln.

Q. A. GILMORE.

**Kilo** [Gr. χίλιος, "thousand"], a prefix used in the French metrical system to denote a thousand times the

VOL. II.—98

measure indicated by the word to which it is prefixed: as, KILOGRAMME, a thousand grammes, the unit of commercial weight, is equal to 2,204,621,25 pounds avoirdupois; KILO-LITRE, a thousand litres, a measure of capacity, is equal to 264.18635 gallons; KILOMETRE, a thousand metres, the unit of linear measure, is equal to 0.62137 mile; KILOSTER, a thousand steres, a measure of solidity, is equal to 35316.58 cubic feet. The latter term is rarely employed, measures of solidity or volume being expressed in cubic denominations of the linear base. (See METRIC SYSTEM.)

**Kilpatrick** (ANDREW ROBERT), M. D., b. Mar. 21, 1817, near Cheneyville, Rapides parish, La.; educated in Georgia under the tuition of a Baptist clergyman, Rev. Otis Smith; graduated in the Medical College of Georgia at Augusta in Mar., 1837; practised medicine first in Burke co., Ga., then (1838-43) in Avoyelles parish, La.; but removed to Woodville, Miss., where he passed through a severe epidemic yellow fever in 1844, and published a full report of it in the *New Orleans Medical Journal*. From 1847 to 1863 he resided near Trinity, in Concordia parish, La., during which time he contributed articles to the *New Orleans Medical Journal*; to an annual medical publication, edited by Dr. E. D. Fenner, styled *Southern Medical Reports: Historical Monographs of Concordia and Catahoula Parishes*, besides other articles in *Dr. Bowd's Review*, New Orleans; some articles to *Lippincott's Gazetteer*; a sketch of the early Baptists in Mississippi and Louisiana; and kept meteorological tables for the Smithsonian Institution. In 1863 he removed to Texas, and in 1866 settled in Navasota, Grimes co., where he now (1875) resides. He passed through an epidemic yellow fever in 1867, and published a report of the same in the *Texas Medical Journal*. In 1868 he was chosen professor of anatomy in the Texas Medical College in Galveston; edited the *Navasota Weekly Tablet* in 1870-71; one of the assistant editors of the *Southern Medical Record*, Atlanta, Ga., in 1874-75; also contributing articles to the *Medical and Surgical Reporter*, Philadelphia, the *Richmond and Louisville Medical Journal*, and *The American Medical Weekly of Louisville, Ky.*

**Kilpatrick** (JESSE JUDSON), b. near Do. Kertown, N. J., Jan. 14, 1836; graduated at the U. S. Military Academy, and entered the army as second lieutenant of artillery May 6, 1861; was commissioned captain 3d New York Vols. May 9, and wounded at battle of Big Bethel, June 10. On his recovery was commissioned lieutenant-colonel 2d New York Cavalry Vols., of which regiment he became colonel Dec. 1862. With his regiment he participated in the Rappahannock campaign, in the second battle of Bull Run, and many minor actions, and in the Maryland campaign. During "Stoneman's raid" to the rear of Gen. Lee's army he commanded a brigade of cavalry, and was promoted to be brigadier-general of volunteers June, 1863. At the battle of Gettysburg he commanded a brigade and division. In



Apr., 1864, he was ordered to duty with Gen. Sherman in the West, and at the battle of Resaca. May, 1864, was severely wounded. During Gen. Sherman's march to the sea and subsequent campaign through the Carolinas he commanded the cavalry and was actively engaged. In June, 1865, he was promoted to be major-general of volunteers. He resigned his commission in the regular army Dec., 1865, and his volunteer commission Jan. 1, 1866. In Nov., 1865, he was appointed U. S. minister to Chili; recalled in 1868.

G. C. SIMMONS.

**Kil'ty** (Augustus H.), U. S. N., b. Nov. 25, 1806, in Maryland; entered the navy as a midshipman July 4, 1821; became a passed midshipman in 1832, a lieutenant in 1837, a commander in 1845, a captain in 1862, a commodore in 1866; retired in 1868. Commanded the Mound City in the action with the Confederate gunboats off Fort Pillow, May 10, 1862, and with the St. Charles batteries on White River, June 17, 1862. In the latter engagement Commander Kilty was severely injured by the explosion of the steam-chest of the Mound City, which was pierced by a shell. In his official report to the navy department of June 20, 1862, Flag-officer Davis says: "Commander Kilty is out of danger, but he is severely crippled in his hands and feet, and suffers a great deal. He is a brave gentleman and a loyal officer. He has always been conspicuous in this squadron for acting his part in the best spirit of the profession." D. Nov. 10, 1879. FOXHALL A. PARKER.

**Kilwa.** See **QUILOA**.

**Kilwinning**, a small town in the county of Ayr, Scotland, famous for an ancient abbey, now destroyed, which was the birthplace of Scottish Masonry. Until 1736, when the Grand Lodge of Scotland was formed, all other lodges in Scotland received their charters from "Mother Kilwinning." This prerogative was exercised down to 1807. Eglington Castle in this town was the scene of the famous "Eglington Tournament" in 1839. Pop. about 4000.

**Kim'ball**, tp. of St. Clair co., Mich. Pop. 1091.

**Kimball** (HEBER C.), b. in 1801; joined the Mormons in 1832 at Kirtland, O.; in 1835 became one of the twelve apostles of that sect; in 1837-38 was a missionary in England; in 1838 went to the Mormon colony in Ray co., Mo.; removed thence to Nauvoo, Ill.; and in 1846 became head priest of the order of Melchizedek at Salt Lake City, where he d. June 22, 1868.

**Kimball** (RICHARD BURLEIGH), b. at Plainfield, N. H., Oct. 11, 1816; graduated at Dartmouth in 1834; studied law in Europe; practised at Waterford, Saratoga co., N. Y., and removed in 1840 to New York City. Among his numerous works the most widely known is *St. Leger* (1849); others are *Letters from Cuba* (1850), *Cuba and the Cubans* (1850), *Romance of Student Life Abroad* (1853), *Heavy Powers, Bankers* (1868), and *To-day* (1870). He has contributed much to periodical literature.

**Kim'berley** (JOHN WODEHOUSE), EARL, b. in England Jan. 7, 1826; graduated at Christ Church, Oxford, in 1847; succeeded his grandfather as Baron Wodehouse in 1846; was under-secretary for foreign affairs from 1852 to 1856, and again from 1859 to 1861, under the administrations of Lords Aberdeen and Palmerston; was ambassador to Russia in 1856; special minister to several states with reference to the Schleswig-Holstein question in 1863, and lord lieutenant of Ireland from 1864 to 1866, in which latter year he was raised to the earldom of Kimberley. Under the second Gladstone administration he was lord privy seal (1868) and secretary of state for the colonies (1870).

**Kim'berly** (LEWIS A.), U. S. N., b. in 1830 in New York; entered the navy as a midshipman Dec. 8, 1846; became a passed midshipman in 1852, a lieutenant in 1855, a lieutenant-commander in 1862, a commander in 1866; served in the flagship Hartford at the capture of New Orleans and in her various engagements on the Mississippi, and was her executive officer at the battle of Mobile Bay. In his official report of Aug. 6, 1864, Capt. Percival Drayton writes: "To Lieut.-Com. Kimberly, the executive officer, I am indebted not only for the fine example of coolness and self-possession which he set to those around him, but also for the excellent condition to which he had brought everything belonging to the fighting department of the ship, in consequence of which there was no confusion anywhere, even when, from the terrible slaughter at some of the guns, it might have been looked for."

FOXHALL A. PARKER.

**Kim'ble**, county of S. W. Central Texas. Area, about 1300 square miles. It is a rough, broken region, with good pasturage and timber, and numerous salt-licks. The valleys have a good soil, which, however, requires irrigation, for which there are many facilities. Pop. 72.

**Kim'brough**, tp. of Arkansas co., Ark. Pop. 611.

**Kim'chi** (DAVID), RABBI, b. at Narbonne, Provence, in

1160; was one of the most distinguished Hebrew writers of the Middle Ages. Little is known of his personal history beyond the fact that in 1232 he was designated by the French and Spanish rabbis as arbiter to settle the heated controversies in the synagogues growing out of the doctrines advanced in Maimonides' *Moré Nevochim*. His works consist of commentaries on nearly all the books of the Old Testament, some of which are given in the rabbinical Bibles; a Hebrew grammar and lexicon bearing the name of *Mikhlol* ("Perfection"), which have been the basis of all modern works of the same kind; and a *Refutation of Christianity*, based upon the denial of Messianic predictions in the Psalms. D. Kimchi exhibited such hostility to Christianity throughout his commentaries that numerous passages were struck out by the Inquisition as a condition of permitting their publication. Several of his works remain in manuscript. D. at Narbonne in 1240. His father, JOSEPH, and his brother, MOSES, were also distinguished rabbis of Provence, the former having been driven from Spain by Mohammedan persecution. Both left some grammatical and exegetical writings.

**Kim'meridge Clay**, an important bed of marl in many localities, several hundred feet in thickness, and often very bituminous, is so called from Kimmeridge in Dorsetshire, England. It constitutes the argillaceous member of the Upper Oolitic formation. (See **JURASSIC**.) It contains many distinctive fossils (*Ostrea deltoidea*, *Eoogyra virgula*, etc.), and has yielded the remains of the *Pliosaurus*.

**Kim'polung**, town of Wallachia, is situated in a mountain-region near the Transylvanian frontier, and carries on a considerable transit trade. Pop. 8695.

**Kim'shew**, tp. of Butte co., Cal. Pop. 857.

**Kim'aston** (SIR FRANCIS), b. at Otley, Shropshire, England, in 1587; studied at Oxford and Cambridge; was employed at court, and gained the favor of the king, by whom he was knighted in 1618. He wrote a Latin translation of Chaucer's *Troilus and Cressida*, and several other volumes of verse, but is chiefly remembered as the founder and regent of a sort of university at London called "Minnerva's Museum," chartered by the king June 26, 1635. Owing to the civil war it came to a speedy end, and Kimaston d. in 1642.

**Kincaid'**, tp. of Jackson co., Ill. Pop. 1049.

**Kincar'dine**, port of entry of Bruce co., Ont., Canada, on Lake Huron, ships grain, lumber, salt, bark, fish, wool, and butter. It has some manufactures and 2 weekly newspapers. Pop. of v. 1907; of tp. exclusive, 4097.

**Kincar'dineshire**, or **The Mearns**, county of Scotland, between the Dee, the North Esk, and the North Sea. Area, 381 square miles. Pop. 34,651. A great part of the country is covered by the Grampian Mountains, of which Mount Battock rises to the height of 3500 feet. But at the foot of this mountain-range lies the "How o' the Mearns," a low and very fertile tract of land, yielding excellent crops of wheat and oats. Large herds of sheep and short-horned cattle graze on the mountain-pastures. Cap. Stonehaven.

**Kind** (KARL THEODOR), b. at Leipzig Oct. 7, 1799; studied law, and began in 1824 to practise as an advocate. After the Greek war of liberation he contributed very much to spread among his countrymen a fuller knowledge of Modern Greece, its institutions, language, and literature. His most prominent writings are—*Neugriechische Volkslieder* (1827), *Neugriechische Chrestomathie* (1835), *Geschichte der griechischen Revolution* (2 vols., 1833), translations from Alexander Suto, and a Greek-German dictionary.

**Kind'ergarten** is the name given by Friedrich Froebel to a company of children between the nursery age and that of the primary schools, who are to be educated according to a certain method. The literal meaning of the word *kindergarten* is "garden of children," and it suggests Froebel's method by speaking of children as if they were plants to be cultivated.

Up to Froebel's time the method of educating had been to *drill*, a process properly applicable only to stone, but which well expressed the hard mechanical method of proceeding from the outward inward, instead of from the inward outward, as the growth of all living organisms must do. As, to prepare himself for his work, the gardener of plants first learns the general laws and conditions of vegetable growth, and next inquires into the special soils, degrees of light, temperature, and moisture necessary to the perfect development of the several species of plants, so Froebel proposed that educators should prepare themselves to cultivate young children—first, by acquainting themselves with the general laws and conditions of human nature, for the purpose of bringing forth the common sense and common conscience; and, secondly, by a careful study of the individual possibilities of beauty and power of the several children committed to their care. Froebel may be



called the Copernicus of education, from the new point of view that he took; or its Newton, from the new character of method that he proposed. Seeing that the child, a mere sensibility, comes into nature from God on the flood-tide of self-activity—not an isolated individual abandoned to the reactions of the inexorable material universe, but in living relation with humanity's heart in the person of the mother, whose duty as well as inmost desire it is to bring him into a joyful sense of his relations to his race, to nature, and to God—Froebel sought and found the clue to the true method of education by analyzing the instinctive play of mother and child, when she studies its instincts and spontaneities in order that she may help him to enjoy his body, which is the first world that circumscribes him. Having found that the child takes possession of his own body and develops his organs of sense by first acting, and then realizing his action as a conscious fact, Froebel discovered that in the same manner he must be brought to take possession in a measure, and gradually, of the universe outside of his body; that is, he must be led to act with the purpose of making orderly changes the instinctively makes changes, not with the intention to compass an end, but simply because he can. The reaction his activity provokes, gives him impressions which rise into thoughts, by expressing themselves in words that re-echo his impressions, and later, into knowledge, by embodying themselves in transient effects, or productions more permanent, which reflect his inner being to his individual consciousness.

But as the sympathizing mother—not peremptorily, but genially—assisted the child to know and use his organs of sense and locomotion in nursery play till he could run alone and began to speak, so the kindergartners, who take the child from his mother's arms, as it were, must—not peremptorily, but genially—superintend his production of effects, and assist him to express himself freely in conversation, while he is following the laws of order suggested to him in producing objects, whether transient or more permanent, that give him experimental knowledge of the laws and order of nature, making outward things a stepping-stone, not a stumbling-block, of progress.

The Froebel education is not, however, merely organic, or even artistic and intellectual, but moral and religious also, never losing sight of the principle that spontaneous (or at least a willing) doing precedes thinking, and thinking precedes knowing, and knowing precedes naming, and naming, or language, is the creative element of human in contradistinction to merely animal intelligence.

As, when the child runs alone and speaks, the nursery education merges in the kindergarten, so, when the child can manipulate cleverly, converse intelligently, and begins to invent, and has come to a sense of moral responsibility by learning "fair play" with his companions, the kindergarten merges in the school. He is then ripe for learning to read and write, to appreciate signs, words having become familiar with things signified, material and mental, as substantial facts. Elementary materials for the child's production, by which he is educated, were gradually elaborated by Froebel in fifty years of experimenting, and consist of a series of solids, round, cubicular, and triangular, divided and subdivided, with tablets, square and triangular, sticks of various lengths, peas or balls of wax representing points, cards for sewing with colored threads, paper for folding, cutting, pricking, and drawing, also for weaving; all to be used under the supervision of the kindergartner to make forms of order and use, but leaving the children a fair margin for their free choice.

Besides these manipulations, which meet and employ instinctive spontaneities, the instinctive desire to work upon the earth is not allowed to die out from want of opportunity to plant and cultivate. The vegetable world is always at hand, and affords subjects for examination and analysis, which engage attention next after the works of his own hands. The latter are the first and best objects for lessons, since what a child has done or made, interests and even commands his attention, and what he has made himself he can exhaustively know—not merely its appearances, but the law and method of its being, which is the child's own thought. If he is allowed to give an account of how he did it, and what he made it for, he will have a pattern, as it were, to follow in analyzing any one of nature's works, learning its law and referring it to its Author; and thus the education of Froebel leads the child to God through his mother, who represents to him infinite Love, and nature, which represents to him infinite Wisdom. In the spirit that makes these one he comes to feel that he "lives, moves, and has his being," for "we are the offspring of God," as heathen poet and Christian apostle agree.

The methods of using Froebel's materials for education are indicated in the manuals prepared for aiding kindergartners, written under the direction of Froebel's ablest

disciple and apostle, the baroness Marenholtz-Bulow. There is one in German, edited by Goldammer, and one in French, edited by Jacobs, and named *Le Jardin des Enfants*. Both are amply illustrated by plates—the former published in Berlin, the latter in Brussels by F. Claassen. In the beginning of his career, Froebel published a work under the title *Menschen-Erziehung* ("Education of Man"), in which the word *kindergarten* does not occur, but all the elements of it are manifest. The best edition of it is edited by his disciple and relative, Lange, and it is published in Hamburg. It has been translated into French by the baroness Crombrughe. Later in life, Froebel published his characteristic and unique work, *Mutter-Spiel und Kinder-Lieder*, which has been translated and set to music by Lady Baker, and published in London. The notes to these, with its pictorial illustrations, have been translated by the baroness Crombrughe into French, and called *Causeries des Mères*. It is a kind of nursery manual. The baroness Marenholtz-Bulow has published many works, among which are eminent *Education by Labor*, *The Educational Mission of Women*, *The Child's Workshop*, and a pamphlet translated into English, and published by the National Bureau of Education in their *Circular of Information* for July, 1872, which may be had for the asking by any citizen of the U. S. In America Mrs. Matilda H. Kriege has published extracts, freely translated, from the above works in a little book called *The Child in its Relations to Nature, to Man, and to God*; and W. Hailmann, a small book on *Kindergarten Culture*. There is also a monthly periodical devoted to the interests of this most radical of reforms, published in Cambridge, Mass. ELIZABETH P. PEARODY.

**Kinderhook'**, post-t. of Tallapoosa co., Ala. Pop. 800.

**Kinderhook**, tp. of Pike co., Ill., on the Hannibal and Naples branch of the Toledo Wabash and Western R. R. Pop. 1154.

**Kinderhook**, post-t. of Branch co., Mich. Pop. 637.

**Kinderhook**, post-v. and tp. of Columbia co., N. Y., 20 miles S. E. of Albany and 5 miles E. of the Hudson River, on the Boston and Albany R. R. The township includes the villages of Valatie and Niverville. Kinderhook Village has 4 churches, 1 weekly newspaper, 1 cotton-mill, and 2 national banks. Valatie has 4 churches, 4 cotton-mills, a knitting-mill, and 2 hotels. Lindenwald, the home of the late ex-President, Martin Van Buren, is 2 miles S. of Kinderhook Village. He was a native of this town. Pop. of tp. 4055. WM. B. HOWLAND, ED. "ADVERTISER."

**Kinderhook**, tp. of Washington co., Va. Pop. 2391.

**Kineau**, or **Kinau**, queen of the Sandwich Islands, b. in the beginning of this century; reigned from the death of Kamehameha II., in 1823, to the accession of Kamehameha III., in 1833. D. in 1844. She was much opposed to the French Roman Catholic mission, and in favor of the Protestant American Methodist mission.

**King**, county of Washington Territory, extending from Puget Sound E. to the Cascade Mountains. It is an uneven, heavily-timbered region, with a good soil and a mild climate. Lumbering is the chief pursuit. Excellent lignitic coal abounds. Area, about 1550 square miles. Cap. Seattle. Pop. 2120.

**King**, tp. of Christian co., Ill. Pop. 413.

**King** AUSTIN A., b. in Sullivan co., Tenn., Sept. 20, 1801; became a lawyer 1822, removed to Missouri 1830; was circuit judge of Ray co. 1837-48, and again in 1862; governor of Missouri 1849-53; member of Congress 1862-64. D. at St. Louis Apr. 22, 1870.

**King** (CHARLES), LL.D., the son of Rufus King, b. in New York Mar. 16, 1789; educated at Harrow School, England, and at Paris, while his father was U. S. minister to Great Britain, serving afterward in the banking-house of Hope & Co., Amsterdam. In 1806 he returned to New York; entered in 1810 into mercantile business with Mr. Archibald Gracie, his father-in-law; served for a time in 1814 as a volunteer in the war with England; was sent to England as commissioner to investigate the treatment of Dartmoor prisoners; was associate with Verplanck in editing the *New York American* 1823-27, sole editor 1827-47; and afterward associated with Col. Webb in the editorship of the *Courier and Enquirer*; was president of Columbia College 1849-64, and d. at Frascati, Italy, Sept. 27, 1867. He wrote a sketch of the Croton Aqueduct (1843), *History of the New York Chamber of Commerce*, and published many addresses.

**King** (HORATIO), b. at Paris, Oxford co., Me., June 21, 1811; learned the printing trade, and published in his native State a newspaper called *The Jeffersonian*; was appointed clerk in the post-office department at Washington in 1839; by gradual promotion he was first assistant postmaster-general in 1861, was appointed postmaster-general



in 1861 by Pres. Buchanan; retired from office on the accession of Pres. Lincoln, but remained in Washington; rendered service in various capacities during the civil war, and became especially prominent by his successful efforts to elevate the standard of society life in Washington, by introducing a literary element into social reunions.

**King** (JAMES GORE), son of Rufus King, b. in New York May 8, 1791; studied in the best English schools, and graduated at Harvard in 1810; studied law; was an adjutant-general in the army 1812-15; became a prominent merchant of New York and Liverpool; member of Congress from New Jersey 1849-51, and president of the New York Chamber of Commerce. D. at Highwood, N. J., Oct. 3, 1853.

**King** (JOHN ALSOP), eldest son of Rufus King, b. in New York Jan. 3, 1788; educated at Harrow, England, and Paris; served as a cavalry officer 1812-15; elected to New York assembly in 1819 and to senate in 1823; was secretary of legation in London in 1826, and afterward *chargé d'affaires* there; was a member of Congress 1849-51, and governor of New York 1857-58; delegate to the "Peace convention" of 1861, and to the State constitutional convention of 1867, besides holding at different times many other important public positions in that State. D. at Jamaica, L. I., July 7, 1868.

**King** (JOHN CROOKSHANKS), b. at Kilwinning, Scotland, Oct. 11, 1806; educated as a practical machinist; came to the U. S. in 1829; was engaged for several years as superintendent of factories at Cincinnati and Louisville, but in 1834 turned his attention to sculpture, in which he met with great success, having executed busts of Daniel Webster, John Quincy Adams, Agassiz, Emerson, Shaw, and many other prominent men. He has devoted himself especially to cameo likenesses, and resides at Boston.

**King** (JOHN P.), b. Apr. 3, 1799, near Glasgow, Barron co., Ky. His father soon after moved to Bedford co., Tenn., where the son remained until 1815, when he made his way to Georgia; studied law, and was admitted to the bar in Augusta in 1819, before his majority. In 1822 he visited Europe, where he spent two years in completing and perfecting his education. During this period he attended lectures in Edinburgh and Paris; on his return he rose rapidly in his profession amidst the most formidable competition. In a few years he acquired a large estate. In 1833 he was chosen a member of the constitutional convention of Georgia of that year. In this body he greatly distinguished himself. He was a Jackson Democrat, and by his superior talents took the lead of that party in the convention. Before this his reputation had not extended beyond the limits of the county of Richmond, but by his debates in this convention, and especially by his discussion with the late William H. Crawford (who was the Democratic Congressional caucus candidate for President of the U. S. in 1824), he rose in one bound to the forefront of the ablest and most eloquent men in Georgia. The next year he was sent to the U. S. Senate, where he took and maintained a high position; but some of his party presses of the State having censured (unjustly, as he thought) a very notable speech he made against some of the leading measures of Mr. Van Buren's administration, he promptly resigned the trust committed to his charge, retired to private life, and resumed his profession in 1838. No like abandonment of politics from personal disgust has occurred in the history of the U. S. In 1841 he was elected to the presidency of the Georgia R. R. and Banking Co., which position (June, 1875) he continues to hold, and for many years has been regarded one of the first railroad men in the country.

A. H. STEPHENS.

**King** (JONAS), D. D., b. at Hawley, Mass., July 29, 1792; graduated at Williams College in 1816 and at Andover Seminary in 1819; preached for a time in South Carolina; was 1823-26 a missionary in Syria, and 1828-69 a missionary at Athens. He was the author of quite numerous writings in the modern Greek language, and by reason of some of his publications was sentenced in 1852 to fifteen days' imprisonment and expulsion from the kingdom, but an official protest saved him from the fulfilment of the sentence. D. at Athens May 22, 1869.

**King** (MITCHELL), LL.D., b. in Scotland June 8, 1783; removed in 1806 to Charleston, S. C., and became a professor in Charleston College, of which he was afterwards for some time president. In 1810 he was admitted to the bar, and began a prosperous law-practice. In 1819, and again in 1842-44, he was judge of the city court. He early attained a wide fame for learning, and for many years was a leader in the cause of education and in many enterprises for the improvement of the public taste and for the diffusion of knowledge.

**King** (PETER), LORD, b. at Exeter, Eng., in 1669, was a nephew of Locke; studied at the University of Leyden,

Holland, and read law at the Inner Temple; entered Parliament in 1699; was one of the managers of the impeachment of Sacheverell in 1709, and in 1712 was counsel for Whiston. By George I. he was made chief-justice of common pleas and privy councillor, and in 1725 was appointed lord chancellor, with the title of Baron King of Ockham. He resigned in 1733, and d. at Ockham, Surrey, July 22, 1734. Baron King wrote several treatises in support of the rights of dissenters, and a *Critical History of the Apostles' Creed* (1702).

**King** (PHILIP PARKER), ADMIRAL, b. on Norfolk Island Dec. 13, 1793, his father being one of the founders of that colony, and afterwards (1800) governor of New South Wales (Australia); entered the navy in 1807; commanded an exploring expedition in Australian waters in 1817 and on the coasts of Patagonia in 1825, publishing in both cases the hydrographical results of the survey. He afterwards settled in Australia, where he took an active part in politics and other public interests. He was appointed rear-admiral in 1854, and d. at Grantham, near Sydney, in Feb., 1855.

**King** (PRESTON), b. at Ogdensburg, N. Y., Oct. 14, 1806; graduated at Union College in 1827; became a prominent lawyer, journalist, and Democratic politician of St. Lawrence co., N. Y., and held various offices; was in Congress 1843-47 and 1849-53; a Republican U. S. Senator 1857-63; became in 1865 collector of the port of New York. He was drowned in New York harbor, Nov. 13, 1865.

**King** (RICHARD JOHN), b. in England about 1820; wrote for John Murray his valuable series of *Handbooks to the Cathedrals of England*, and has contributed to *Fraser's* and other magazines some very able topographical and antiquarian sketches of English counties and towns, which were published collectively in 1874.

**King** (RUFUS), GEN., son of Charles, b. New York City Jan. 26, 1814; graduated at U. S. Military Academy; was appointed brevet second lieutenant of engineers July 1, 1833; resigned Sept. 30, 1836, and for two succeeding years was assistant engineer on the Erie R. R., and for four years (1839-43) adjutant-general of the State of New York. Associated during this time and until 1845 in the editorial conduct of the Albany *Evening Journal*, in the latter year he removed to Wisconsin, and assumed charge of the Milwaukee *Sentinel*, of which he was editor until 1861, when he was appointed U. S. minister to Rome; but the outbreak of the civil war caused him to tender his services to the government in a military capacity, and in May, 1861, he was appointed a brigadier-general of volunteers, serving as such in various departments in Virginia until Oct., 1863, when he resigned from the army and assumed his duties at Rome as U. S. minister. Recalled July 1, 1867. D. Oct. 13, 1876. G. C. SIMMONS.

**King** (RUFUS), LL.D., b. at Scarborough, Me., Mar. 24, 1755, son of Richard King, a wealthy merchant; graduated at Harvard College in 1777; studied law under Theophilus Parsons at Newburyport; was on the staff of Gen. Glover in the Rhode Island campaign of 1778; admitted to the bar; commenced practice at Newburyport in 1780; elected a member of the general court or legislature of Massachusetts in 1782 and succeeding years, and by the legislature chosen in 1784 as delegate to the Continental Congress at Trenton, N. J. One of his earliest acts in Congress was to move a resolution (Mar., 1785) "that there be neither slavery nor involuntary servitude in any of the States described in the resolution of Congress of Apr. 1784 (the North-west Territories), otherwise than in punishment of crime whereof the party shall have been personally guilty; and that this regulation shall be made an article of compact and remain a fundamental principle of the Constitution between the original States and each of the States named in said resolves." This resolution was, by a vote of 7 States against 4, referred to the committee of the whole, and not further acted upon until two years later, when its provisions were embodied in the famous ordinance for the government of the N. W. Territories presented to Congress at New York July 11, 1787, by Nathan Dane of Massachusetts, which became the Magna Charta of five great States. King was one of the commissioners appointed by Massachusetts to settle the boundary of that State with New York, and also empowered, with his colleague Dane, to convey to the U. S. the large tract of land beyond the Alleghenies which was claimed by the State. In Aug., 1786, he was associated with James Monroe as a committee to represent to the legislature of Pennsylvania the necessities and embarrassments of the Federal treasury with reference to the 5 per cent. impost levied by Congress on the States. Elected a member of the convention for framing the Federal Constitution, King took his seat May 25, 1787, participated actively in the debates, and was one of the committee on revision of style and arrangement of the ar-



ticles. After signing the Constitution he returned to Massachusetts, was elected to the State convention for the consideration of that instrument, and was instrumental in securing its ratification, notwithstanding violent opposition. In 1788 he removed to New York City, where two years before he had married Mary, daughter of John Alsop, and in 1789 was elected one of the first Federal Senators for New York under the newly established Constitution, his colleague being Gen. Schuyler. He was re-elected in 1790. On the formation of the earliest national political parties, King ranked as one of the leaders of the Federalists. His ardent defence of Jay's treaty with England (1794), both in the Senate and in the press, under the signature of "Camillus," brought him into conspicuous favor with Pres. Washington, who offered him the secretaryship of state on the resignation of Edmund Randolph, and in 1796 appointed him minister to England. He remained in London eight years, notwithstanding the accession of the opposite party to power in 1801, and discharged the duties of his post during that important epoch of European history with great tact and ability. Returning to the U. S. in 1804, he settled on a farm at Jamaica, L. I., where he remained for some years in retirement, but on the outbreak of the war with Great Britain (1813) was elected for the third time to the U. S. Senate. King was opposed to that war, but aided in passing the measures necessary for its prosecution, and after the Capitol was burned in Aug., 1814, he made a stirring appeal to the country to avenge the outrage. His policy after the war was directed towards the speediest recovery of national prosperity; he was chiefly instrumental in securing the navigation and commercial acts of 1818; took an interest in promoting trade with the West Indies; strongly opposed the establishment of a national bank, and procured the enactment of a general measure regulating the sales for cash of the public lands. In 1816 he was, against his will, nominated by the Federalists as their candidate for governor, but was defeated. In 1819 he was elected to a fourth term in the Senate, during which he was chiefly conspicuous as leader of the opposition to the admission of Missouri as a slave State, and to the extension of slavery generally. His speeches on this subject formed a point of departure for all subsequent Congressional debates on slavery. On Feb. 16, 1825, a few days before his final withdrawal from the Senate, he offered a resolution for devoting the proceeds of the sales of public lands to the purchase and emancipation of slaves and their removal to some foreign country. Later in the same year King accepted a new appointment as minister to England, at the urgent request of Pres. J. Q. Adams, but resigned and returned home the following year (1826) on account of ill-health. D. at Jamaica, L. I., Apr. 29, 1827. He is generally acknowledged to have been an able diplomatist, a wise and liberal statesman, a brilliant orator, a genuine patriot, and a philanthropist of enlarged views and true insight.

POURCE C. BLISS.

**King** (THOMAS BUTLER), born in Hampshire county, Mass., Aug. 27, 1804; was educated at Westfield Academy; studied law, and moved to Georgia in 1823, where he married a lady of wealth and devoted himself to planting. His residence is on St. Simon's Island. He was from 1832 a member of the State senate for a number of years, in which body he greatly distinguished himself by his efforts in the cause of public works for cheap transportation. He was a member of Congress from Georgia from 1839 to 1843, and from 1845 to 1849. While in Congress naval affairs chiefly occupied his attention. Many valuable reports upon these subjects were made by him during his terms of service. In 1849, Gen. Taylor sent him on a special mission to the then Territory of California, where, in connection with Gen. Riley, he rendered important service in preserving law and order where no organized civil government existed; and this was done without any active interference on the part of the military. While in California he established interests of an individual character which subsequently required his attention to the exclusion of politics for several years. In 1860, while he was opposed to the policy of secession as most of the large slaveholders of the South were, yet when Georgia in 1861 resolved to adopt that measure, he cast his fortunes with those of the State. D. May 10, 1864.

A. H. STEPHENS.

**King** (THOMAS STARR), b. in New York Dec. 16, 1824; d. in San Francisco, Cal., Mar. 4, 1894. His father was a Universalist minister in Charlestown, Mass. Young King had a passion for study, but was obliged from family necessities to forego a college education. From twelve till twenty he labored first as clerk in a store, afterwards as a teacher, preparing himself in leisure hours for the ministry. His first preaching was in Woburn, Mass., his first settlement in Charlestown, over his father's parish. In 1848 he accepted a call to the Unitarian church in Hollis street,

Boston, and remained there till the spring of 1860, when he went to California to take charge of the Unitarian church in San Francisco. The outbreak of the civil war roused all his remarkable powers as a writer, speaker, and man, and to his influence is ascribed the change of public opinion in the State from lukewarmness towards the Northern cause to devoted loyalty. Through his exertions the U. S. Sanitary Commission obtained the generous sums of money that enabled it to carry on its work at the critical period of the war. Mr. King's eloquence as a preacher and lecturer, which was familiar throughout the West and North-west, made him equally popular on the Pacific coast. His personal qualities endeared him to all who knew him. But for his incessant labors in the pulpit and on the platform he would have been eminent as a writer. He contributed frequently to the *Universalist Quarterly*, but he published but one book, *The White Hills, their Legends, Landscapes, and Poetry* (1860). A few of his papers were collected after his death—*Patriotism, and other Papers* (1864). The same year Richard Frothingham wrote a brief memoir, *Tribute to Thomas Starr King*. In 1850 Mr. King received the honorary degree of A. M. from Harvard College.

O. B. FROTHINGHAM.

**King** (WILLIAM), b. at Seabrook, Me., Feb. 9, 1768; was endowed with distinguished talents, and with equal educational advantages might have become as prominent as Rufus, his celebrated brother. After residing at Topsam for some years, he settled at Bath as a merchant about 1800; was for several terms a member of the Massachusetts legislature, was one of the leading advocates of the separation of Maine, president of the convention which framed the constitution of Maine, and first governor of the new State. In 1821 he was made U. S. commissioner for the adjustment of Spanish claims, was a general of militia, collector of customs at Bath 1831-34, and a patron of institutions of learning. D. at Bath June 17, 1852.

**King** (WILLIAM), b. at Antrim, Ulster, Ireland, May 1, 1650; studied at Trinity College, Dublin; entered the Church in 1674; became dean of St. Patrick in 1688, in which year he was twice imprisoned in the tower of Dublin for sympathizing with the English revolutionists. He became bishop of Kerry in 1691, archbishop of Dublin in 1702; was one of the lords justices of Ireland in 1717, 1721, and 1723, and d. at Dublin May 8, 1729. He wrote several controversial works against Catholicism, but is best known by a remarkable Latin treatise on the origin of evil (*De Origine Mali*, 1702), and by a sermon on predestination (1709), in which he maintains that the moral attributes of God are different from the qualities bearing the same name among mankind.

**King** (WILLIAM RUFUS), b. in Sampson co., N. C., Apr. 7, 1780; graduated at Chapel Hill, University of North Carolina, in 1803; studied law, and was admitted to the bar in 1806. The same year he was elected to the legislature from his native county, and was re-elected to the same position in 1807; this, however, he resigned on the meeting of the legislature to accept the appointment of State solicitor for the Wilmington circuit, which office he also resigned after holding it for two years. In 1809 he was again returned to the State legislature; in 1810 he was returned a member of Congress from his district, and continued by re-elections to hold this position until 1816, when he resigned it to become secretary of legation under William Pinckney, American minister, first to Naples, and then to St. Petersburg. During his Congressional term he was an ardent and able advocate of the war-policy and measures of Mr. Madison's administration. On his return from Europe in 1818 he moved to the then Territory of Alabama, where he established a plantation and devoted his attention to agriculture. In 1819 he was a member of the constitutional convention of the Territory of Alabama; and upon the admission of Alabama as a State into the Federal Union, the same year, under the constitution formed by this convention, he was elected one of the two U. S. Senators, which position he continued to hold from 1819 to 1844. During the whole of his Senatorial career Mr. King was a zealous supporter of the war-policy of Gen. Jackson. He advocated the election of the President in 1824, 1828, and 1832. He was imbued with great ability the policy of Mr. Van Buren, who so closely followed in the "footsteps of his father-in-law." In 1844 he resigned his position in the U. S. Senate, and accepted the appointment of minister to France tendered to him by Pres. Tyler. The purpose of that tender mission was to prevent France from entering with Great Britain in a joint protest against the re-annexation of Texas into the Federal Union. Having been successful in this mission, Mr. King returned to the U. S. Nov., 1846, and remained in private life until 1852, when he was re-elected by the governor of Alabama to fill the unexpired term in the



U. S. Senate of Arthur P. Bagby, who was sent by Pres. Polk as minister to Russia. This unexpired term was less than a twelvemonth, but before it was ended Mr. King was again elected by the legislature to the U. S. Senate for another full term of six years, beginning Mar. 4, 1849. Upon the death of Gen. Taylor, on July 9, 1850, and the accession of Vice-President Fillmore to the Presidency in consequence of that event, Mr. King was unanimously elected president of the Senate. He presided over this august body during the exciting debates that ensued with great urbanity, dignity, and ability. At the Presidential election of 1852 he was the Democratic candidate for the office of Vice-President of the U. S. with Gen. Franklin Pierce for the Presidency; both were elected by large majorities, but Mr. King did not live to perform the duties of his office. His health began rapidly to fail before the close of the canvass in Nov., 1852. Early in Jan., 1853, under advice of physicians, he went to Cuba, but was not able to return by the 4th of March, the day of inauguration. This being anticipated, a special act of Congress was passed and despatched to him in time, providing for his taking the official oath in Havana. Some weeks afterwards he was able to return to his home in Dallas co., Ala., where he d. in Apr., 1853.

A. H. STEPHENS.

**King and Queen**, county of E. Virginia. Area, 320 square miles. The Mattaponi River flows along its S. W. border. It has an undulating surface, and contains valuable marl-beds. Corn is the staple product. Cap. King and Queen Court-house. Pop. 9709.

**King and Queen Court-house**, post-v., cap. of King and Queen co., Va., 15 miles from West Point.

**King'bird**, the *Tyrannus Carolinensis*, a familiar little bird found throughout the North American continent. It belongs to the tyrant flycatcher family, devours considerable numbers of honey-bees, and boldly attacks and drives away hawks, eagles, and crows, flying to great heights in its eagerness for the encounter.

**King'-crab**, or **Horse-shoe Crab**, the *Limulus Polyphemus*, a remarkable articulate of the Atlantic shores of the U. S., classed by most writers as an entomostracan, but reckoned by others as constituting, with its congeners, a separate sub-class, and by some regarded as an anomalous representative of the class of Arachnoids, which includes the spider-scorpions. It is used in the U. S. as a fertilizer for land, being hardly edible.

**King'dom**, tp. of Bibb co., Ala. Pop. 825.

**King'field**, post-tp. of Franklin co., Me., 22 miles N. of Farmington. Pop. 560.

**King'fish**, or **Opah** (*Lampris guttatus*, Retz.), a fish which is the sole representative of a peculiar family (Lamprididae), said from its beautiful colors to look "like one of Neptune's lords dressed for a court-day." It is widely distributed, being found in European seas, in those of China and Japan, and also, it is said, on the W. coast of Africa.

**King'fishers**, or **Alcedinidae**, a family of birds belonging to the order Insessores, and so named from their peculiarly piscivorous habits. This family is represented in North America by the genus *Ceryle*, nearly allied to the typical Old-World *Alcedo*. The common species of the U. S. is the belted kingfisher (*C. alcyon*, Linn.).

**King George**, county of Virginia, having the river Potomac on the N. and E., and the Rappahannock on the S. W. Area, 176 square miles. It is uneven, and much of the soil is fertile. Corn is the principal product. Cap. King George Court-house. Pop. 5742.

**King George Court-house**, post-v., cap. of King George co., Va., 19 miles E. of Fredericksburg.

**Kingkitao**, or **Kienghitao**, called by the Chinese **Hanching** or **Wangking**, and by the French **Séoul** or **Sioul**, the capital of Corea, near the centre of which it is situated. There are no reliable accounts of its population.

**King'lake** (ALEXANDER WILLIAM), b. at Taunton, Eng., in 1811; was educated at Eton and at Trinity College, Cambridge, where he graduated in 1832; was called to the bar at Lincoln's Inn 1837, and acquired an extensive chancery practice, but retired from the law in 1856. Soon after finishing his studies Kinglake made an extensive tour in Eastern countries, of which he published an account under the title of *EOthen* (1844), which obtained great popularity. He accompanied Lord Raglan in the Crimean war, and wrote, in great part from the papers of that general, a *History of the Crimean War*, of which the first volume appeared in 1863, and the fifth, devoted to the battle of Inkerman, in 1874. This work, which is not yet completed, is eloquently written, and enters into great detail, but exhibits a bias highly unfavorable to the French, and especially toward Napoleon III. Kinglake entered Parliament in

1857, and became prominent for his anti-Napoleonic attitude upon the Conspiracy bill (1858) and the annexations of Savoy and Nice (1860).—His cousin, JOHN ALEXANDER KINGLAKE, b. at Taunton in 1805, a lawyer and for many years Liberal member of Parliament for Rochester, has written articles for the reviews, and is often confounded with the historian.

**King'lets**, The (*Regulus*, Cuv.), constitute a genus of the extensive family of Turdidae (or thrushes). The common American species are the ruby-crowned (*R. calendula*) and golden-crested (*R. satrapa*) wrens or kinglets, which are both closely allied to the golden-crested wren (*R. cristatus*) of Europe, the smallest of the Old-World birds.

**King'man**, county of S. Central Kansas. Area, 648 square miles. It is traversed by Good River, and is well adapted to grazing.

**Kingman**, post-v. of Penobscot co., Me., on Mattawamkeag River and the European and North American R. R.

**King of Arms**, or in Scotland **King-at-Arms**, a herald of the highest rank. The English kings of arms are Garter, Bath (who is not of the college of arms), Clarenceux, Norroy, and one for the order of St. Michael and St. George (the last not belonging to the heralds' college). Scotland has one, called Lyon, or Lord Lyon king-at-arms. Ireland has one, Ulster king of arms. There have been other English kings of arms, whose offices are now extinct. (For these and some continental kings of arms, see HERALD.)

**Kings** (BOOKS OF), FIRST and SECOND, two of the canonical books of the Old Testament, following the second book of Samuel and preceding the first book of Chronicles. The two books were originally but one, and contain the annals of the kings of Judah and Israel from the death of David to the Captivity. The Septuagint and Vulgate versions call them the third and fourth books of Kings, reckoning the two books of Samuel as belonging to the same work. Ewald and other modern German critics go still further, reckoning Judges and Ruth to belong to the same work, which they call the "Great Book of the Kings," while suggestions have not been wanting that large portions of the Pentateuch and book of Joshua originally belonged to it, constituting an unbroken series of annals from the creation of the world to the dispersion of the Hebrew race. It is certain that the books of Kings are in reality a continuation of those of Samuel—that they are written in the same spirit, with the same style and characteristic expressions; but the identity of authorship cannot be asserted from these premises, as there are numerous minor differences which show at least the hand of another contributor. On the other hand, the contrast in many respects with the books of Chronicles, which narrate substantially the same events, is very marked, showing a considerable priority of time in favor of Kings. By a modern German school of criticism the two works are designated as prophetic and priestly, and this antithesis, which is argued to represent a real and long-continued conflict between the two orders of religious teachers, may be accepted so far as to admit a noticeable distinction in this respect between the two historical works. But the very fact that the books of Kings are largely occupied with the public ministrations of the prophets, while less attention was given to the priestly service of the temple, was a sufficient reason for the writer of Chronicles, himself probably a minister of that sanctuary, to omit to dwell upon the prophetic annals already written, and to bestow greater attention upon matters which might be of greater interest to his own class. The books of Kings have been considered to show a strong bias against the northern kingdom, as all its monarchs without exception are said to have "done evil in the sight of the Lord," but as far the larger number of the monarchs of Judah are charged with like conduct, the argument is not conclusive. A prominent feature of Kings consists of the narratives of the prophets Elijah and Elisha, which occupy fourteen chapters. The Septuagint version exhibits some remarkable variations from the received text of Kings, a considerable number of passages being transposed, while a few are omitted, and several additional fragments of narrative are inserted, chiefly relating to Solomon and Jeroboam. Biblical scholars disagree as to the authenticity and value of these fragments, but they are generally rejected as corruptions of the original text. The sources from which the writer drew his materials are often referred to. They were a series of biographies of individual kings, the writings of several prophets, and a general history called the *Book of the Kings of Israel and Judah*, of which the present work may be considered as a brief compend. All these original works have perished. As to date and authorship, the narrative itself shows that it must have been written during or after the Captivity, and many coincidences of style and matter appear to justify the Tal-



mudic tradition which ascribes it to Jeremiah, which is maintained in recent times by Hävernick and Graf, but opposed by Keil and Davidson. Calmet ascribed the authorship to Ezra. Many critics contend for a still later date on the strength of Chaldean forms, which might, however, have easily crept into the Hebrew language during the close intercourse with Babylon before the Captivity. (See the commentaries of Keil (1846; Edinburgh trans., 1857), Thenius (1849), Schlusser (1861), and G. Rawlinson in the *Speaker's Commentary* (1873).) POTTER C. BLISS.

**King's**, county of Ireland, in the province of Leinster, bordering on the Shannon. Area, 772 square miles. Pop. 75,900, of whom 28,383 cannot read or write. Towards the S. runs a small branch of the Slieve Bloom Mountains; the surface is otherwise level. The soil is tolerably fertile. Cap. Tullamore. From 1851 to 1872 the emigration from this county was 35,533.

**Kings**, county of New Brunswick, intersected by the river St. John. The soil is fertile. Large quantities of lumber are cut and sawed. The county is traversed by the European and North American Railway. Cap. Hampton. Pop. 24,593.

**King's**, county of Nova Scotia, bordering on the Bay of Fundy. Its shores are bold and picturesque. Its soil is to a great extent of the best description. It is well timbered, and produces iron, copper, manganese, slate, building-stone, etc. The county is traversed by the Windsor and Annapolis R. R. Cap. Kentville. Pop. 21,509.

**King's**, the easternmost country of Prince Edward Island, Dominion of Canada. It is very fertile and well cultivated. Cap. Georgetown. Pop. about 17,000.

**Kings**, county of New York, comprising the westernmost part of Long Island, and including some small islands along the coast. Area, 72 square miles. Much of the soil is naturally light, but proximity to markets has caused it to become very productive. Garden products are the staple crops. The county has extensive manufacturing and commercial interests, which are described in the article *BROOKLYN* (which see). It is traversed by various railroads, centering in Brooklyn, the capital. Pop. 419,921.

**Kings**, tp. of Williamsburg co., S. C. Pop. 1774.

**King's (or Queen's) Bench**. See *COURTS*, I. (1).

**Kingsborough**, post-v. of Johnstown tp., Fulton co., N. Y., 1 mile from Gloversville. It has 10 manufactories of mittens.

**Kingsborough** (EDWARD KING), LORD, b. Nov. 16, 1795. He published a work in 9 large folio vols. upon the *Antiquities of Mexico*, comprising *five volumes of Ancient Mexican Paintings and Hieroglyphics, together with the Monuments of New Spain by M. Dupain, with their respective Scales of Measurement and Accompanying Descriptions; the whole illustrated by many valuable medallions* (London, 1830-41), at an expense of some \$200,000. Only seven volumes had been issued when Lord Kingsborough d. at Dublin Feb. 27, 1837; the two concluding volumes were brought out after a considerable interval. This work is valuable as a collection of materials, but is confused in arrangement and disfigured by uncritical theories.

**Kingsbury**, an unorganized county of Dakota, traversed by the Dakota or James River. Area, about 750 square miles.

**Kingsbury**, post-tp. of Piscataquis co., Me., 22 miles W. of Dover. Pop. 174.

**Kingsbury**, post-v. and tp. of Washington co., N. Y., on the Hudson River. It is traversed by the Champlain Canal and Rensselaer and Saratoga R. R. It contains Sandy Hill, one of the county-seats; has great water-power, 10 churches, manufactories of lumber, paper, machinery, etc., and valuable limestone-quarries. Pop. 4277.

**Kingsbury** (CHARLES P.), GEN., b. in New York 1818; graduated at the U. S. Military Academy, and entered the army as second lieutenant of ordnance in 1840; served as assistant and in command of various arsenals until the threatened troubles with Mexico in consequence of the proposed annexation of Texas, when he accompanied the army of occupation to Texas; subsequently during the Mexican war was Gen. Wool's chief ordnance officer; was engaged at Buena Vista on the staff of Gen. Taylor. During the civil war he was superintendent of the U. S. armory at Harper's Ferry in Apr., 1861, when the property was destroyed to prevent its falling into the hands of the Confederates; was chief of ordnance (with rank of colonel) of the Army of the Potomac 1861-62, throughout the Virginia Peninsular campaign, on the termination of which he was relieved, owing to ill-health, and subsequently served on important special duty until July, 1865, when he was placed in charge of the U. S. arsenal at Watertown, Massachusetts. In Dec., 1870, he was retired on his appen-

tion, with the rank which he had attained in his corps, that of lieutenant-colonel. He was the author of various professional works, and was a frequent contributor to various periodicals. D. Dec. 25, 1879. G. C. SIMMONS.

**Kingsbury** (HENRY W.), COL., b. in Connecticut in 1837; graduated at the U. S. Military Academy, and appointed second lieutenant of ordnance May 6, 1861; first lieutenant of artillery May 14, 1861; was engaged in the first battle of Bull Run on the staff of Gen. McDowell, with whom he continued until Dec., 1861, when he was placed on duty with his battery in the defenses of Washington; in the spring of 1862 he accompanied the Army of the Potomac to Virginia, and in April was appointed colonel of the 11th Connecticut Vols., which regiment he led in the battles of Gaines's Mill and Malvern Hill, and subsequently at South Mountain and Antietam, where he received wounds from the effect of which he d. the following day, Sept. 18, 1862. G. C. SIMMONS.

**King's (or Queen's) Counsel**, in English practice, are certain barristers or sergeants-at-law who have been specially appointed by letters-patent to be His (or Her) Majesty's counsel. They are entitled to a right of precedence in all the courts before other barristers or sergeants, and among themselves usually have precedence according to the date of their appointment. Their rank in this respect is generally defined by the terms of the patent. King's counsel do not, as their name might indicate, render legal services exclusively in behalf of the Crown, but may be retained by ordinary clients. They cannot, however, act for a plaintiff in a suit against the Crown, or engage in the defence of persons prosecuted for crime, without obtaining special license from the Crown. But this is never refused, and may be obtained by the payment of a small fee. King's counsel are appointed for life, but the letters-patent may be revoked for dishonorable practices or unprofessional conduct.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**King's Creek**, tp. of Caldwell co., N. C. Pop. 625.

**King's Evil** *Scurfula*, a disease which for many centuries was professedly cured by the touch of the kings of England and France. The practice is traced to the times of King Edward the Confessor (1043-66), was employed by Louis XI. of France in 1480, by Charles VIII. at Rome and Naples in 1495, and by Francis I. in 1597. Charles II. of England (1660-84) carried the practice to the greatest extreme of any English monarch, having "touched" nearly 100,000 patients during his twenty-five years' reign. It was last employed in England by Queen Anne (1703-15), Dr. Samuel Johnson having been, when a boy, one of her patients; but on the accession of the Brunswick dynasty was discontinued, and a special service for the purpose omitted from the Liturgy in 1719. The "Young Pretender" attempted to gain adherents by touching for the king's evil at Holyrood Palace in 1775, and Louis XVI. of France performed the same ceremony at Rheims as late as 1775. (For curious data on this subject see Lecky's *History of Rationalism*.)

**King's Ferry**, post-v. (sometimes called *NORTHVILLE*) of Genoa tp., Cayuga co., N. Y.

**Kingsley**, tp. of Forest co., Pa. Pop. 575.

**Kingsley** (CALVIN), D.D., LL.D., b. at Annsville, Oneida co., N. Y., Sept. 8, 1812; licensed as Methodist preacher in 1835; graduated at Allegheny College, Pa., in 1841. The same year he was appointed professor of mathematics in that institution, and was afterwards a pastor at Meadville and Erie, Pa. In 1856 was elected editor of the *Western Christian Advocate* at Cincinnati, O., and again in 1860. He took an earnest part against slavery, and was elected bishop in 1864. In 1869 he started on an episcopal tour of the world, and d. at Beirut, Syria, in 1870. He published *On the Resurrection of the Body* (1845), and left a posthumous work on his travels *Around the World*.

**Kingsley** (CHARLES), b. at Holne, Devonshire, England, June 12, 1819, was the son of Rev. Dr. C. Kingsley, at one time rector of St. Luke's, Chelsea, and afterwards vicar of Holne. His preliminary education was directed by Rev. Derwent Coleridge at Ottery St. John. In 1839 he entered King's College, London, but in the following year removed to Magdalen College, Cambridge, where he graduated with honors in 1842. His first destination was for the law, but after a few months he exchanged that study for theology, and took orders in the Church of England, becoming in 1844 rector of Eversley, Hampshire, where he resided through life. He early devoted himself to the improvement of the condition of the working classes, acquiring thereby the sobriquet of "the Chartist parson," and was the chief originator of the school of ethics styled "Christian socialism," with which was closely connected that fondness for manly sports travestied as "muscular



Christianity." His earliest publication was *Twenty-five Village Sermons*, addressed to his rustic parishioners, 1846, followed in 1848 by a dramatic poem, the *Saint's Tragedy*, founded on the career of Elizabeth at Hungary, and in 1850 by a novel, *Alton Locke, Taylor and Port*, the production which first brought him into notice, and by which he will always be best known. It was based upon personal research among artisans and laborers, undertaken in connection with Rev. Fred. D. Maurice, and which led to the establishment of co-operative associations. This work had an immense popularity in America, and contributed much to determine Kingsley's literary career. In 1859 he was chosen professor of modern history at Cambridge; resigned in 1863, in which year he became canon of Chester, and subsequently of Westminster, and chaplain to the queen. Among his works are *Western Ho* (1855), *Yeast*, a novel (1851), *Phaethon* (1852), *Hyppatia* (1853), *Alexandria and her Schools* (1854), *Glennan* (1855), *Poems* (1856), *The Hermit* (1856), *Two Years Ago* (1857), *The Roman and the Teuton* (1861), *Hereward* (1866), *The Hermits* (1867), *How and Why?* (1869), *At Last, a Christmas in the West Indies* (1871), *Plays and Poems, Peace Idylls* (1873), *Westminster Sermons and Health and Education* (1874). A collection of poems, chiefly lyric, was published in 1856, and *Andromeda*, a hexameter poem, appeared in 1858. In 1872 he undertook the editorship of *Good Words*, and in 1873-74 visited the U. S. on a lecturing-tour, in which he was received with warmth by the literary classes. D. at Eversley Jan. 24, 1875.

PORTER C. BLISS.

**Kingsley** (HENRY), a brother of Charles Kingsley, b. at Holne vicarage, Devon, in 1824; was educated at Oriel College, Oxford; lived 1853-58 in Australia; acquired reputation as a reviewer, journalist, and novelist. Author of *Geoffrey Hamlyn* (1859), *Ravenshoe* (1861), *Aunt Elliot* (1863), *The Holydays and Buxtons* (1865), *Leighton Court* (1866), *Hetty* (1871), *Old Margaret* (1871), and other novels. He was for some time editor of the *Edinburgh Daily Review*. D. May 24, 1876.

**Kingsley** (JAMES LUCE), LL.D., b. at Windham, Conn., Aug. 28, 1778; graduated at Yale in 1799; was a tutor there 1801-05, librarian 1805-24, and professor of Hebrew, Greek, and Latin, and of ecclesiastical history 1805-51. D. at New Haven, Conn., Aug. 31, 1852. He contributed many valuable articles to periodical literature, and published a *History of Yale College* (1835) and a *Life of President Stiles*, and valuable editions of *Tacitus* and of *Cicero de Oratore*. Prof. Kingsley was master of an elegant style in both English and Latin. He was called by President Dwight the "American Addison," and several Latin compositions on festive or commemorative occasions received the highest praise for purity of Latin style from President Woolsey.

**King's Mountain**, a mountain-range, some 16 miles long N. and S., with lateral spurs abounding in marble and iron, mostly in Gaston co., N. C., near the E. border of Cleveland co. Its S. extremity is in York co., S. C. The highest point is Crowder's Knob, some 3000 feet high and very precipitous. Near the S. extremity, in South Carolina, a body of British troops under Lieut.-Col. Ferguson were surprised and attacked (Oct. 7, 1780) by the American militia under Col. Benjamin Cleveland, and after a most gallant defence nearly all the British troops were made prisoners. The British were in part armed with breech-loading small-arms, then first employed in warfare. On the following day ten of the Tory prisoners were hanged for murder and other crimes. This was one of the most bloody contests of the war in the Southern States, and contributed much to the final success of the American arms.

**King's Mountain**, tp. of Cleveland co., N. C. Pop. 1248.

**King's Mountain**, tp. of York co., S. C. Pop. 1818.

**King's Prairie**, tp. of Barry co., Mo. Pop. 857.

**King's River**, tp. of Carroll co., Ark. Pop. 686.

**King's River**, tp. of Madison co., Ark. Pop. 958.

**King's River**, of California, rises in the Sierra Nevada, in Fresno co., by numerous head-streams, and flows in a S. W. course into Lake Tulare. Its copious waters divide into numerous channels before they reach the lake.

**King's River**, in the northern basin of Nevada, is in Humboldt co. It sinks about 50 miles N. W. of Winnemucca. Its valley contains some 75,000 acres of good grazing and tillage land. The bottoms have a heavy growth of blue-joint and red-top grass, and the hills are covered with a fine growth of bunch-grass and white sage. The average elevation is 4850 feet. The river abounds in trout.

**King's River**, tp. of Tulare co., Cal. Pop. 166.

**King's Store**, tp. of Pickens co., Ala. Pop. 212.

**Kings'ton**, the capital of the island of Jamaica, stands on the southern coast, 12 miles from Spanish Town, the former capital, in lat. 18° N., lon. 76° 50' W. It is situated in a plain at the foot of the Blue Mountains, surrounded by rich sugar-plantations and numerous villas and gardens. In spite of the regular land and sea breezes morning and evening, the climate is very hot, and as parts of the vicinity are marshy, the place is unhealthy; yellow fever is a frequent visitor. Although there is no building of any architectural interest in the city, it is nevertheless well built, with regular and spacious streets, and it has recently been provided with good drinking water through a magnificent aqueduct. The harbor is enclosed on the S. by a tongue of land, and is defended by several strong forts, and the city derives its greatest importance from its situation as a commercial station on the route between Europe and Central America. The value of exports for the year 1869-70 was \$6,315,813, and of imports, \$6,600,146. The principal articles of exportation are rum, sugar, tobacco, and dyewood. Pop. about 35,000.

**Kingston**, post-v. of King's co., N. B., on a neck of mountainous land between the Kennebecasis and the St. John rivers, 19 miles above St. John. It has a court-house, jail, churches, and schools. Pop. about 200.

**Kingston**, a city, cap. of Frontenac co., Ont., Canada, near the lower extremity of Lake Ontario, opposite the Thousand Islands. It was founded in 1784 on the site of the old French fort Frontenac, lat. 44° 8' N., lon. 78° 40' W. It is strongly fortified. Its harbor is sheltered by Wolf and Garden islands. It is connected by steam ferry with Cape Vincent, N. Y. Its wharves, shipyards, and grain-elevators are well constructed. It has manufactures of locomotives, musical instruments, farming tools, stoves, and many other kinds of goods. It is on the Grand Trunk Railway, 161 miles E. of Toronto. It has 3 banks, a board of trade, and 18 churches, being the seat of a Roman Catholic bishop and the see-town of the Anglican bishop of Ontario. Kingston has water and gas companies, a fire brigade, and a well-organized police. It has a custom-house, a jail, a penitentiary, 10 schools and academies, and is the site of Queen's University and College, including a medical college. It has also an institution called Regiopolis College. It has a library and mechanics' institute, 2 daily and 2 weekly papers, 2 hospitals, 2 orphanages, an insane asylum, and many religious, benevolent, and temperance societies. Kingston is a naval station, and contains the royal dockyards. A long bridge has been built across Cataragui Bay. The town is mostly built of blue limestone, and its streets cross each other at right angles. It is divided into seven wards. Pop. in 1871, 12,407.

**Kingston**, post-tp. of Autauga co., Ala. Pop. 1278.

**Kingston**, post-v. of King's River tp., Madison co., Ark. Pop. 65.

**Kingston**, post-v. of Bartow co., Ga., at the junction of the Rome R. R. with the Western and Atlantic R. R., 41 miles S. of Dalton. Pop. 402.

**Kingston**, tp. of De Kalb co., Ill. Pop. 975.

**Kingston**, a v. of Trimble co., Ky. Pop. 59.

**Kingston**, post-tp. of Plymouth co., Mass., on the seacoast and on the Old Colony R. R., 33 miles S. E. of Boston. It has a good harbor for light-draught vessels, 3 churches, a high school, and manufactures of lumber, thread, iron-ware, gimlets, rivets, shipping, etc. It has also prosperous agricultural and fishing interests. Pop. 1604.

**Kingston**, tp. of Tuscola co., Mich. Pop. 324.

**Kingston**, post-v. and tp. of Meeker co., Minn. Pop. of v. 56; of tp. 530.

**Kingston**, post-v. and tp., cap. of Caldwell co., Mo., 8 miles from the Hannibal and St. Joseph R. R. and 160 miles from Kansas City. It has a good court-house, jail, and school building, 2 churches, 2 weekly newspapers, a flour-mill, and the usual number of stores and shops. The principal business is wagon-making. Pop. of v. 414; of tp. 1277.

MILLS & SHIPLEY, Eds. "SENTINEL."

**Kingston**, tp. of Washington co., Mo. Pop. 1085.

**Kingston**, post-v. and tp. of Rockingham co., N. H., 38 miles S. E. of Concord. It has an academy, 3 churches, and extensive manufactures of carriages, lumber, and leather. Pop. 1054.

**Kingston**, city, cap. of Ulster co., N. Y., 90 miles N. of New York City, and 55 miles S. of Albany, on the W. bank of the Hudson River and N. bank of Rondout Creek; E. terminus of the Delaware and Hudson Canal, of the New York Kingston and Syracuse, and of the Wallkill Valley R. Rs., which connect by steam-ferry with the Hudson River R. R. at Rhinebeck, immediately across the river. Kingston was incorporated as a city by act of Mar. 29, 1872, by the junction of the former incorporated villages

of Kingston and Rondout with the small village of Wiltbur. It has 24 churches, 1 daily and 5 weekly newspapers, 5 national and 3 savings banks, 13 carriage manufactories, 5 iron foundries and machine shops, several hotels, an academy, several private seminaries, an efficient school system with 16 teachers, 6 brickyards, 5 boat building yards, 3 ferries, 4 lines of passenger steamers, a volunteer fire department, a horse railroad, a handsome city hall and court-house. It is the location of the largest cement manufactory in the country, turning out about 1000 barrels daily; receives 1,500,000 tons of coal annually by the Delaware and Hudson Canal, and annually ships to New York at least 1,000,000 tons of blue flagging stone, brick, ice, lime, and lumber. It has a wharfe front of 4 miles, and 43 steamboats are owned there; does a heavy business in grain, flour, etc. The city is governed by a mayor and eighteen aldermen. It received a charter from Gov. Stuyvesant in 1661 under the name of *Wiltwick*, was first settled in 1665, and was incorporated by patent in 1667. On Feb. 19, 1777, the first State convention adjourned from Fishkill to Kingston, and the first State constitution was adopted Apr. 29, and, having been printed at Fishkill, was proclaimed in front of the court-house at Kingston Apr. 22, 1777. The legislature met here in September of the same year, but was dispersed by the approach of a British force under Sir Henry Clinton Oct. 7, when the town was burnt. Being afterwards rebuilt, it was incorporated as a village in 1805. Rondout, now a part of Kingston, was incorporated in 1849; it was long the county-seat, and had 2 newspapers. Pop. of city in 1870, 6315; of tp. 21,943. HORATIO FOWLER, ED. "DAILY FREEMAN."

**Kingston**, tp. of Delaware co., O. Pop. 537.

**Kingston**, post-v. of Green tp., Ross co., O., 10 miles N. of Chillicothe. It is the seat of an academy. Pop. 345.

**Kingston**, post-b. and tp. of Luzerne co., Pa., in the anthracite coal-region. The borough is on the Lackawanna and Bloomsburg R. R., and on the N. branch of the Susquehanna, opposite Wilkesbarre, with which it is connected by a bridge. The massacre of Wyoming took place in this township, and is commemorated by an imposing monument. Pop. of b. 1143; of tp. 2825.

**Kingston**, post-v., cap. of Washington co., R. I., is in South Kingston tp., 3 miles S. E. of Kingston Station, on the Providence and Stonington R. R. It has a national bank.

**Kingston**, post-v., cap. of Roane co., Tenn., 40 miles W. of Knoxville and 130 E. of Chattanooga, is situated at the junction of the Clinch River with the Tennessee, both of them being here navigable for steamboats. It has 2 weekly newspapers, 1 hotel, 2 iron-furnaces, 2 steam saw-mills, foundry and machine-shop, 1 charcoal furnace, 1 steam distillery, and 19 stores. Pop. 739.

W. B. REED, ED. "EAST TENNESSEAN."

**Kingston**, post-tp. of Green Lake co., Wis. Pop. 807.

**Kingston**—ELIZABETH CHUDLEIGH, DUCHESS OF, b. in England in 1720, was daughter of Col. Chudleigh, governor of Chelsea College, who d. when she was still a child, leaving his family in poverty. Elizabeth was a girl of remarkable beauty, to which circumstance she was indebted for an appointment as maid-of-honor to the princess of Wales, mother of George III., through the influence of Pulteney, afterwards earl of Bath. She was privately married in 1744 to Capt. Hervey, grandson of the earl of Bristol, but immediately separated from him, and for many years led a dissipated life in European capitals. She married the duke of Kingston in 1769, he being ignorant of her former marriage, and on his death in 1773 succeeded to an enormous fortune, which, however, was disputed by the duke's relatives on the ground of bigamy. The duchess was tried by the House of Lords for bigamy in 1776, and declared guilty, but retained her fortune, as being derived from bequest. After a further series of adventures she d. at a château near Paris Aug. 28, 1788.

**Kingston-on-Thames**, town of England, in the county of Surrey, on the E. bank of the Thames. It has an extensive trade in corn and malt, and many good educational institutions. Coins and other remains from the time of the Romans are often discovered here. Pop. 15,257.

**Kingstown**, capital of the island of St. Vincent, in the West Indies, at the head of a small inlet which forms a good harbor, is well built and fortified, and has a fine botanical garden. Pop. about 2000.

**Kingstown**, town of Ireland, on the southern shore of the Bay of Dublin. It has a magnificent harbor, and is the station of the steam-packets to Holyhead and Liverpool. It is one of the most frequented watering-places of Ireland. Pop. 11,884.

**Kings-tree**, post-v. of Kings tp., cap. of Williamsburg

co., S. C., on the left bank of Black River, 65 miles N. E. of Charleston, on the North-eastern R. R., has 2 weekly newspapers, 2 schools (1 white and 1 colored), 3 churches, 2 hotels, 1 livery-stable, 1 hook-and-ladder fire company, 3 bakeries, 2 drug stores, and a number of other business interests. The principal occupation is farming. Pop. of tp. 1774. J. MARION STAGGERS, FOR ED. "STAR."

**Kingsville**, post-v. and tp. otherwise called RAVELY of Johnson co., Mo., on the Missouri Pacific R. R. Pop. of v. 298; of tp. 1360.

**Kingsville**, post-v. and tp. of Ashtabula co., O., on the Lake Shore R. R. It has an academy. Pop. 1758.

**King-te-Ching'**, district of the province of Kiang-Si, China, and the seat of the celebrated manufactures of porcelain, in which nearly 1,000,000 persons are engaged.

**King William**, county of Virginia, having the Mataponi River on the N. E. and the Pamunkey on the S. W. Area, 260 square miles. It is uneven, and generally fertile. Grain and tobacco are staple products. The county is traversed by the Richmond and Chesapeake R. R. Cap. King William Court-house. Pop. 7515.

**King William Court-house**, post-v., cap. of King William co., Va., 27 miles N. E. of Richmond. Pop. 44.

**King'-wood**, the wood of a species of *Triptobania*, a Brazilian leguminous tree. The wood is very beautiful, but comes only in small pieces, and is used in ornamental joinery.

**Kingwood**, post-tp., Hunterdon co., N. J. Pop. 1942.

**Kingwood**, post-v. and tp., cap. of Preston co., W. Va., is situated in the Alleghany Mountains, 10 miles N. of the Baltimore and Ohio R. R.; has 2 churches, 1 national bank, 2 weekly newspapers, 3 hotels, numerous stores, a fine school building, and several elegant private residences. It is on the line of a proposed railroad, the Iron Valley and Pennsylvania line. Principal industry, farming. Pop. 1581.

WILLI M. O. DAWSON,

ED. "PRESTON CO. JOURNAL."

**Kink'ajou**, the *Cereuleptes undulatus*, a small bear-like carnivorous mammal of tropical South America, hardly as large as a cat. It is placed in a family, *Cereuleptidae*. It is a graceful nocturnal creature, arboreal in its habits, easily tamed, and excessively fond of honey, one of the principal articles of its food. It has many popular names, but the above is the one now generally employed.

**Kink'el** (JOHANN GOTTFRIED), b. at Obercassel Aug. 11, 1815; studied theology at Bonn and Berlin; became professor first of theology, and then of the fine arts, at Bonn, and published a volume of poems which became popular. On account of his participation in the revolutionary movements in Rhenish Prussia in 1848, he was sentenced to twenty years' imprisonment at Spandau, but escaped, lived for some years in London, and removed in 1866 to Zurich as professor of the history of the fine arts. Of his writings, the most noticeable, besides his poems, are *Die altchristliche Kunst* (1845) and *Nimrod*, a tragedy (1857).

**Kin'lock**, tp. of Lawrence co., Ala. Pop. 1621.

**Kin'mundy**, city and tp. of Marion co., Ill., 229 miles S. of Chicago, and 136 miles N. of Cairo, on the Illinois Central R. R., has 1 bank, 1 weekly newspaper, 5 churches, 2 hotels, large school buildings, brick mills, various manufactories, and 12 stores. Principal industry, farming, grazing, and fruit-raising. Pop. 1895.

EDWARD FREEMAN, ED. "KINMUNDY INDEPENDENT."

**Kin, Next of**, a term employed in law to denote the nearest blood relatives of a deceased person, among whom his personal property is distributed after the payment of debts and legacies, according to the provisions of the statute of distributions. This is the ordinary technical sense of the phrase, though it is sometimes used with a wider extent of meaning, to designate a person's nearest relations by blood, without regard to this statute. The relationship must be by consanguinity, and not by affinity. The next of kin may be either of lineal or of collateral consanguinity, and the nearness of relationship among them is computed according to the rules of the civil law, in accordance with which the degrees between one relative and another are ascertained by reckoning upward from one of the parties to the common ancestor, and then downward to the other party. (The distinction between lineal and collateral consanguinity is explained, and this civil-law rule of estimating relationship illustrated, in the article *CONSAQUINITY*. See also *AFFINITY*.) Upon the death of a person intestate who was the owner of personal property, there are two important things to be settled by the next of kin entitled: one is to administer upon his personal estate, and the other to share it among themselves, either wholly or partly, according to the statute of distributions. By the



English common law the power to administer upon the goods and chattels of a wife is granted to the husband or his representatives, while, by ancient statutes, if it be the husband that is deceased, administration upon his property is granted to either his widow or next of kin, or both. In case of administration by the next of kin, one or more are selected from among them as administrators, preference being given to those who are most nearly related to the intestate, according to the civil-law method of reckoning above referred to. Of persons in equal degree any one may be taken. Children are preferred to parents, parents to brothers or sisters, brothers or sisters to grandparents, grandparents to uncles, aunts, nephews, and nieces, etc. (See ADMINISTRATION.) In the U. S. the English rules as to the appointment of administrators are substantially adopted in the various States, though more or less modified by statute. After the payment of debts by the administrator, and of various expenses, as funeral expenses, taxes, etc., the residue of the property is distributed among the next of kin and the husband or widow of the deceased. The statute of distributions was enacted in the reign of Charles II. (22 and 23 Chas. II. ch. 10). If the deceased person be a married woman, leaving a husband surviving, he takes, by English law, the entire personal property after the usual necessary disbursements, the statute not applying to husbands. In other cases the statute requires the distribution of the surplus property, after the expiration of one year from the time of granting administration, in the following manner: If the intestate leave a widow and children, the widow receives one-third of the property, and the children the residue in equal proportions. If any child be dead, leaving lineal descendants, they divide equally the share which he would have received. This is called taking *per stirpes*, or by the doctrine of representation. If there are no children or their representatives, one-half goes to the widow and the other half is distributed equally among the next of kin who are in equal degree and their representatives; but no representation is admitted among collaterals after brothers' and sisters' children. If there be no widow, the whole estate is divided among the children. If there be neither widow nor children, the whole is distributed among the next of kin in equal degree and their representatives. Substantially the same preferences exist among the next of kin in regard to their right to receive a share in the property as in regard to the right to be administrators. If children survive or their descendants, these take the property to the exclusion of other relatives. If there be no children or their descendants, the father takes the whole. If he also be dead, the mother and the brothers and sisters, with their descendants, divide the property, and so on. If in any case those who receive the property are related to the deceased in equal degrees, they share equally, or, as it is termed, *per capita*. If there be any personal property of a testator left undisposed of by his will, it is distributed among the next of kin according to the same rules of distribution. Statutes of distribution similar in their general provisions to the English statute have been enacted in the U. S., though with various modifications of the rules just stated.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Kin'ney**, county of Texas, bounded on the S. W. by the Rio Grande. Area, 1400 square miles. It is not generally very fertile, and water is deficient, but it affords good pasturage. Stock-raising is the chief pursuit. Cap. Fort Clark. Pop. 1204.

**Kinney** (Rev. JOHN W.), b. in 1799; d. in Texas Jan. 9, 1865. He joined the Ohio (M. E.) conference in 1818, and became a member of the Kentucky conference when it was organized; after eight years' labor in Kentucky, located in Illinois, and fought through the Black Hawk war as captain of a company; emigrated to Texas in 1833, and with the Rev. Henry Stevenson held the first camp-meeting in Austin's colony. He possessed great pulpit power. He belonged to the Texas conference at the time of his death.

T. O. SUMMERS.

**Kinnickinnick'**, or **Killickinnick'** [Chippeway, a "mixture"], a name given by the northern Indians to various substances used by them for mixing with tobacco before smoking, such as the inner bark of the red willow and the leaves of the mountain cranberry (*Arctostaphylos Uva-Ursi*).

**Kinnickinnick**, post-tp. of St. Croix co., Wis. Pop. 628.

**Ki'no**, an astringent drug, the hardened juice of *Pterocarpus marupium*, a lofty tree, natural order Fabaceae, growing in the East Indies, and also of other trees in the West Indies, South America, Africa, and Australia. East India kino is the only variety in general use, most of the others being unknown in America. It is in small shining, brittle fragments, of a deep reddish-black color and bitter-

ish, highly astringent taste. It forms a deep-red solution in water and alcohol. Kino owes its astringency to tannic acid (tannin), and is used in medicine to check morbid discharges in bowel complaints.

EDWARD CURTIS.

**Kinross'**, or **Kinross'-shire**, county of Scotland, between the counties of Perth and Fife. Area, 72 square miles. Pop. 7208. The surface is undulating, covered with low hills which enclose Loch Leven. The soil is a mixture of gravel and clay, but fertile and affording good pasturage on the moorlands. Principal town, Kinross.

**Kinsale'**, town of Ireland, in the county of Cork, Munster, stands on the Bandon River, 2 miles from its fall into the Atlantic. It has an excellent harbor, valuable fisheries, and is much resorted to as a bathing-place, but its trade has mostly been transferred to Cork. Pop. 6955.

**Kins'ley**, post-v. and tp., cap. of Edwards co., Kan., on the Arkansas River, and the Atchison Topeka and Santa Fé R. R., 268 miles W. of Topeka and 34 E. of Fort Dodge, 60 miles N. of the salt-fields on the boundary of the Indian Territory, of which it is the nearest shipping point. The first house was built in Mar., 1873; a newspaper was started the same year; the county was organized in 1874 with some 600 inhabitants. Kinsley suffered much from the grasshopper plague (1874); has fine soil and climate. Mrs. C. C. McGINNIS, Ed. "REPORTER."

**Kins'man**, post-v. and tp., Trumbull co., O. Pop. 1029.

**Kin'ston**, post-v. and tp., cap. of Lenoir co., N. C., 35 miles W. of New Berne, on the Atlantic and North Carolina R. R., has a high school, 8 churches (3 colored), 1 newspaper, 1 hotel, 40 stores, a carriage and plough factory, and other industries, principally farming. Pop. of v. 1103; of tp. 4604. E. A. WILSON, Ed. "GAZETTE."

**Kiong-Choo'**, town of China, the capital of the island of Hainan, on the northern coast, in lat. 20° N., lon. 110° 22' E., and is surrounded with high walls of hewn stones. It is described by the Chinese as a model of a city, so rich that it has no beggars, so noble-spirited that it needs no police, and it is said to have 200,000 inhabitants. Unfortunately, the Chinese speak in exactly the same terms of another town they have founded on Hainan, and describe it with exactly the same features; which circumstance occasions some mist around the double-star, at least to ordinary minds.

**Kioto**. See MIYAKO.

**Ki'owa**, county of South-west Central Kansas. Area, 900 square miles. The N. W. part is traversed by the Arkansas River and the Atchison Topeka and Santa Fé R. R. It is a good pastoral region.

**Kiowas**, or **Kioways**, a tribe of Indians of the Shoshone family, having a reservation in the S. W. of the Indian Territory, but not yet reclaimed from a nomadic life, hunting and marauding upon the great plains of Kansas, Colorado, and Northern Texas. They have been more intractable than any other Indian tribe except the Apaches, have been often at war with the Pawnees, the Dakotas, and the Mexicans, and have been frequently chastised by U. S. troops. Treaties were made with the Kiowas in 1853, 1865, and 1869, by the latter of which they agreed to settle in the Indian Territory, but the following year they again committed murders in Texas, for which their chiefs, Santanta and Big Tree, were sentenced to death, but ultimately pardoned. They number about 2000.

**Kip** (Rt. Rev. WILLIAM INGRAHAM), D. D., b. in New York Oct. 3, 1811, of an old family of Dutch descent (originally Kype). He graduated at Yale in 1831; took deacon's orders in the Protestant Episcopal Church in 1835; was rector of St. Peter's, Albany, 1838-53, and in the latter year was consecrated bishop of California. He is the author of many works, among which are *The Lenten Fast*, *Early Jesuit Missions in North America* (1846), *Christian Holidays in Rome*, *Domestic and Religious Life in Italy*, *The Catacombs of Rome* (1854). He has contributed much to periodical literature.

**Kip'pis** (ANDREW), D. D., F. R. S., b. at Nottingham, Eng., in 1725; studied theology in Dr. Doddridge's seminary at Nottingham; became in 1746 minister of a dissenting congregation at Boston, Lincolnshire, and in 1753 of a Presbyterian church of Unitarian tendencies in Prince's street, Westminster, where he remained through life. In 1763 he became professor in a theological academy in London for the education of dissenting ministers; wrote much for the *Gentleman's Magazine*, the *Monthly Review*, and the *New Annual Register*; edited Doddridge's *Lectures* and Dr. Lardner's works; published lives of Dr. Lardner and of Capt. Cook, and undertook a new edition of that vast work, the *Biographia Britannica*, but it was projected on too extensive a scale, and only five folio volumes, with part of a sixth, were published, extending to the middle of the letter



F (1778-93). Dr. Kippis published also some sermons and controversial pamphlets on theological subjects. D. at Westminster in 1793.

**Kiptchak', or Kaptkhak',** a Tartar or Mongolian race which gave name to a khanate founded in the thirteenth century by the Golden Horde, and which extended from the Jaxartes in Toorkistan to the limits of Russia proper, and comprised all the region N. of the Caucasus traversed by the rivers Dnieper, Don, Volga, and Ural. After the career of Tamerlane in the fifteenth century, Kazan, Astrakhan, and Crimea became independent of Kiptchak, and were at length annexed to Russia.

**Kirby**, tp. of Northampton co., N. C. Pop. 1844.

**Kirby**, post-tp. of Wyandot co., O., on the Pittsburg Fort Wayne and Chicago R. R. Pop. 389.

**Kirby**, tp. of Marion co., S. C. Pop. 1135.

**Kirby**, tp. of Caledonia co., Vt., 1 miles S. E. of Lyndonville. It has manufactures of lumber. Pop. 417.

**Kirby** (EDWARD), b. in Brownsville, Jefferson co., N. Y., 1840; graduated at the U. S. Military Academy and appointed second lieutenant of artillery May 6, 1861. The stirring time in which he graduated called for the services of every military educated man, and Kirby was at once ordered to Washington, and assigned to the duty of drilling the newly-arrived volunteers; upon the movement of the army he was assigned to Ricketts's battery, with which he served at the battle of Bull Run, assuming command of the same upon the capture of Gen. Ricketts; he was next engaged in the disastrous combat of Ball's Bluff, Oct., 1861; in the Virginia Peninsular campaign of 1862 he commanded a battery at Yorktown, Fair Oaks, Savage Station, Glendale, and Malvern Hill, and in the Rappahannock campaign at Fredericksburg and Chancellorsville, in all of which battles he displayed great coolness, skill, and bravery, and at the latter received wounds from the effect of which he d. at Washington, D. C., May 28, 1863, aged twenty-three. For his gallant services at Chancellorsville he was appointed on his deathbed a brigadier-general of volunteers. Though barely arrived at manhood, the few years of his life were well and honorably filled in the service of his country. G. C. SIMMONS.

**Kirby** (WILLIAM), b. at Wymsham, Suffolk, Sept. 19, 1759; graduated at Caius College, Cambridge, in 1781, took orders in the English Church and obtained the living of Barham, which he held through life. He was widely known by his work on *Entomology*, published in 1815 in conjunction with Spence, and by his Bridgewater treatise on *Habits and Instincts of Animals with Reference to Natural Theology* (1839). D. at Barham July 4, 1850.

**Kirby's Mill**, tp. of Jackson co., Ala. Pop. 285.

**Kirchbach, von** (HEUG EWARD), b. May 23, 1809; educated at the military academy, and entered in 1826 the 26th regiment of infantry. In 1850 he was attached to the staff as major; in 1859 became commander of a regiment; in 1863 of the 19th brigade of infantry, and in the same year was made a major general. In 1866, in the war against Austria, he led with distinction the 10th division as lieutenant-general; fought at Nachod, Skalitz, Schweinschädel, Gratzlitz, and in the battle of Königgrätz, and received the order *pour le mérite*. In 1870, in the war against France, he led the 5th army corps. At its head he opened the war by the attack on Weissenburg, and two days afterwards he took a most important part in the battle of Wörth, Aug. 6. The crown prince, who commanded the army, gave orders to break off the fight which had just commenced, but Kirchbach continued it on his own responsibility, and a few moments later on the crown prince agreed with him. Four days after the battle, in which he received a slight wound, he was made a general of infantry. In the battle of Sedan, when the leader of the 11th army corps was severely wounded, Kirchbach assumed the command of this corps too, and performed the decisive manœuvre by which the French army was completely surrounded. During the siege of Paris he held Versailles and its vicinity.

AUGUST NIEMANN.

**Kircher** (ATHANASIOS), b. at Geisa, in Hesse, May 2, 1602; joined the Jesuits in 1619; was educated at Würzburg, where he was professor of philosophy and the Eastern languages; was in the Jesuits' college at Avignon in 1633-35; was professor of mathematics in the College of Rome 1635-43. D. at Rome Nov. 28, 1680. He wrote much upon physics, archaeology, philology, etc.

**Kirchheim**, town of Germany, in the kingdom of Würtemberg, on the Lauter, manufactures cotton fabrics, musical instruments, and furniture, and trades in corn, cattle, and wool. Pop. 5435.

**Kirchhoff** (GUSTAV ROBERT), b. Mar. 12, 1824, at Königsberg; studied mathematics and natural science at

the university of his native city; lectured on physics at Berlin in 1848 and at Breslau in 1850, and was appointed professor of natural philosophy at Heidelberg in 1854. His researches concerning heat, elasticity, magnetism, and electricity, communicated in Poggendorff's *Annalen* and in *Crelle's Journal für Mathematik*, attracted great attention. But his most brilliant discovery was that of the spectro-scope, made in connection with Bunsen, and its application for the so-called spectrum analysis, which has exercised so great an influence on the study both of chemistry and astronomy. (See his *Chemische Analyse durch Spectralbeobachtung*, together with Bunsen (Vienna, 1861), *Das Sonnenspectrum und die Spectren der chemischen Elemente* (Berlin, 1861), *Vorlesungen über analytische Mechanik* (Leipzig, 1874).)

**Kirgheez', Kirgheez-Kaizaks, or Cossacks**, the name of a nomadic people of Central Asia, numbering about 2,000,000, and occupying a vast region called the Kirgheez Steppes, of about 850,000 square miles, stretching from the Caspian Sea to the Altai Mountains and from the Sea of Aral to the Tobol and Irtysh, traversed by several mountain-ranges, between which extend large barren plains dotted with salt lakes. It is now divided into the three provinces of Orenboorg, West Siberia, and Toorkistan. The climate is exceedingly cold in the winter, excessively hot in the summer, and always very variable. Only a few districts along the rivers are rudely tilled; the remainder is pasture-land. The Kirgheez are divided into the Little, Great, and Middle Hordes, politically distinct from each other. They are of Eastern or Turco-Tataric origin, akin to the Uzbeks in race and language. They are below middle size, but strong and hardy; have the high cheek-bones and small, deep-set, oblique eyes of the Mongolians, but their faces, though generally ugly, are not wholly flat. Their language is a very pure Turkish dialect; their religion, a mixture of Islamism and idolatry. Without being savages, their state of civilization is very low. They know but little of agriculture, and still less of manufactures. The breeding of sheep, horses, and camels is their business, besides occasional robbery. In the beginning of this century they fully deserved their title of the "slave-hunters of the steppes." They attacked the caravans, took the goods, and sold the persons as slaves at the markets of Khiva and Bokhara. But the line of forts which the Russian government has laid through the country has effectually checked this business. The women, who often are quite pretty, do the work. The men spend most of their time on horseback, hunting and sporting, or in sensuous enjoyments. Mutton, horseflesh, and sour mare's milk, from which an intoxicating beverage is distilled, are the principal articles of food; bread is nearly unknown. They are governed by their own chieftains, but since 1860 they have been brought under Russian authority, and great pains have been taken to civilize them. There are no towns among them, and the only remains of cities and temples which have been found are vestiges of an earlier civilized race.

**Kir'in, or Girin**, the largest province of Mantchooria, Chinese empire, bounded N. by the Amoor and Soongaree rivers, E. by the Oosoree River and the Japan Sea, S. by Corea and China proper, and W. by China proper and Mongolia. Area, about 200,000 square miles. Pop. about 500,000. The capital, Kirin, Kirin-Oola, or Girin, is a large town on the Soongaree, and is the residence of a viceroy.

**Kirk** (EDWARD NORRIS), D. D., b. in New York Aug. 14, 1802; graduated at Princeton in 1820, and afterwards studied law and theology; served as agent for the foreign mission board; held 1828-36 a Congregational pastorate at Albany, N. Y., and in 1839 became secretary of the Foreign Evangelical Society. In 1842 he became pastor of the Mt. Vernon church, Boston, Mass., with which he maintained the pastoral relation until his death, Mar. 27, 1874. He was the author of several volumes of sermons and lectures, and many published occasional discourses, besides some translations. Dr. Kirk was an active friend of the cause of Protestant religion in the Roman Catholic countries of Europe.

**Kirk** (JOHN FOSTER), b. in 1821 at Frederickton, N. B., and educated in Nova Scotia. In 1842 he removed to Boston, Mass., where for eleven years he was secretary to the historian Prescott. He is the author of a *History of Charles the Bold* (3 vols., 1867-68), and in 1870 became editor of *Lippincott's Magazine*.

**Kirkaldy** (SIR WILLIAM OF GRANGE), b. in Scotland early in the sixteenth century. Son of Sir James Kirkaldy, high treasurer in the reign of James V., was one of the earliest Protestants of Scotland, joined a conspiracy against Cardinal Beaton in 1546; surrendered to the French at St. Andrew's in the summer of that year, and was imprisoned, but escaped to France, where he became distin-



guished in the court and army of Henry II.: returned to Scotland in 1539; took part in the political movement against Mary queen of Scots; narrowly escaped assassination by Bothwell at the battle of Carberry Hill, and pursued that nobleman to the coast of Norway (1567); contributed to the defeat of Mary at Langside, and became governor of Edinburgh Castle (May, 1568); espoused the cause of Mary, and defended the castle for her from 1570 to 1573 against the besieging forces of Marshal Berwick; surrendered May 28, and was hung at Edinburgh, with several of his followers, Aug. 3, 1573.

**Kirkbride** THOMAS S., M. D., LL.D., b. near Morrisville, Bucks co., Pa., July 31, 1809. His ancestry were of the Society of Friends, and he received his early education in the excellent schools of that denomination. He graduated M. D. from the University of Pennsylvania in Mar., 1832, and was immediately appointed resident physician of the Friends' asylum for the insane at Frankford, Pa. In 1833 he was elected resident physician of the Pennsylvania Hospital in Philadelphia, and was for two years in charge of the west wing of the hospital, which was the first hospital department for the treatment of the insane in the U. S. In 1835 he opened an office for general practice in Philadelphia, but in Oct., 1840, just before the completion of the new Pennsylvania Hospital for the insane W. of the Schuylkill, he was elected its superintendent and physician-in-chief. He entered upon his duties at the opening of the hospital, Jan. 1, 1841, and has been at its head for thirty-four years. He was and is firmly convinced that not more than 250 insane patients should be treated at one time in a single hospital: and foreseeing that that number would be reached in his hospital within a few years, he commenced, amid his other cares, in 1853, the effort to raise money for a second institution. The hospital grounds included a tract of 113 acres, and by dividing the pleasure-grounds and placing his new hospital a third of a mile distant from the other, he could keep the two entirely distinct, though under the same general supervision and treatment. He was the first superintendent in this country to separate in entirely distinct institutions the two sexes. In 1859, with the assistance of some friends, he had raised in Philadelphia and vicinity \$355,000, and had erected, in accordance with his own carefully prepared plans, a hospital for the insane, which is so perfect in all its appointments that it has been a model for all those since erected. To this hospital he transferred all his male patients, and while retaining the general superintendency over both, placed his most trusted assistant at the head of the male department, and gave most of his personal attention to the female department. To this latter he has since added, through the liberal bequest of a friend, two wards at a cost of about \$60,000. In all matters appertaining to mental alienation Dr. Kirkbride ranks as one of the ablest men in the profession. A careful student, thoroughly devoted to his speciality in medical science, of the most gentle and genial manners, and of rare executive ability, he has been remarkably successful in the treatment of the insane, while his writings on the subject have given him a high reputation. His first publication, in 1850, *Rules and Regulations for the Pennsylvania Hospital for the Insane*, had a circulation far beyond that hospital, and his *Propositions Relative to the Construction of Hospitals for the Insane*, first adopted by the Association of Medical Superintendents of American Institutions for the Insane (of which he was one of the founders), have been repeatedly reaffirmed by them, and at their request were published in 1854, with notes and additions, under the title of *The Construction, Organization, and General Arrangement of Hospitals for the Insane*. It is the standard authority on this subject, both in Europe and the U. S. The same year he published an eloquent *Appeal for the Insane*. In his thirty-four years of superintendency of the Pennsylvania Hospital for the Insane, Dr. Kirkbride has taken up, year by year, in his annual reports, nearly every subject connected with the care and treatment of the insane and the provision to be made for them, and has discussed at length all topics connected with the construction, heating, and ventilation of hospitals. These reports are of great value to every student of mental disease. He has also been a member of numerous commissions on the erection and management of insane hospitals, and an active participant in the medical and philanthropic institutions of Philadelphia. The degree of LL.D. was conferred on him in 1874. L. P. BROCKETT.

**Kirkcaldy**, town of Scotland, in the county of Fife, on the Frith of Forth, where it stretches along the northern shore for about 3 miles, which has given it the name of "Lang town." It has large bleaching-fields, flax-spinning mills, and manufactures of linen and canvas, and its harbor, though completely dry at low water, admits large vessels at full tide. Pop. 12,422.

**Kirkcudbrightshire**, or the **Stewartry of Kirkcudbright**, county of Scotland, bordering on the Irish Sea and the Frith of Solway. Area, 954 square miles. Pop. 41,852. Only one-third of the surface is arable; the rest is granite hills covered with moss, the highest of which are Blacklurg, 2890 feet, and Cairnsmoor, 2329 feet. Cattle of the celebrated Galloway breed are reared here. Principal town, Kirkcudbright.

**Kirkdale**, parish of Yorkshire, England, in the Vale of Pickering, remarkable for a cave 245 feet long, discovered in 1821 in cutting through the Oolitic limestone rock. A great abundance of fossil bones of extinct species of animals was found there, and described by Dr. Buckland in his *Reliquie Diluvians*, as well as in all recent works on paleontology. The most remarkable were hyænas, tigers, elephants, rhinoceroses, hippopotamuses, cave-bears, and horses, all of species not now represented in England. (See *Cave-Hunting*, by W. B. Dawkins, 1874.)

**Kirke**, or **Kertk** (Sir DAVID), b. at Dieppe, France, in 1596, of English parentage; was engaged in business as a wine-merchant in Bordeaux and Cognac, but went to England in consequence of the persecutions of the Huguenots, and with his father and brothers became connected with Sir William Alexander's American projects. David commanded in 1627 an expedition of three vessels under letters of marque, with which he blockaded Quebec, and in an engagement near Gaspé (July 18, 1628) captured a French squadron commanded by De Roquemont sent for the relief of Quebec. In 1629, Kirke and his brothers again sailed from England against Canada, compelled Champlain to surrender Quebec in July, and also reduced the colony of Cape Breton. Both these conquests, however, were restored to France in 1632. Kirke was knighted in 1633, and with others obtained a grant of Newfoundland, which he colonized, being governor of that island for twenty years, until dispossessed by Cromwell, when he went to England and recovered his property through Cromwell's son-in-law, Claypole. He returned to Newfoundland, and d. at Ferryland in 1656. His *Life* was published by a descendant in 1871 (London).

**Kirkersville**, post-v. of Harrison tp., Licking co., O., 2 miles from Kirkersville Station (Outville P. O.), on the Baltimore and Ohio and the Pittsburg Cincinnati and St. Louis R. Rs. Pop. 295.

**Kirkes** (WILLIAM SENHOUSE), M. D., b. in England about 1820; was physician and lecturer at St. Bartholomew's Hospital in London; published in 1848, with Dr. James Paget, a *Handbook of Physiology*, which became a standard work upon that subject both in England and the U. S.; and with Dr. William Baly, an appendix to Müller's *Physiology*, entitled *Recent Advances in the Physiology of Motion*. Later papers, on the *Detachment of Fibrous Deposits from the Intestine of the Heart*, constitute a remarkable contribution to pathological science. D. in Dec., 1864.

**Kirkintilloch**, town of Scotland, in the county of Dumbarton. It has cotton manufactures. Pop. 6342.

**Kirk-Kilis-seh**, town of European Turkey, in the province of Room-Elee, contains several fine mosques, public baths, and extensive bazaars, but is generally ill built. It is famous for its confectionery, and carries on an active trade in butter and cheese. Pop. 16,000.

**Kirkland**, tp. of Adams co., Ind. Pop. 508.

**Kirkland**, post-tp. of Oneida co., N. Y., on the Utica and Rome division of the Midland R. R. It contains iron-mines, stone-quarries, and several important villages, among which are CLINTON (which see), Kirkland (or Manchester), Franklin Iron-works, and Clark's Mills. P. 4912.

**Kirkland** (CAROLINA MATILDA), b. in New York in Jan., 1801, was the daughter of Samuel Stansbury, a bookseller. She married Prof. William Kirkland of Hamilton College (1800-46), spent some years in Western New York and Michigan, and afterwards in New York City, where for a time she very successfully taught a school for a number of young ladies. Under the pseudonym of Mary Clavers she published several works on Western life distinguished for piquancy and originality, edited the *Union Magazine* (New York, 1847-49), assisted in the management of *Sartain's Magazine* (1849-51), made two short visits to Europe (1848 and 1850), and attained rare popularity and success as a writer. D. Apr. 6, 1864. Her principal works are—*A New Home, What'll Follow?* (1839), *Forest Life* (1842), *Western Clearings* (1846), *Holidays Ahead* (1849), *The Evening Book* (1852), *Personal Memoirs of George Washington* (1857).

**Kirkland** (JOHN THORNTON), D. D., LL.D., b. at Little Falls, N. Y., in 1770; d. in Boston Apr. 26, 1840, son of Samuel Kirkland, missionary to the Indians; Harvard College 1786; Congregational church in Summer street, Boston, 1794; president of Harvard College 1810-28. He

published occasional pamphlets and a life of Fisher Ames (1869). His name is identified with Harvard College as one of its ablest and most distinguished presidents, equally remarkable for sagacity, kindness, and energy. His administration was effective through the force of his personal qualities; he bequeathed no system of rules or organized methods to his successors, and opened no avenues of future progress, but graced his position and gave great distinction to the college by his intellect and dignity.

O. B. FROTHINGHAM.

**Kirkland** (SAMUEL), b. at Norwich, Conn., Dec. 1, 1744; graduated at Princeton in 1765. In 1766 he was ordained a Congregational minister. He lived much as a missionary with the Six Nations, and was appointed in 1775 by the Congress of Massachusetts to procure their favor or neutrality. In this attempt he was but partially successful. He was afterwards an army chaplain in the Revolutionary war. He may be regarded as the founder of Hamilton College, since he established the academy from which it sprang. In 1789 he received from the government a grant of land two miles square, now in the town of Kirkland, N. Y. D. at Clinton, N. Y., Feb. 28, 1808. (See his *Memoir*, by Dr. S. K. Lothrop, his grandson, in Sparks's *Amer. Biography*, 2d series.)

**Kirklin** (Kirk's Cross Roads P. O.), N. Y. and tp. of Clinton co., Ind. Pop. of v. 141; of tp. 1266.

**Kirkmansville**, a v. of Todd co., Ky. Pop. 389.

**Kirkpatrick** (ANDREW), b. at Mine Brook, N. J., Feb. 17, 1756; graduated at New Jersey College in 1775, and began the study of theology, but soon devoted himself to the law; was admitted to the bar in 1785; practised with distinction at Morristown, and afterwards at New Brunswick; became judge of the supreme court in 1797, and was chief-justice from 1803 to 1824. His decisions are found in Pennington's, Southard's, and Halsted's reports. He married in 1792 a daughter of Col. John Bayard. Kirkpatrick Place in New York City was named from him. D. at New Brunswick, N. J., Jan. 7, 1831. (See *Memoir*, by Gen. James Grant Wilson.)

**Kirksville**, post-v., cap. of Adair co., Mo., 6 miles E. of Chariton River, 65 miles W. of Quincy, and 200 miles N. W. of St. Louis; has 7 churches, 2 weekly newspapers, 2 banks, 4 hotels, a State normal school, a hub and spoke, furniture, woollen, cheese, and plough factories. All kinds of business are well represented. The county has splendid farming-lands and an abundant supply of wood and coal. Principal occupation, farming. Pop. 1471.

S. M. PICKLER, Ed. "JOURNAL."

**Kirkville**, post-v. of Richland tp., Wapello co., Ia. Pop. 236.

**Kirkville**, post-v. of Onondaga co., N. Y. Pop. 150.

**Kirkwall**, capital of the Orkney Islands, N. E. of the most northern point of Scotland, formerly an independent kingdom. There is a fine cathedral of St. Magnus dating from about 1138, and close by the ruins called the King's, the Earl's, and the Bishop's palaces. In the latter, Haco, king of Norway, died in 1263. Kirkwall has steamer communication with Leith, Aberdeen, Wick, and Lerwick, has an annual fair of considerable celebrity, a museum, libraries and grammar school, and cultivated society. The vessels registered at the port exceed 70,000 tons burden. Pop. 3500.

**Kirkwood**, a villa near Atlanta, Ga.

**Kirkwood**, post-v. of St. Louis co., Mo., on the Pacific R. R. of Missouri.

**Kirkwood**, post-v. and tp. of Broome co., N. Y., on the E. bank of the Susquehanna, and on the Delaware Lackawanna and Western R. R. Joseph Smith, the Mormon prophet, was born here. Pop. 1462.

**Kirkwood**, tp. of Belmont co., O. Pop. 1792.

**Kirkwood** (DANIEL), A. M., LL.D., b. in Harford co., Md., Sept. 27, 1814; was a mathematical instructor in York co., Pa., 1838-43; principal of Lancaster (Pa.) high school 1843-48; of Pottsville academy 1848-51; professor of mathematics 1851-54 in Delaware College; its president 1854-56; became in 1856 professor of mathematics in Indiana University; author of *Comets and Meteors* (1873), and of important astronomical papers, which have given him a high reputation at home and abroad.

**Kirkwood** (SAMUEL J.), b. in Harford co., Md., Dec. 20, 1813; educated at Washington, D. C.; admitted to the bar in Ohio in 1843; was for four years prosecuting attorney of Richland co., and a member of the State constitutional convention of 1850; removed to Iowa in 1855; was elected to the State senate in 1856 as a Republican; was governor of Iowa 1860-63, and was honorably distinguished as one of the great "war governors" for his efforts in maintaining the quota of Iowa troops in the field and providing for their

comfort and efficiency; was chosen U. S. Senator (1866-67) to fill the unexpired term of James Harlan, vacated by his acceptance of the secretaryship of the interior; in 1875 again elected governor of Iowa; and in 1876 elected U. S. Senator.

**Kirsanov**, town of Russia, in the government of Tambov, on the Pursovka, carries on some manufactures and rears a good breed of horses and fine-blooded sheep. Pop. 5663.

**Kirsch's wasser** [Ger. for "cherry-water"], often called **Kirsch**, an alcoholic liqueur prepared in Europe from cherries. The ripe fruit is first stoned and then fermented. Afterwards the broken pits are thrown into the mash, and the whole is distilled. A fraudulent imitation is made of ordinary spirits flavored with cherry-laurel water. It is a dangerous compound. (See *MYRASCINO*.)

**Kirtland**, post-tp. of Lake co., O. Pop. 1029.

**Kirtland** (JARED POTTER), M. D., LL.D., b. Nov. 10, 1793, at Wallingford, Conn.; studied medicine 1812-15 at the medical schools of Yale and Pennsylvania universities; began practising at Wallingford; removed in 1818 to Poland, O.; was appointed professor of the Ohio Medical College at Cincinnati in 1837, of the Willoughby Medical School in 1841, and of the Western Reserve College in Cleveland in 1843, which latter chair he filled to 1864. His scientific researches and experiments have principally been engaged in the sexual relations of the naiads, in the rearing of bees, and in the cultivation of fruit trees on his residence at East Rockport, O. D. at E. Rockport, O., Dec. 10, 1877.

**Kirwan** (RICHARD), b. in Galway co., Ireland, about the middle of the eighteenth century; was educated at Trinity College, Dublin, and at the Jesuit college at St. Omer in France; settled near London in 1779; devoted himself to chemistry and geology, and read valuable papers before the Royal Society, for which he received the Copley medal in 1782. He returned to Ireland in 1789, and became president of the Royal Irish Academy. Among his numerous works were *An Essay on the Extension and Composition of Acids*, *Elements of Mineralogy*, and *An Essay on the Analysis of Mineral Waters*. D. at Dublin in 1812.

**Kis'faludy**, the name of two brothers who in the beginning of this century exercised great influence on the rising Hungarian literature. They were both educated at the gymnasium of Raab, entered the Austrian army, and made campaigns in Italy and Germany, but retired from the military service into private life and engaged in literary pursuits. The elder, SÁNDOR, was b. at Sümeg, the family estate, Sept. 22, 1772, and d. there Oct. 28, 1844. His poem in twenty songs, *Himfy's Love*, somewhat sentimental in its tone, but of an elegant form, excited general enthusiasm; his ballads also made a great impression; his tragedies were less successful. The younger brother, KÁROLY, was b. at Tété Feb. 6, 1788, and d. at Pesth Nov. 21, 1830. He wrote dramas, took his subjects from national life, treated them with great skill for theatrical effect, and became the favorite of his countrymen on account of his sound and pleasant humor.

**Kishenev**, or **Kishinef**, capital of the province of Bessarabia, on the Buik, an affluent of the Dniester, and is picturesquely situated on three hills, between which the river winds around, crossed by several bridges. The railway to Odessa has been in operation for several years, and in 1874 that to Jassy was completed; thus new channels have been opened up to the trade of this rapidly growing city. It is the seat of the civil and ecclesiastical authorities of Bessarabia, and has about 20 churches, a synagogue, several magnificent Turkish baths, a gymnasium, a seminary, good schools, and several theatres. It has large markets, especially for cattle and corn. The inhabitants are much engaged in the cultivation of fruit and tobacco. Plums are exported in immense quantities. It is also the centre of a very considerable trade in tallow, wool, wheat, hides, etc., carried hence to Odessa and Jassy. It existed as a small place in the ninth century, was nearly destroyed in the seventeenth by the Tartars, and was transferred in 1812 from Moldavia to Russia. Pop. 120,000.

ALFRED NEMANN.

**Kish'on**, a small river of Central Palestine, rises near Mount Tabor, and flows N. W. into the Mediterranean, draining the plain of Esdrælon and the mountains of Carmel and Samaria. It is famous in biblical history as affording the scenes of the defeat of Sisera by Deborah and Barak, and of the slaughter of the priests of Baal by Elijah. Some portion of the Kishon was anciently called the "waters of Megiddo;" it is now known as the *Nahr el-Megiddo*.

**Kiskimin'itas**, post-v. and tp. of Armstrong co., Pa., on the Kiskimin'itas River, on the Western division of the Pennsylvania Canal, and on the Western Pennsylvania R. R. (North-west Station). Pop. 1728.



**Kis-Körös'**, town of Hungary, celebrated for its fine red wine. Pop. 6413.

**Kiss** (August), b. at Pless, in Upper Silesia, Oct. 11, 1802; began his education in the royal iron-foundries at Gleiwitz; pursued his studies at the academy of Berlin, under Rauch, and was first known by bas-reliefs for churches and other public buildings, and by groups of nymphs, tritons, and similar decorations for a fountain at Charlottenhof, designed by Schinkel. The plaster model of his famous group, *The Amazon and the Panther*, was exhibited in 1839, and created such enthusiasm that a public subscription was opened, even on Sundays and in churches, to pay the cost of casting it in bronze. In 1845 this was placed in the Museum of Berlin. The same artist subsequently produced a bronze equestrian statue of Frederick the Great for the city of Breslau, two statues, one colossal in size, of Frederick William III., *St. Michael and the Dragon*, a gift to Frederick William IV., a copy of which in zinc is at Charlottenhof; an equestrian statue of *St. George*, of colossal size, which was sent to the Paris Exposition in 1855. The work of Kiss is marked by grandeur and energy. D. Mar. 24, 1865. He was a member of the Royal Academy of Arts at Berlin. O. B. FROTHINGHAM.

**Kissingen**, town of Bavaria, on the Saale, has three mineral springs, from which 500,000 bottles of water are annually exported. In summer the place is much frequented, as the water is not only drunk, but also used for bathing.

**Kissingen, The Battle of**, took place July 10, 1866, between the Prussians and the Bavarians. The latter held the Franconian Saale occupied from Waldaschach to Hammelburg, in order to prevent the Prussian army from crossing the river. Gen. Vogel von Falckenstein, the Prussian commander-in-chief, ordered the Goeben division, with the Manteuffel division as reserve, to advance on the left wing towards Kissingen, and the Beyer division on the right wing towards Hammelburg. The Bavarians defended the defiles at Kissingen very obstinately, yet after a contest of two and a half hours the Prussian artillery succeeded in silencing the Bavarian cannons at Kissingen. At 4 p. m. the town was stormed by the Prussians, and an attack which the Bavarians made with a fresh force at 7 p. m. was repelled. At the other points, Hammelburg and Waldaschach, the Prussians were also victorious, and crossed the river. AUGUST NIEMANN.

**Kist'nah**, or **Krishna**, one of the largest rivers of Hindostan, rises in the Western Ghats, about 40 miles from the Malabar coast, flows S. E. across the whole breadth of the peninsula of Deccan for 800 miles, and enters the Bay of Bengal near Masulipatan. Precious stones are found in some portions of its course.

**Kit Carson**, post-v., cap. of Greenwood co., Col., on the Kansas Pacific R. R. Pop. 473.

**Kit'chel** HARVEY DENISON, D. D., b. at Whitehall, N. Y., Feb. 3, 1812; graduated at Middlebury College, Vt., 1835; studied theology at New Haven; held Congregational pastorates at Thomaston, Conn., 1839-48; at Detroit, Mich., 1848-64; pastor of Plymouth church, Chicago, Ill., 1864-66; became president of Middlebury College 1866, and resigned that post in 1875.

**Kitchen-garden**. See HORTICULTURE and the names of the principal garden-vegetables.

**Kit'chen-mid'dens** are large mounds consisting of oyster-shells, bones, and other refuse. They are found along the coasts of Denmark, and were formed in pre-historic times in places where the pagan inhabitants assembled to celebrate their annual religious festivals. Their character was not fully understood until the middle of this century, but their thorough exploration by Worsaae and Steenstrup has proved of great interest to science, as they contain numerous specimens of weapons and utensils, and also in various other ways give illustrations of the life which at that time was led in these regions.

**Kite** [Welsh *cŵd*], a toy employed for ages and in many countries by boys as a plaything, and which has also had its scientific uses. Thus, Franklin and others have obtained the electric spark from the clouds by this dangerous means. In engineering, the kite has been employed to carry lines across deep chasms, and in removing the passengers of stranded ships the kite has sometimes been successfully employed. The kite is a light frame of wood covered with strong paper, and held by a string so attached to it that it shall be acted upon by the wind much like a ship's sail when sailing close to the wind. A tail is usually, but not always, added, which gives the kite steadiness in sudden flaws of wind. The Chinese and Japanese construct kites in the form of owls, bats, dragons, etc. These have no tail, but fly low, and well before the wind.

**Kite**, the *Milvus regalis*, a common bird of prey in Europe, distinguished by the beauty and ease of its rapid

flight and the deep forking of its tail. The name is extended to numerous other species of the same and of closely-allied genera. The U. S. have, among others, the Mississippi kite (*Ictinia mississippiensis*) and the black kite (*Rostrorhamus sociabilis*).

**Kit-Kat** (or **Kit-Cat**) **Club**, a society consisting of about fifty gentlemen of ability and rank interested in promoting the Protestant succession in the House of Hanover. It was instituted in 1703, and took its name from Christopher Kat, a pastry-cook who lived near the tavern where they met in King street, Westminster, and supplied the members with pies. The association lasted about twenty years. Sir Godfrey Kneller painted the portraits of the members, 43 in number, among whom were Addison, Steele, Walpole, Marlborough, and himself, three-quarters length, whence the term "kit-kat portraits." The memoirs of the club, illustrated by engravings from Kneller's pictures, were published in 1821.

O. B. FROTHINGHAM.

**Kit'sap**, county of Washington Ter., consisting of a peninsula between Hood's Canal and Puget Sound, with some islands in the sound. It is heavily timbered, and has good advantages for commerce and the fisheries. Area, about 500 square miles. Lumbering is the chief pursuit. Cap. Port Madison. Pop. 866.

**Kittanning**, tp. of Armstrong co., Pa. Pop. 1504.

**Kittanning**, post-b. of Valley tp., cap. of Armstrong co., Pa., on the Allegheny River and Allegheny Valley R. R., 44 miles N. of Pittsburgh and 35 miles from Parker City. It has 2 national banks, 3 weekly newspapers, 1 rolling-mill, 1 woollen-mill, several oil-refineries, and various other manufactories. It has a college and other educational institutions. Pop. 1889. M. B. OSWALD, Ed. "FREE PRESS."

**Kittatinny**, or **Blue Mountain**, a chain which takes its rise near Slawagunk, Ulster co., N. Y., passes S. W. through a corner of New Jersey, crosses the Delaware at the Water Gap, trends W. S. W. through Pennsylvania, crosses the Susquehanna a few miles above Harrisburg, and the Potomac near Berkeley Springs, and continues with gradually lessening altitude through Virginia, North Carolina, and Tennessee into Alabama, thus having a total length of more than 800 miles. In average elevation and bulk the Blue Mountain range exceeds the Blue Ridge, which has acquired greater prominence on maps on account of its greater definiteness, springing from a narrow base, and the greater height of some of its peaks. The average elevation of the Blue Mountain is from 800 to 2500 feet.

**Kit'tery**, post-tp. of York co., Me., the south-westernmost tp. in the State. It is on the Piscataquis River, opposite Portsmouth, N. H., with which it is connected by a bridge, and is on the Portsmouth, Saco and Portland R. R., 50 miles S. W. of Portland. The Portsmouth navy-yard is on Continental Island in this township. Kittery has 5 churches. It was settled in 1623, and was the birth-place of Sir William Pepperell. Kittery Point is an important post-village in this township. Pop. of tp. 3333.

**Kit'tiwake**, a popular name for sea-gulls of the genus *Rissa*. Several species are known. They are rather pretty birds, and are named from their cry, which resembles their name, somewhat slowly pronounced.

**Kit'to** JOHN, D. D., b. at Plymouth, Eng., Nov. 4, 1804; lived for years in great poverty, and when eleven years old totally lost his hearing in consequence of an accidental injury; was sent to the workhouse and learned the shoemaker's trade, but devoted all his time to books; published in 1825 *Essay and Letters*, which attracted much attention; learned the printer's art in the Islington College; resided at Malta 1827-29, and at Bagdad; travelled extensively in the East 1829-35; published the *Pictorial Bible* (1838), *Pictorial History of Palestine* (1839-40), another *History of Palestine* (1843), *The Lost Senses*, an alphabetical, (1845); edited and largely wrote the *Cyclopædia of Biblical Literature* (1845 seq.); founded and edited the *Journal of Sacred Literature* (1848-53), and many other works, of which the most popular was *Daily Bible Illustrations* (8 vols., 1849-53). Kitto received the degree of D. D. from Giessen. D. at Cannstatt, Germany, Nov. 25, 1854.

**Kit'tredge** (THOMAS), M. D., b. at Andover, Mass., in July, 1746. He came of a family distinguished for the eminence of many of its members in the medical profession. He studied at Byfield Academy under Samuel Moody (1725-95), and at Newburyport with Dr. Sawyer; was surgeon of Col. Frye's regiment at Bunker Hill; received his degree from Harvard University in 1811. He held many important public trusts. His practice at Andover began in 1768. D. at Andover in Oct., 1818.

**Kit'trell's**, post-tp. of Granville co., N. C., on the Raleigh and Gaston R. R. Pop. 1829.

**Kittrell's Springs**, a place of valetudinary resort in



Granville co., N. C., half a mile from Henderson, on the Raleigh and Gaston R. R. Here are saline chalybeate waters, useful in a considerable range of diseases.

**Kiu'-Siú', Kiou-Sioo, or Xi'mo**, the southernmost of the three principal islands of Japan, is situated in the Pacific, between lat. 31° and 34° N., and between lon. 129° and 131° E., and is separated from Corea by the Strait of Corea, and from the island of Nippon by the Strait of Sokok. Nagasaki is situated on this island; otherwise it is entirely unknown to foreigners.

**Kiwi-Kiwi.** See **APTERYX**.

**Kiz'il-ir'mak** [Turkish, "red river"], the modern name of the Halys, the principal river of Asia Minor, rising nearly in the E. of the peninsula, and flowing circuitously about 500 miles to the Black Sea, near the town of Sinope. It forms the boundary between the Turkish pashalics of Anatolia and Senyas. Its principal affluent is the Kasi Soo or Kastamoonsee River, the *Mela* of Strabo.

**Kizliar**, town of Asiatic Russia, in the government of Stavropol, on the Terek. Vines are cultivated, and silkworms reared here with great care and considerable success. Pop. 11,000.

**Klad'no**, town of Bohemia, 13 miles N. W. of Prague, has some iron-works and important coal and iron mines in the neighborhood. Pop. 3,500.

**Kla'genfurth**, town of Austria, the capital of Carinthia, on the Glan. It is fortified, has large manufactures of white lead, an important transit-trade, and good educational institutions. Pop. 13,178.

**Klam'ath**, county of N. W. California. Area, about 2000 square miles. It is bounded on the W. by the Pacific Ocean. Its surface is generally rugged, its climate much cooler than that of the State at large. Much of the surface has a heavy growth of redwood and other timber. Gold is obtained quite extensively. Cap. Orleans. Pop. 1686. The county is now (1877) abolished.

**Klamath**, tp. of Klamath co., Cal. Pop. 278.

**Klamath**, tp. of Siskiyou co., Cal. Pop. 84.

**Klamath River** rises in Jackson co., Or., traverses the Klamath Lake, passes S. W. into California, and after joining the Trinity River in Klamath co., turns N. W., and finally enters the Pacific Ocean. It is a rapid stream, and traverses a rocky and well-timbered region; it is navigable for small steamers some 30 miles.

**Klam'ath, Hamat, or Clamets**, called by themselves **Lutami**, a tribe of Indians living near the lakes of the same name and on the Klamath and Rogue rivers in Southern Oregon and Northern California. They belong to the tribal group called Northern Californian, sometimes termed the Klamath family, which occupies portions of the region extending from Rogue River, Or., on the N. to the parallel of 40° on the S., and from the W. boundary of Nevada to the Pacific, and comprises, besides the Klamaths proper, the Modocs, Shastas, Pitt River Indians, Eurus, Cahroes, Hoopahs, Weeyots, Wallies, Tolawahs, and Tatums or Rogue River Indians, besides several small bands having no distinctive names. These tribes are included in the ordinary name of "Digger Indians," given as a term of contempt to all the aborigines of Northern and Middle California, Nevada, Utah, and Southern Oregon; but the Klamath group of tribes is unquestionably superior to the others thus confounded with them. They are tall, muscular, and well-made, have regular features, the face large and oval, and the cheek-bones slightly prominent; the women are much shorter than the men, but are not unfrequently quite handsome. Tattooing is practised by both sexes to a limited extent; they are fond of nose and ear rings, and paint their bodies. They build conical and sometimes square houses of stone and wood, partly sunken in the ground; have canoes, and are expert fishers, but indifferent hunters, being fonder of using snares and traps than weapons, with which they are ill provided. Berries and roots form a large portion of their food. The women are ingenious in basket-making and plaiting grass into hats, hammocks, and mats. They are fond of traffic, using shell-money; are not addicted to war, but when attacked defend themselves desperately, as was instanced in the "Modoc war" of 1873. Polygamy is common, and morality very low, wives being bought and sold. The chiefs have little more than a nominal authority. The passion for wealth and for gaming is universal; they are superstitious, and their religion is a degrading fetishism. The dead are sometimes buried, but more commonly buried. In 1851 the Klamaths proper numbered 18 villages and about 3000 souls; they have since rapidly declined, partly through conflicts with whites, but chiefly through the vices contracted from contact with "civilization." By a treaty made in 1864 they ceded to the U. S.

all their lands except a reservation on the Klamath lakes of 1200 square miles, where they are gradually adapting themselves to the pursuits of agriculture, and especially devoting themselves to lumbering. In 1873 they numbered only 572. (For copious information upon the Klamaths and the allied tribes see H. H. Bancroft's *Native Races of the Pacific States* (1874), vol. i., ch. iv., where all the authorities are indicated.)

PORTER C. BRASS.

**Klap'ka** (Györcy), b. at Temesvár, Hungary, Apr. 7, 1820; was educated in the artillery school at Vienna, became an officer in the emperor's life-guards, and in 1847 obtained a command in a border regiment. When Hungary revolted in 1848, young Klapka immediately espoused the cause of his insurgent country, and was made chief of staff of Gen. Kis, and in 1849 commander of an army corps. He led his troops with talent and energy in the battles of Kapolna, Komorn, etc., and was made minister of war by Kossuth. After the defeats experienced by the Hungarians, Klapka shut himself up in the fortress of Komorn, where he heroically repulsed during several weeks the desperate attacks led by the famous Austrian general, Haynau. He surrendered only after having obtained for his army and himself the "honors of war." He spent many years in exile in Germany, England, France, and Turkey, and entering the German service attempted, though unsuccessfully, to raise Hungary against Austria in 1859 and 1866. Klapka was naturalized as a Swiss citizen, and elected a member of the federal council in 1856. In 1867, on the reorganization of the Austro-Hungarian empire, he returned to his native country, and was employed in the army. In 1873 he was in the military service of Turkey, and visited Egypt in 1874. He wrote *Memoirs of the War of Independence in Hungary* (1850), *The National War in Hungary and Transylvania* (1851), and a work on *The War in the East* (1855).

FÉLIX AUGAGNE.

**Klap'roth** (MARTIN HEINRICH), b. at Wernigerode, Germany, Dec. 1, 1743; was employed for seven years in an apothecary shop at Quedlinburg, and afterwards at Hanover and Berlin, at which latter places he made a methodical study of chemistry, and published numerous analyses of great value, which obtained for him professorships of chemistry at the Berlin School of Artillery (1787) and university (1789). He was made a member of the French Institute, of the council of public health, and of many scientific bodies. Among his discoveries were the metals zirconium, titanium, and uranium, the sulphate of strontium, and the molybdate of lead. He did much to advance the classification of minerals by chemical analysis; was an early defender and popularizer of the discoveries of Lavoisier. His numerous writings were chiefly published as papers in the *Denkschriften* of the Berlin Academy, the analyses alone constituting five volumes of a collected series published from 1795 to 1810. He also edited a *Chemical Dictionary* (5 vols., 1807-10) and a *Chemical Manual*. D. at Berlin Jan. 1, 1817.

**Klaproth, von** (HEINRICH JULIUS), son of the celebrated chemist, b. at Berlin, Prussia, Oct. 11, 1783; applied himself by stealth when fourteen years of age to the study of Chinese, and manifested such wonderful talent for languages that he was allowed to devote himself to philology instead of applied science, as intended by his father. He studied at the universities of Halle and Dresden, and finding in the Dresden library a fine collection of Oriental MSS., he established in 1802 the *Asiatisches Magazin*, printed at Weimar, for making known the results of his researches. These achievements of a boy of nineteen years naturally attracted attention in Germany and Russia, and in 1804 the government of the latter country appointed Klaproth interpreter to an embassy already on its way to China. He set out alone, overtook the embassy in Siberia, and accompanied it into Mongolia (Jan., 1806), but the refusal of the Chinese government to receive a Russian envoy prevented his penetrating into China proper. Returning to Europe by a different route, he acquired a knowledge of the geography of Central Asia, and of the languages of the inhabitants, which he turned to good account. In 1807 he was sent to explore the Caucasus, and spent a year in that region, after which he was appointed professor at the University of Wilna. He was made a member of the Russian Academy, had a pension and other honors equivalent to a grant of nobility, but difficulties thrown in the way of the publication of his researches led to a rupture, and when he left Russia in 1812 his titles and honors were revoked. He then published at Halle his *Travels in the Caucasus and Mongolia* (1812-14), at Weimar his *Geographical, Historical, and Descriptive of Eastern Caucasus* (1814), and at Berlin his *Description of the Russian Provinces between the Caspian and Black Seas* (1814). He conceived a great aversion for Napoleon precisely at the time when the fortunes of that monarch were most rapidly declining; visited him at



the island of Elba, and was received with honor. On the final establishment of the Bourbons in France, Klapproth settled in Paris, obtaining through the influence of Humboldt a nominal professorship at Berlin with a handsome salary. He spent the remainder of his life in the French capital, engaged in the production of a series of works upon Asia, especially Central Asia and China. Among these were *Asia Polyglotte* (1823-29), with a linguistic atlas; *Tablneau historique de l'Asie* (1824), treatises on the Chinese, Korean, Manchoo, and other Asiatic languages, and very numerous papers in the transactions of learned societies. He left in MS. a geographical and historical work on the Chinese empire, and a *Nœc Mithridates, or Systematic Classification of All Known Languages, with Vocabularyes*. The geographical labors of Klapproth in Central Asia have been characterized as fraudulent on a colossal scale by Sir Henry Rawlinson (1872). D. at Paris Aug. 20, 1835.

**Klat'au**, town of Bohemia, 68 miles N. W. of Prague. It has considerable manufactures of leather. Pop. 7382.

**Klau'senburg** [Hun. *Kolozvár*], the capital of Transylvania, formerly a separate principality of the Austrian empire, now united to Hungary, situated 225 miles S. E. of Pesth. Pop. 26,382. It has a university established in 1872, a Unitarian college, a fortified castle, manufactures of porcelain, and a considerable trade. The inhabitants are chiefly Magyars.

**Kléber** (JEAN BAPTISTE), b. at Strasbourg in 1755. Son of a stonemason, he was one of the truest and best representatives of that generation of Frenchmen who started from the then so-called low ranks of society, and demonstrated, through their splendid actions and noble conduct, the necessity of the coming of the Revolution, which erased for ever discrimination between classes. Kléber's military and warlike character caused him to give up his first calling as an architect, and to enlist in the military service of Austria. He was soon tired of that mercenary work, and returned to France, where he was inspector of buildings at Belfort, when in 1792 he volunteered to serve as a private in the republican armies of France, where he rapidly rose to the highest rank. After the glorious siege of Mayence, Kléber was sent to fight against the royalists of Vendée, then to the armies of Sambre-et-Meuse and of the Rhine, with which he crossed the Rhine and won the two battles of Altenkirchen and Friedberg in 1795. As he was a strong republican, the Directory did not want to employ him; but Napoleon gave him a command in the expedition to Egypt, and left him there as general-in-chief. After the departure of Napoleon, Kléber vanquished the Turks at Heliopolis; 1800 again subdued Egypt, which had revolted, and was murdered at Cairo, June, 1800, by a fanatical Moslem. In Strasbourg there is a square called "Place Kléber," adorned with a statue of the great Strasbourg republican general. FELIX AUCAIGNE.

**Kleene'-Boc** [Dutch for "little buck"], the *Cephalopus pygmaeus*, one of the smallest of the antelope group, an active little animal of South Africa. It is one foot high at the shoulders, and is of a dark slate-color.

**Klein** (JOHANN ADAM), b. in Nuremberg Mar. 24, 1792; d. May, 1875. He studied at the art academy in Vienna, and after travelling in Hungary, returned and began work in his native city in 1815: in 1819 was sent by King Louis of Bavaria to Italy; was there two years, and afterwards made Nuremberg his home. Klein was chiefly famous as a painter of battle-pieces, but excelled also in portraiture. He was, besides, an engraver of ability, and reproduced many of his own and other artists' works.

**Kleist, von** (HEINRICH), b. at Frankfurt-on-the-Oder Oct. 10, 1776. He never succeeded in giving his life a fixed and practical aim. The military service he left in order to study philosophy and mathematics, and these studies he left in order to accept a position in the Prussian civil service. This he gave up in 1806, and determined to devote himself exclusively to literature, but more than once he abandoned literature too with disgust. The result of a life thus scattered was despair, and the state of degradation in which Napoleon kept Germany, and the personal disappointments and calamities which befel Kleist from this source, added to his misery. It was of no use that moments of the most sublime enthusiasm alternated with his despair. He grew tired of life, and Nov. 21, 1811, he shot himself at Wansee, near Potsdam, having shot first his friend, according to a given promise, Henriette Vogel, the wife of a rich merchant, a spirited and highly gifted woman, but sick in mind like her lover. In 1826, Tieck published a collected edition of his works in 3 vols. His dramas, *Die Familie Schroffenstein* (1803), *Amphitryon* (1807), *Der zerbrochene Krug* (1811), *Käthchen von Heilbrunn* (1810), *Die Hermannsschlacht*, and *Der Prinz von Homburg*, belong now to the standard pieces of every stage in Germany; and his

novels, among which *Michael Kohlhaas* occupies the first place, have taken rank beside Goethe's and above Tieck's. It is now generally acknowledged that Kleist was one of the richest and most original poetical geniuses which the German people has produced. Other poets have depicted greater characters, but in the life and fulness of the delineation none has ever surpassed him, and the sickliness of his spirit is not so very conspicuous in his works. After his death he became the idol of the romantic school, not exactly on account of the diseased state of his mind, but on account of his absolute contempt for real life.

CLIFFORD PETERSEN.

**Klemm** (FRIEDRICH GUSTAV), b. at Chemnitz Nov. 12, 1802; studied history in Leipsic, Jena, and Dresden; held different positions at the library of Dresden 1831-63, and d. Aug. 25, 1867. His principal writings are *Allgemeine Culturgeschichte der Menschheit* (10 vols., 1843-52), *Allgemeine Culturanthropologie* (2 vols., 1854), and *Die Frauen* (6 vols., 1854-58).

**Klen'ze, von** (LEO), b. at Hildesheim Feb. 20, 1784; studied at Brunswick, Berlin, and Paris; travelled through Italy, and settled in 1815 at Munich, where he became architect to the court. He built the whole modern Munich—the Walhalla, Pinakothek, Glyptothek, Odeon, Museum, royal palace, post-office, etc., and a great number of private palaces and houses. Also in St. Petersburg, whither he was invited in 1839, he built a great number of buildings, all of which are distinguished by something magnificent and picturesque; but there is nothing original in them. Of his writings, *Aphoristische Beobachtungen* (1838) is an interesting book. D. Jan. 27, 1864.

**Kleptomania**. See INSANITY, by W. A. HAMMOND, M. D.

**Klias'ma**, a river of Russia, rises in the government of Moscow, flows through those of Vladimir and Nizhne-Novgorod, and joins the Oka after a course of 327 miles. It is navigable for about 150 miles, and, as it runs through the most densely peopled and industrially developed districts of the country, is of great commercial consequence.

**Klike'tats**, a tribe of Indians living in Washington Territory, in the region N. of the Dalles, between the Cascade Range and the Columbia River. They belong to the Sahaptin family of the Columbian group, and are therefore akin to the Nez Percés and Walla Wallas, while they seem to be almost identical with the Yakimas, from whom, apparently, they are distinguished only by geographical location. They were formerly quite migratory in their habits of life, but their most permanent abode was in the valleys between Mounts St. Helen and Adams, W. and S. of the Yakimas. The name *Klike'tat* means "robber," and was gained by their encroachments upon neighboring tribes, they having for many years overrun the Willamette Valley, until in 1855 they were curbed by forces of the U. S. army. They have since been consolidated with the Yakimas, and placed upon the reservation near Fort Simcoe, E. of the Coast Range, where they have made considerable progress in civilization. They are divided into five bands, and number about 2000. (See Bancroft's *Native Races of the Pacific States*, vol. i.)

**Klike'tat**, county in S. Washington Territory. Area, about 5000 square miles. It lies E. of the Cascade Mountains, and is bounded on the E. and S. by the Columbia River. It is generally a good open grazing country. It includes the Klike'tat Prairie. Cap. Rockland. Pop. 329.

**Kling'er, von** (FRIEDRICH MAXIMILIAN), b. at Frankfurt in 1753, and educated at the University of Giessen; wrote dramas for the Seyler band of strolling actors; took part as a volunteer in the Bavarian war of succession; went to St. Petersburg in 1780; rose there to the highest positions in the military administration; became lieutenant-general in 1811, and d. Feb. 25, 1831. In 1775 he wrote a tragedy, *Sturm und Drang*, a horribly affected imitation of Shakspeare, from which the whole period of fermentation preceding the appearance of Goethe and Schiller received its name. But, with the exception of this one fact, all Klinger's tragedies, comedies, and novels are entirely destitute of interest.

**Klipp'springer** [Dutch], the *Oreotragus saltatrix*, a beautiful and graceful South African mountain antelope, resembling in its habits the chamois. It is an extremely agile and swift little creature, less than two feet in height.

**Klop'stock** (FRIEDRICH GOTTLIEB), b. in Quedlinburg, Prussian Saxony, July 2, 1724. He studied theology first in Jena, where he (1745) wrote the first song of his great epic poem, *Messiah*; then in Leipsic, where he (1748) published the first three songs of that poem in *Bremische Beiträge*. They made a deep impression. Every young man became at once his admirer and his disciple. But, although he had touched the very heart of his nation, he found no support



and little encouragement at home. All literature in Germany was at that time more or less a court affair, and every court was a petty copy of Versailles. Frederick the Great considered the attempt of forming a genuine German literature as foolishness, and even the emperor Joseph, to whom Klopstock dedicated his great drama, *Hermann's Schlacht*, could not be brought to take any notice of him. He was supported by foreigners. The Danish king gave him a pension—small enough—and on this he lived partly in Copenhagen, partly in Hamburg, where he d. Mar. 14, 1803. Even when a boy he entertained the idea of writing a great epic poem, and he certainly succeeded in realizing this idea, though, unfortunately, his poem bears striking, even painful, marks of being the result of great exertions, as much as the product of great powers. Klopstock becomes often forced when he wishes to be strong, and obscure when he tries to be deep. His *Odes* are generally hard to understand, and not always worth understanding. It is impossible, therefore, to explain the impression he made and the influence he exercised from the artistic value of his works: they depended on the peculiar position he occupied in the history of German literature. He is the father of modern German poetry, not because he created it, but because he made it possible—not on account of his genius, but on account of his standpoint. In a moment when the German nation had given up its confidence in itself, and looked to France not only for its literary forms, but for its literary impulses, Klopstock stepped forth and emphasized German character, as revealed in German history and German Protestantism, with such a strength that it echoed through two or three generations, and became a rallying-point for all national aspirations and sympathies.

CLEMENS PETERSEN.

**Knapp** (ALBERT), b. at Tübingen, Württemberg, July 25, 1798; studied theology; held different positions in the Protestant Church, and was appointed pastor in 1836 at Stuttgart, where he d. June 18, 1864. His *Christlichen Gedichte* (2 vols., 1829) and *Neuen Gedichte* (1834) contain some of the most beautiful hymns produced in our time.

**Knapp** (CHAPNEY L.), b. in Berlin, Vt., Feb. 26, 1809; learned the printing-trade at Montpelier; was for some years editor of the *Vermont State Journal*; secretary of state from 1836 to 1840; removed to Massachusetts, and was secretary of the senate in 1851, and was a member of Congress from 1855 to 1859. He had nominated Gen. Harrison for the Presidency in 1836, obtaining for him the electoral vote of Vermont, four years before the campaign in which that President was elected.

**Knapp** (HERMANN), M. D., b. in Germany in 1832; was professor of ophthalmology in the University of Heidelberg from 1864 to 1868. In the latter year he removed to New York, where he opened the New York Ophthalmic and Aural Institute, and founded the *Archives of Ophthalmology and Otology*, published both in German and English. He is the author of *Intraocular Tumors* and various papers in different ophthalmological periodicals.

**Knapp** (JACOB), b. at Otego, Otsego co., N. Y., Dec. 7, 1799; was educated as an Episcopalian, but about his twenty-first year joined the Baptist Church; studied at Madison University in Hamilton, and taught school at Springfield, where he entered the ministry in 1822. In 1830 he removed to Watertown, taking an active and very successful part in a revival there, after which he entered upon the wider field of itinerant preaching. His labors now directed him to all the principal cities and towns of the New England and Middle States, thence westward to Chicago and St. Louis, and finally to California, everywhere by his earnest enthusiasm and practical preaching winning multitudes of converts. He published his *Autobiography* a few years before his death on Mar. 2, 1874, in which, among the statistics of his labors, it is stated that about a dozen years after he began independent preaching the number of converts had reached 100,000, and he thereafter refrained from counting them.

**Knapp** (SAMUEL LORENZO), LL.D., b. at Newburyport, Mass., Jan. 19, 1783; graduated at Dartmouth in 1801; became a lawyer; commanded a militia regiment as colonel in the war of 1812-14; from 1821 to 1828 edited journals in Boston, Mass., the *Gazette*, the *National Republican*, and others. In 1827 he entered upon the practice of law in New York. Col. Knapp was the author of many works, chiefly biographical, among which are *Tales in North America by Ali Bey* (1818), *Biog. Sketches of Eminent Lawyers, Statesmen, and Men of Letters* (1821), *Genius of Freemasonry* (1828), *Sketches of Public Characters* (1830), *An. Biography* (1833), *Life of DeWitt Clinton* (1828), of Daniel Webster (1835), Aaron Burr (1835), and a revision of J. H. Hinton's *History of the United States* (1834). D. at Hopkinton, Mass., July 8, 1838.

**Knapsack** [Dan. *knappzak*, from *knappen*, to "eat"], Vol. II.—99

a case, wallet, or scrip of leather or painted canvas carried upon the shoulders. The knapsack is chiefly employed by foot-soldiers for carrying their personal effects.

**Knare's borough**, town of England, in the county of York, on the left bank of the Nidd. It has some manufactures of linen and cotton goods, and some interesting ruins. Pop. 5295.

**Knaus** (LUDWIG), b. at Wiesbaden Oct. 5, 1829. His father was an optician. He received instruction from Jacobi, the painter of the grand duke, and was sent, pensioned by the state, to Düsseldorf. There Sohn and Shadow were his teachers, but he struck out an original path for himself in the portrayal of scenes in peasant-life. In 1853 he went to Paris, and remained eight years; returned to Germany; sojourned a while in Berlin, and finally (1866) took up his residence in Düsseldorf. M. Knaus is a member of the Academy of Amsterdam, and has received a gold medal at Berlin. Other medals were bestowed on him in 1853, 1855, 1857, 1859, and a medal of honor in 1867; the same year he was created an officer of the Legion of Honor. The pictures of Knaus represent scenes in German rustic life, and are rich in humor. Good examples may be seen in private collections of New York.

**Kneeland** (ABNER), b. in 1774; was for a time a Baptist minister, then a Universalist, and finally a deist. He was (1821-23) editor of a Universalist periodical in Philadelphia; in 1828 editor of the *Olive Branch*, N. Y.; in 1832 founded the *Investigator* at Boston, Mass., and in 1836 was tried before the supreme court at Boston on a charge of blasphemy. D. at Salubria, Ind., Aug. 27, 1844. He published *The Deist* (1822), *Lectures on Universal Salvation* (1824), a translation of the *New Testament* (1823), a *Review of the Evidences of Christianity* (1829), and other works.

**Kneeland** (SAMUEL), M. D., b. in Boston, Mass., Aug. 1, 1821; graduated at Harvard in 1840, and at the Massachusetts Medical School in 1843; studied in Paris, and practised medicine in Boston 1845-50. He is an active member of many learned societies; served as an army surgeon in the late war. In 1866 he became secretary of the Massachusetts Institute of Technology, and professor of zoology and physiology there. Prof. Kneeland has contributed much to scientific and other literature, and edited (1866-69) the *Annals of Scientific Discovery*.

**Kneller** (SIR GODFREY), b. at Lübeck in 1646; was sent by his father (who intended that he should pursue the military profession) to London to study mathematics and fortification. Having more taste for painting, he went to Amsterdam, and studied, so tradition says, with Rembrandt and Ferdinand Bol; at the age of seventeen went to Rome, and was a pupil of Maratti and Bernini; in Venice gained a reputation by painting the portraits of eminent persons, especially of Cardinal Bassadonna. His fame was earned in London, whither he repaired in 1674. The duke of Monmouth, being attracted by a portrait of his secretary which Kneller had painted, sat for his own, and persuaded the king, Charles II., to sit also. The picture was successful, partly, it would seem, because it was executed with rapidity and boldness, and the artist's fortune was made. He had as much as he could do, and at his own prices. The number of his portraits is as astonishing as the quality of his subjects. He painted the likenesses of ten sovereigns—Charles II., James II., William III., George I., Louis XIV., Peter the Great, Charles V., and queens Maria, Mary, and Anne. William employed him to paint the beauties of Hampton Court, conferred on him the honor of knighthood, and presented him with a gold medal and chain. George I. created him a baronet. Kneller d. in 1723, and had a monument erected to him in Westminster Abbey; he was buried at Whitton. The monument was erected at his own expense, after designs by a sculptor of his own selection. Kneller was vain, and greedy of money and distinction, and is thought to have done less than justice to his real talents. He was a coarse man, and did coarse work; but he had knowledge, judgment, and taste, and when he exerted himself, as in those of his pictures in the Gallery of the Admirals, in which he shared the honor with Lely, showed that he was a man of ability. After the death of Sir Peter Lely he stood at the head of his profession in England. But he owed his rise to the quality of his patrons rather than to the quality of his art. In a better age he might have done better work. The portraits of the Kit-Kat Club are among the best of Kneller's pieces. To him we owe the preservation of Rembrandt's cartoons. Kneller was married, but left no heirs to enjoy the large fortune that he accumulated. He was a wit, highly appreciated by men like Dryden, Addison, Prior, and Steele, and the members of the Kit-Kat Club, to which he belonged.

O. P. FISHINGHAM.

**Kniaz'nin** (FRANCISZKA DIONIZJA), b. O. I. 4, 1750;



educated at Vitebsk, in the school of the Jesuits, which order he entered. After the dissolution of the order in 1773 he became secretary to Prince Adam Czartoryski, but fell about 1796 into a mental derangement from which he never recovered. D. Aug. 25, 1807, at Konskawola, one of the estates of the prince. He translated Horace, Anacreon, Catullus, Ossian, and others, and among his own poetical productions there are many idylls and minor poems of a delicate beauty, both in sentiment and form.

**Knight** [from Teut. *Knächt*, defined by Grimm as *puer, famulus, servus*, "attendant or servant"]. The word corresponding to our "knight" is in most languages derived from the horse, as, for instance, the French *chevalier*, the Danish *Ridder*, etc. In nearly all nations which have attained any martial renown there has been set apart a body of combatants known by a distinguishing title and performing certain honorable service. Such were those Grecian warriors whom historians call knights, and such also the equites of Rome. (See EQUESTRIAN ORDER.) But knighthood, as associated with chivalry, is of Northern origin. A certain value of land, called in England a "knight's fee," and in Normandy "*fief de haubert*," was allotted to a tenant, who in return bound himself to follow his lord to battle. Thus, in its earlier days knighthood was but a part of the feudal system, and could boast little of that nobleness which afterwards distinguished it. Its real history begins with the Crusades. During these wars it assumed a voluntary character. The younger sons of noble families enlisted under the banners of wealthy lords, in whose service they might hope to gain such honor, and even riches, as would raise them to an equality with their elder brothers. Barons were glad to take these adventurers into their pay, and it was not long before knighthood won by voluntary service became more esteemed than that feudal sort which was the right of the eldest born; so that in time rich landowners grew ashamed of a title which they had not earned, and refused the honor until they had earned it by some brave exploit. During the Crusades knighthood became blended and almost identified with religion. Every knight pledged himself to aid in recovering the Holy Land. Fighting against infidels was itself a religious service; warriors who died while wearing the cross were assured by priest and pope of a speedy entrance into paradise; chivalry was held to be little lower than the Church itself, and the two were united in the persons of those monk-soldiers who, while under vows of poverty, chastity, and obedience, were also foremost and fiercest in battle. Their deeds, however great, were supposed to increase not their own renown, but that of the order to which they belonged, and it may be that such devotion to a common interest had some influence over secular warriors, and aroused that *esprit de corps* which made knighthood a universal brotherhood. Another peculiar trait of knighthood was the worship of women. Women gave the prize in tournaments; the knight wore his mistress's favor in real as in mimic battle; God and the ladies (*Dieu et notre Dame*) were associated on the lips and in the heart of every true knight. Various manuals were written, especially when chivalry was on the decline, to teach knightly duty, but our most vivid knowledge of knights and their manners is derived from ancient romances and from chroniclers like Froissart and Joinville, whose naively-told stories show us not only the virtues of chivalry, but also its vices. In France, knighthood came nearest to the ideal standard. German knights were wanting in courtesy, and too often regarded noble birth as more important than noble deeds.

During the Middle Ages many orders of religious knighthood were founded for the purpose of helping Christians against the infidels. Their members were bound to poverty, chastity, and obedience, but the first, at least, of these vows was soon broken. The orders became very rich and luxurious, the original motives of their formation were lost sight of, and their power aroused the jealousy of kings and nobles. The chief of these orders were: The *Hospitallers*, or brothers of St. John of Jerusalem, founded 1043 to nurse and care for poor wounded crusaders. After leaving the Holy Land they occupied first the island of Rhodes, and then Malta, whence they were expelled by Napoleon Bonaparte in 1798. The *Templars*, so called from having a house near the supposed site of Solomon's Temple, founded 1118 for the protection of pilgrims. They grew extremely rich, and after quitting Palestine had establishments in several European countries. Having been accused of heresy and other crimes, they were in 1311 suppressed by Pope Clement V., at the instigation of Philip the Fair, king of France, who caused many of them to be imprisoned, banished, or put to death. The *Teutonic* order, instituted during the siege of Acre, at the close of the twelfth century, acquired great power, and in the thirteenth century conquered Prussia, Livonia, and Courland from their heathen chiefs. The Spanish order of *St. James of Compostella* was founded

for the defence of pilgrims to the shrine of that saint, and the knights were continually engaged in warfare with the Moors.

JANET TUCKEY.

**Knight**, tp. of Vanderburg co., Ind. Pop. 1342.

**Knight** (CHARLES), b. at Windsor, Eng., Mar. 19, 1791; studied at a classical school at Ealing, and served an apprenticeship with his father, who was a bookseller at Windsor. After a brief residence in London, occupied in gaining a practical insight into journalism, he established, in company with his father, a newspaper, the *Windsor and Eton Express*, which he edited from 1812 to 1826. During this period he also published the *Etonian* (a magazine edited by Præd, and of which Macaulay and Nelson Coleridge, then "Eton boys," were leading writers), and the *Plain Englishman*, a cheap literary miscellany in 2 vols., chiefly written by himself (1820-22). Removing to London in 1820, Knight purchased the *Guardian* newspaper, which he edited for two years, when he sold it in order to commence business as a publisher in Pall Mall. The most important venture of the new house was *Knight's Quarterly Magazine* (1822-24), which contained some brilliant articles by Macaulay, Præd, and other Cambridge students, but came to an end after six numbers. About this time (1824) he brought out a newly discovered work by Milton on *Christian Doctrine*, which gave occasion to the remarkable article on Milton with which Macaulay commenced his triumphal career in the columns of the *Edinburgh Review*. Shortly afterward Knight conceived the plan of a national library, "a cheap series of books which should condense the information contained in voluminous and expensive works," for which he selected the subjects of about 100 volumes in history, science, art, and miscellaneous literature. The scheme being too large for a single publisher, a part was given to other houses, and it was adopted by the Society for the Diffusion of Useful Knowledge, then just formed. As a consequence of the commercial crisis of 1826, Knight's publishing-house went down like so many others, but in the following year he commenced business again as superintendent of the publications of the U. K. Society. His connection with that association lasted nearly twenty years, and was the central incident in his career. He displayed great enterprise and mental activity in projecting many of the most popular and useful works of a series which was practically the continuation of his own early scheme. The *British Almanac* and *Companion to the Almanac* were commenced in 1828, edited by Knight for forty years, and still continued as an indispensable handbook and work of reference. In 1829 he recommenced business as a publisher in his own name for the purpose of bringing out the *Library of Entertaining Knowledge*, a series for which he wrote the volumes on *Menageries* and *The Elephant*. In 1832 he commenced the *Penny Magazine*, which had an unprecedented success, reaching a sale of 200,000 within a twelvemonth, and led to the *Penny Cyclopædia*, commenced in 1833 by the U. K. Society, but of which Knight was the publisher. Originally intended as a popular manual of reference in eight handy volumes, it grew into twenty-seven bulky volumes, forming a learned and original digest of universal knowledge. With the co-operation of John Kitto and other able writers Knight next brought out a series of illustrated works, the *Pictorial Bible*, *Peagee's Book*, *History of Palestine*, *Pictorial History of England*, *London*, *Old England*, *Shakespeare*, *The Land We Live In*, etc., which had a deservedly great success. In 1854 he commenced the *English Cyclopædia*, in four divisions, according to the subject, a work of still greater value than its predecessor, the *Penny Cyclopædia*. Besides editing the *Weekly Volume* and the *Shilling Volume* series, Knight compiled *Half Hours with the Best Authors*, *Half Hours of English History*, and other works on the same plan, prepared a valuable biography of Shakespeare, and wrote a *Popular History of England* in 8 vols. (1856-62), which occupied his declining years, and may be considered his greatest original work. After 1862 he revised and re-issued his earlier productions, and wrote an interesting autobiography entitled *Passages of a Working Life during Half a Century* (3 vols., 1864-65). D. at Addlestone, Surrey, Mar. 9, 1873. Knight may fairly be esteemed one of the greatest benefactors of the English-speaking public of the nineteenth century, as the founder of that system for the generalization of knowledge which was so successfully carried into effect for many years by himself and his younger rivals, the Messrs. Chambers. His original productions, too numerous to be here mentioned, are all characterized by a vigorous style and a high degree of adaptation to the wants of the class of readers addressed. His pecuniary success was not in proportion to the enormous circulation of his works, and on some of the best of them, like the *Penny Cyclopædia*, he lost heavily. In consideration of this fact he was in 1860 appointed by the government publisher of the *London Gazette*, a sinecure post with



£1200 a year. His statue was erected in 1874 in his native city of Windsor. PORTER C. BLISS.

**Knight** (HENRY (OGGSWELL), b. at Newburyport, Mass., about 1788; spent his childhood at Rowley; graduated at Brown University in 1812; was ordained in the Episcopal Church, and published two volumes of sermons, but was never settled over a congregation. He published a volume of verse in 1809, and another, *The Broken Harp*, in 1815, both of which were republished with additions in 1821. D. 1855. He left an amusing autobiography, extracts from which were given in a volume entitled *Thorn Cottage, or the Poet's Home* (1855), which chiefly consists of sketches and verses written by his younger brother, Frederick (b. in Hampton, N. H., Oct. 9, 1791; d. at Rowley Nov. 20, 1849). The poems of Henry C. Knight are full of fine touches of character and sportive satire, which make them worthy of remembrance. (See Duyckinck's *Cyc. Am. Lit.*, vol. ii. p. 158.)

**Knight** (JONATHAN), b. in Bucks co., Pa., Nov. 22, 1787; removed at the age of fourteen, with his parents, to East Bethlehem, Washington co.; received only a limited common school education, but by close application at home made much progress in the study of mathematics, of which he was very fond. At the age of twenty-one he was engaged as a teacher, at the same time pursuing his occupation as a surveyor; in 1816 he made for the State a survey of Washington co.; was elected county commissioner 1817-20; in 1822 he was elected to the State legislature, and for six sessions was re-elected to the senate or house of representatives; U. S. commissioner (1825) for extending the National Road from Wheeling to Illinois, and for many years chief engineer of the Baltimore and Ohio R. R. D. at E. Bethlehem Nov. 22, 1868.

**Knight** (JONATHAN), M. D., b. at Norwalk, Conn., Sept. 4, 1789; graduated at Yale in 1808; studied under Dr. Rush at the medical school of the University of Pennsylvania 1811-13, became professor of anatomy and physiology at Yale College in 1813, and in 1828 was transferred to the chair of surgery; was president of the American Medical Association in 1853; was a skillful operator and an effective lecturer, but wrote little. He obtained in 1862 the establishment of a U. S. military hospital at New Haven. D. at New Haven Aug. 25, 1864.

**Knight** (RICHARD PAYNE), b. at Wormsley Grange, Herefordshire, England, in 1750; came in 1771 into possession of a handsome fortune, which he liberally employed in the formation of a unique collection of ancient coins, bronzes, and objects illustrating the pagan religions of antiquity. He wrote a curious work entitled *An Account of the Remains of the Worship of Priapus lately existing at Isernia in the Kingdom of Naples, to which is added a Dissertation on the Worship of Priapus, and its Connection with the Mystic Theology of the Ancients*, which he privately printed in 1786, and for which he was severely criticised on the score of delicacy, though at the present day the same branch of inquiry has assumed great importance, and Knight's treatise was reprinted in elegant style in New York in 1874. He was for many years a member of Parliament and trustee of the British Museum, to which he bequeathed his collection of antiques. He published several volumes of poems, which were little esteemed, a successful work on the *Principles of Taste* (1805), and an edition of Homer, with the digamma restored and supposed interpolations suppressed, which excited considerable interest, but was not accepted as authoritative. D. in London Apr. 24, 1824.

**Knight** (THOMAS ANDREW), F. R. S., brother of Richard Payne Knight, b. at Wormsley Grange, Herefordshire, England, Oct. 10, 1758; graduated at Balliol College, Oxford, and devoted his attention to vegetable and animal physiology and horticulture, of which sciences in their modern form he may almost be considered the founder in England. He contributed forty-six papers to the *Transactions of the Royal Society*, in some of which he came near anticipating the characteristic doctrines now known as *Darwinism*. His studies on the propagation of fruit trees, made public about 1795, attracted deserved attention. In 1797 he published a *Treatise on the Culture of the Apple and the Pear*, and in 1809 *Pomona Herefordensis, or Natural History of the Old Cider and Perry Forests of the County of Hereford*. He succeeded Sir Joseph Banks as president of the Horticultural Society, and d. at London May 11, 1838. After his death his *Physiological and Horticultural Papers* were collected and published (1841), with a sketch of his life, in a volume which well deserves the study of country gentlemen. "Few men," says Allibone, "have done so much to promote the science of horticulture as Mr. Knight has effected, both by precept and example."

**Knight-Service.** See **TENURE**.

**Knight's Ferry**, post-v., cap. of Stanislaus co., Cal., in a fertile wheat-region, once celebrated for rich placer gold-mines.

**Knights Templar.** See **TEMPLAR**.

**Knights'town**, post-v. of Wayne tp., Henry co., Ind., on the Pittsburg Cincinnati and St. Louis R. R. and on Blue River, 34 miles E. of Indianapolis. It has several churches, a national bank, an academy, machine-shops, and 2 weekly newspapers, and is situated in a fine farming district. Pop. 1528.

**Knights'ville**, post-v. of Van Buren tp., Clay co., Ind., is situated on the Terre Haute and Vincennes R. R., 16 miles E. of Terre Haute and 56 W. of Indianapolis. It has 3 churches, 3 schools, 3 lodges, 1 newspaper, 1 large planing-mill and sash and door factory, 2 blast furnaces with a capacity of fifty tons per day, and 1 rolling-mill giving employment to 150 men, 3 coal-shafts, 3 drug stores, and 8 other stores. It is the centre of the block-coal region of Indiana, is one of the largest shipping-points for freights between St. Louis and Indianapolis, and the N. terminus of a projected railroad to Bowling Green, Ky. It was first laid out in 1865, and is surrounded by a fine timbered and agricultural country. Pop. 1071.

LUTHER WOLFE, ED. "CLAY CO. ENTERPRISE."

**Knip'perdolling** (BERNHARD), b. in Münster, Germany, near the end of the fifteenth century, adopted in Sweden the doctrines of the Anabaptists, one of the wild fermentations of the Lutheran reform, and, returning to his native province, was associated with Matthias, Johann Boccold or Bockelson (called John of Leyden), and other fanatics in the celebrated socialistic crusade proclaimed in Münster in 1534. Knipperdolling was elected burgomaster, and subsequently stadtholder, John of Leyden being proclaimed king. Equality of property and community of wives were among the cardinal doctrines of this mad effervescence, which startled Luther, and was by him denounced in the strongest terms. On the suppression of the movement, Knipperdolling was taken prisoner and put to death, after frightful tortures, Jan. 23, 1536.

**Knit'ting** [Ang. Sax. *cnyttan* or *cnyttan*; Ger. *knuten*, *knot*; Hind. *ganthi*; Sans. *ghanthi*, a "knot"], a manner of weaving or twisting a single thread into a kind of cloth by means of steel, ivory, or wooden implements called knitting-needles, which are made of various sizes, according to the fineness of thread used and the tightness of stitch required. For flat or straight knitting two needles are employed; for round knitting, such as stockings and cuffs, three, four, or even five, are needed. Steel needles are used with silk, flax, and cotton thread; wood, bone, or ivory for most kinds of woollen yarn. As knitting consists of loops or meshes made without knots, it is easily undone, the slipping of one loop frequently causing the destruction of the whole fabric. It is extremely elastic, and therefore very suitable for gloves, stockings, and other articles in which an exact fit without compression is desirable. The work is easily learned, and by a skilful knitter, whose fingers have acquired delicacy of touch, can be carried on almost or altogether without using the eyes. It is for this reason specially adapted as an employment for the aged, and is practised with much success by the blind.

Knitting is a far more modern invention than its kindred art, netting. The exact period when it was first practised is not known, though at the time of the Rowleyan controversy much information on the subject was collected by antiquaries. Chatterton, in the poems written by him, pretending that Thomas Rowley, who lived in the fifteenth century, was their author, mentioned knit stockings:

"She said, as her white hands white hosen were knitting,  
What pleasure it is to be married!"—*Edo.* xxxvii.

and his antagonists used this as an argument against his veracity, asserting that knit hose were not known until the sixteenth century. (For particulars of this controversy see the *Gentleman's Magazine*, 1782-83.) Many antiquaries affirm that knitting was invented in Scotland, and thence introduced into France; others say that it is of Spanish origin, and was first known in England in the reign of Henry VIII. But in a rare collection of the costumes of Edward VI. is one specifying, among other woollen articles, "knitte hose, knitte petticoates, knitte gloves, knitte sleeves." In 1527 the French knitters formed themselves into a corporation, styled "Communauté des Maîtres Bonnetiers en Tricot," choosing for their patron St. Francis, who, according to legends, was the second son of Eugenius, a Scottish king in the seventh century. St. Francis became a hermit, and lived at Menax in France. Wherever and whenever knitting was invented, it is certain that German women of all ages and classes excel in the art above other nations. Very young German children are sent to knitting schools, and stockings are knitted by little creatures who have



hardly learned how to wear out those articles by walking in them. Such schools have been established in Ireland and Scotland, but only for the children of the poor. Excellent directions for both knitting and netting will be found in Madame Golbaud's work on those subjects (London, 1870, 8vo).

JANET TUCKER.

**Knob Creek**, post-tp., Cleaveland co., N. C. Pop. 638.

**Knobel** (KARL AUGUST), D. D., b. near Sorau, Silesia, Aug. 7, 1807; studied at the University of Breslau, where he became a professor of theology in 1831, and at Giessen in 1839. His work on *Eccelesiastes* (1836), *Hebrew Prophecy* (1837), and his *Commentaries on Isaiah* (1843), *Genesis* (1852), *Exodus and Leviticus* (1857), *Numbers, Deuteronomy, and Joshua* (1861), and *Genealogical Tables of Genesis* (1850), are among the most learned productions of the rationalistic school of theology. D. at Giessen May 25, 1863.

**Knobelsdorff, von** (HANS GEORG WENZESLAUS), BARON, b. at Kuchädel, in the Prussian province of Brandenburg, Feb. 17, 1697; entered the Prussian army, and was a captain when in 1730 he left the military career in order to study art, especially painting and architecture. After travelling through France and Italy, he joined the crown prince at Rheinsberg, and soon became a favorite of his. On the accession of Frederick II. to the throne in 1740, Knobelsdorff was made superintendent of all the royal buildings, and planned the Thiergarten at Berlin, and built Sans Souci at Potsdam and the opera-house in Berlin, besides other minor buildings. D. Sept. 16, 1753.

**Knob Nos'ter**, post-v. of Washington tp., Johnson co., Mo., situated on the Missouri Pacific R. R., 208 miles W. of St. Louis and 78 miles E. of Kansas City, has 6 churches, 1 national bank, 1 weekly newspaper (agricultural), 1 flour-mill, 3 hotels, a fine public-school building, and the usual number of stores, built mostly of brick. Pop. 911. J. R. CORDELL, Ed. "MISSOURI FARMER."

**Knobs**, tp. of Yadkin co., N. C. Pop. 1451.

**Knob View**, post-tp. of Crawford co., Mo. Pop. 515.

**Knollys** (HANSERD), b. at Chalkwell, Lincolnshire, England, in 1598; was educated at Cambridge University, and became an Anglican priest, but was ejected for non-conformity, and compelled in 1638 to flee to New England. In Boston he was early involved in a controversy with the authorities, and was afterwards named by Cotton Mather "Mr. Absurd Knowless." Knollys was (1638-41) the first minister of Dover, N. H. Thence he went to Long Island, and in 1641 returned to London, where he was for a long time a successful Baptist pastor. D. Sept. 19, 1691. He was a man of bold, generous, and liberal spirit, an accomplished scholar, and an able preacher and teacher of youth. He wrote *A Flowing Fire in Zion* (1646), a small Hebrew grammar (1648), and an autobiography, finished by Kilfin (1692). The Hanserd Knollys Society of London, formed in 1845, reprints early Baptist writings.

**Knollys, or Knolles** (RICHARD), b. at Cold-Ashby, Northamptonshire, England, about 1543; graduated in 1565 at Lincoln College, Oxford, of which he was chosen fellow; was appointed head-master of the Free Grammar School at Sandwich, Kent, where he spent a useful life, and d. in June, 1610. He wrote a *Compendium of Lute, Gr., and Heb. Grammar, with Roots* (1600), and translated Camden's *Britannia* into English, the MS. of which is preserved at the Ashmolean Museum at Oxford; besides several other books on Oriental subjects. But the only work for which Knollys is now remembered is the *Generall Historie of the Turkes, etc.* (folio, 1603), which was reprinted in 1610, 1631, and 1638. The best edition is the 6th, in 3 vols. (1687-1700), with a continuation by Sir Paul Rycaut. This book was commended by Dr. Johnson in the *Rambler* (No. 122) as "displaying all the excellence that narration can admit."

**Knot**, a twisting or entwining of one or more pieces of cord, or the looping of such cord around some other substance, in such a way that the two parts shall be held together. Knots are of special importance on shipboard, and the number of them in use among seamen is very great. To these a great number of names are given. Much skill is required in the adjustment of some of the kinds.

**Knot**, in measuring a ship's speed, represents a nautical mile. On the ship's log-line there are 120 knots to the mile; consequently, the number of knots which run out in a half minute represent approximately the number of geographical miles per hour in the ship's rate of speed.

**Knot, Grayback, or Robin Snipe**, the *Tringa canuta*, a sandpiper of the Atlantic States and of Europe. It is some ten inches long, and is a good game-bird. The young birds in season are delicious for the table. The place of breeding of this bird is unknown.

**Knott** (J. PROCTOR), b. in Marion co., Ky., Aug. 29, 1830; studied law; removed to Missouri in 1850; was attorney-general of that State in 1860; returned to Ken-

tucky in 1862, and was a Democratic Representative in Congress from 1867 to 1871, and again elected in 1874. He won a national reputation as a humorist by several of his speeches in Congress.

**Knout** [Russ. *knut*], an instrument of punishment in Russia, varying in form, but often consisting of a wide and pointed piece composed of thongs of leather braided with wire, soaked in milk, and dried hard. This is swung by a handle, and when applied to the back of a culprit cuts like a knife. Criminals were often scourged to death by this instrument, which at present is less frequently used.

**Knowledge**. This term includes the possessions of the mind derived through its several activities of sensuous perception, reflection, understanding, and speculation, in so far as the same relate to truth. It should be distinguished from mere feeling and from opinion or impression. Knowledge implies the exercise of discrimination and comparison in regard to ideas, noting their agreement and disagreement. Feeling is limited to the subjective, and relates only to modifications of the feeling subject, there being no antithesis of subject and object in it. When the Ego perceives itself as feeling, it becomes conscious, and cognition takes the place of simple feeling. Inference accompanies all grades of knowing, although it is merely implicit in the lowest stages. Hence, all knowledge contains the results of inference, and is based upon it to some extent. The realm of truth which knowledge has for its object includes three departments: I. Nature; II. Spirit or Human Mind; III. Pure Ideas or General Principles. Knowledge implies conviction reached by the perception of sufficient grounds. Certitude must be distinguished from truth, as a mere phase of it. It appertains to the immediate or external, and hence to the phenomenal or transitory. Such knowledge as is derived from certitude or immediate knowing lacks, therefore, the unity of system, and is partial, needing modification in each particular through other particulars and through the whole. Inasmuch as there is unity in existence, natural and spiritual, an isolated knowledge of particulars is not a true or adequate knowledge. Since existences are interdependent, each one being conditioned by all others, a true knowledge can exist only in a systematic form—that of science. In science each thing or province of things is treated in its relations to the others and to the whole. Thus, by reason of the relativity of particular existences, a true knowledge of them must deal with relations, and in this sense knowledge may be called relative, not on account of its inadequacy, but rather on account of its truth. The "relativity of knowledge" is a doctrine that has been quite well known since the time of the Sophists of Greece. It has taken a subjective direction in modern times. It has been held (a) that knowledge is relative, because we cannot cognize existence in itself absolutely, but only in its modes; (b) that it is relative, because we can know only what stands in relation to our faculties; (c) because the subjective constitution of our faculties adds elements and modifications to the matter derived from sensation. These positions have been generalized in the doctrine of the relativity of knowledge based on the tenet that we know only phenomena, and not "things in themselves." Knowledge has been further classified according to its origin in the psychological activities: (1) the intuitive—sensuous perception, or consciousness; (2) the discursive—inference and generalization; (3) the speculative—synthetical and analytical processes combined in one. Thus arise various distinctions, such as a priori, a posteriori, abstract, mediated, intuitive, representative, empirical, apodictic, etc. etc. (See MIND.) W. T. HARRIS.

**Knowles** (JAMES DAVIS), b. at Providence, R. I., in July, 1798; graduated at Columbian College, D. C., 1824. In Oct., 1825, he became pastor of the Second Baptist church in Boston; in 1832 was appointed professor of sacred rhetoric at Newton Theological Institute in Massachusetts. He published memoirs of the first Mrs. Adoniram Judson (Ann Hasseltine) and of Roger Williams; edited the *Christian Review*, and d. at Newton, Mass., May 9, 1838.

**Knowles** (JAMES SHERIDAN), b. at Cork, Ireland, in 1784. His father, James Knowles, a cousin of R. B. Sheridan, was a schoolmaster and teacher of elocution, enjoying a high reputation, and was editor of an improved edition of Walker's *Pronouncing Dictionary*. In 1792 the family removed to London. At the age of twelve young Knowles composed a play, which was represented by an amateur company of schoolboys. In 1806 he made his first appearance as an actor at Dublin, and afterward taught elocution at Belfast and Glasgow, without attaining eminence in either profession. He had written four or five dramas which have not been preserved, and had published a small volume of fugitive poetry, when in 1815 he met with his first success by the production of *Caius Gracchus* at Belfast. In 1820 *Virginia* was produced at Drury Lane, with Macready in the leading part, and Knowles was thenceforward



recognized as one of the chief dramatic authors of England. He produced fourteen other dramas, some of which were undoubtedly among the best "acting plays" of the time, though none displayed any exceptional poetic genius, and all were justly amenable to the charge of systematic violation of the "unities." The plots were so involved in their construction as to require a great effort for their comprehension. Knowles sometimes took part in representing his own dramas, and made a successful theatrical tour in the U. S. In 1843 his *Dramatic Works* were collected into three volumes revised ed. 2 vols., 1856, and in 1845 he abandoned the stage from conscientious scruples, devoting himself to literature, and in 1849 a pension of £200 was granted him. In 1852 he joined the Baptist denomination, and became a preacher distinguished for religious fervor. His last years were passed in retirement, on account of ill-health, at Torquay, Devonshire, where he d. Nov. 20, 1862. His dramas, besides those already mentioned, are—*William Tell* (1825), *The Boy's Daughter of Bethel Green* (1828), *Alfred the Great* (1831), *The Hunchback* (1832), *The Wife, a Tale of Mantua* (1833), *The Daughter (1836)*, *The Love Chase* (1837), *Woman's Wit* (1838), *The Maid of Marston* (1838), *Love* (1839), *John of Procida* (1840), *Old Moods* (1841), *The Rose of Acon* (1842), and *The Secretary* (1843). He also published two novels—*Henry Fortescue* and *George Lovell* (1847), and two controversial works against Romanism, *The Rock of Rome, or the Arch-Heretic* (1849), and *The Idol Demolished by its own Priest* (1851), the latter volume being a reply to Cardinal Wiseman's *Lectures on Transubstantiation*. PORTER C. BLISS.

**Knowlesville**, post v. of Ridgeway tp., Orleans co., N. Y., on the New York Central R. R. and the Erie Canal.

**Knowlton**, post v. and cap. of Brown co., Quebec, Canada. It is the seat of an academy. Pop. about 500.

**Knowlton**, post tp. of Warren co., N. J. Pop. 1691.

**Knowlton**, post tp. of Marathon co., Wis. Pop. 166.

**Know-Nothings**, the name assumed by a secret political society in the U. S. first organized in 1853, and which appeared in the elections of 1854 as a well-disciplined party, and swept several of the Northern States, including New York. The cardinal idea of the society was opposition to foreign citizenship. In the Presidential campaign of 1856 the Know-Nothings appeared as the "American party," presenting Millard Fillmore as its candidate, but the growth of the slavery issue extinguished the question of foreign citizenship, and the party speedily died a natural death.

**Knox**, county of N. W. Central Illinois. Area, 720 square miles. It is fertile and undulating, and contains abundant supplies of coal, with considerable timber. Cattle, grain, wool, and hay are staple products. The manufactures include carriages, clothing, flour, saddlery, furniture, brick, and metallic wares. The county is traversed by the Chicago Burlington and Quincy and the Peoria and Oquawka R. Rs. Cap. Galesburg. Pop. 39,522.

**Knox**, county of S. W. Indiana, bounded on the E. by the W. fork of White River, on the S. by White River, and on the W. by the Wabash, which separates it from Illinois. Area, 516 square miles. It is partly level and partly rolling, and is very fertile. Cattle, grain, and wool are staple products. The county is traversed by several railroads, centering at Vincennes, the capital. Pop. 21,562.

**Knox**, county of S. E. Kentucky. Area, about 340 square miles. It is a mountain region, with iron, coal, salt, and limestone. Livestock and corn are staple products. The county is traversed by the Cumberland River. Cap. Barbourville. Pop. 8,294.

**Knox**, county of Maine, bounded on the S. E. by Penobscot Bay and the Atlantic Ocean, and including numerous islands. Area, about 350 square miles. It is uneven, but generally fertile. Wool, potatoes, and live-stock are staple products. The manufactures include shipping, ships' furniture, cooperage, lime, and lumber. The fisheries and foreign and coastwise commerce employ a considerable part of the population. The county is traversed by the Knox and Lincoln R. R. Cap. Rockland. Pop. 10,823.

**Knox**, county of N. E. Missouri. Area, 501 square miles. It is very fertile, and is generally undulating. It is in part timbered land. Cattle, grain, tobacco, and wool are staple products. Carriages, wagons, and brick are leading articles of manufacture. It is traversed by the Quincy Missouri and Pacific R. R. Cap. Edina. Pop. 10,974.

**Knox**, county of Nebraska, formerly called L'Eau qui Court. Area, 1008 square miles. It is separated from Dakota on the N. by the Niobrara and Missouri rivers. It has a good soil, and is adapted to grain and stock raising. Cap. Niobrara. Pop. 261.

**Knox**, a central county in Ohio, traversed by the Baltimore and Ohio (Lake Erie division) and the Cleveland Mt. Vernon and Delaware R. Rs., intersected by the Vernon Walhonding and Licking (N. fork) rivers. The surface is undulating and the soil rich. The chief agricultural products are Indian corn, wheat, oats, potatoes, tobacco, and hay. Nearly 700,000 pounds of wool are annually clipped, 600,000 pounds of maple-sugar and 800,000 pounds of butter are produced. It has 10,000 horses, 8500 milch cattle, 150,000 sheep, and 30,000 swine; 24 carriage-factories and a considerable number of manufactures. Cap. Mt. Vernon. Area, 525 square miles. Pop. 26,333.

**Knox**, county of E. Tennessee. Area, 510 square miles. It is in the beautiful and fertile valley of the Holston River, which traverses it. It has several mountain-ridges, and contains abundant iron ore and marble. Cattle, grain, tobacco, and wool are staple products. The county is traversed by the various railroads centering at Knoxville, the capital. Pop. 28,990.

**Knox**, an organized county of N. Texas, traversed by the Brazos River. Area, 1275 square miles. Its surface is hilly and broken, and partly of undulating prairie-land, with little timber. It is attached for judicial purposes to Montague co.

**Knox**, tp. of Knox co., Ill. Pop. 2881.

**Knox**, tp. of Jay co., Ind. Pop. 685.

**Knox**, post-v. of Centre tp., cap. of Stark co., Ind., on the S. bank of the Yellow River, 7 miles S. of the Pittsburg Fort Wayne and Chicago R. R. It has a good court-house and school house, 2 hotels, 1 newspaper, and a number of stores and shops. Lands in the vicinity are cheap and well adapted to stock-raising, as also to wheat, corn, and potatoes. Pop. 241.

O. MUSSELMAN, ED. "STARK CO. LEDGER."

**Knox**, tp. of Clarke co., Ia. Pop. 777.

**Knox**, tp. of Pottawattamie co., Ia. Pop. 961.

**Knox**, post tp. of Waldo co., Me., 12 miles N. W. of Belfast. It has manufactures of lumber and carriages. Pop. 899.

**Knox**, post tp. of Albany co., N. Y. It has 6 churches and several small villages, and is on the Albany and Susquehanna R. R., 17 miles W. of Albany. The village has an academy, 4 churches, and a woollen mill. Pop. 1656.

**Knox**, tp. of Columbiana co., O. Pop. 2151.

**Knox**, tp. of Guernsey co., O. Pop. 810.

**Knox**, tp. of Holmes co., O. Pop. 964.

**Knox**, tp. of Jefferson co., O. Pop. 1301.

**Knox**, tp. of Vinton co., O. Pop. 539.

**Knox**, post tp. of Clarion co., Pa. Pop. 656.

**Knox**, tp. of Clearfield co., Pa. Pop. 587.

**Knox**, tp. of Jefferson co., Pa. Pop. 863.

**KNOX (HENRY)**, GENERAL, b. in Boston, Mass., July 25, 1750; received a common school education; became a bookseller in Boston and an officer in a militia body of grenadiers, having devoted much study to military tactics. When the battle of Bunker Hill was impending he made his way secretly out of Boston, offered his services to Maj.-Gen. Artemus Ward at Cambridge, and acted as a volunteer aid to that general during the battle. In the siege of Boston he was engaged as engineer and artillery officer in Gridley's regiment, and attracted the attention of Washington by his skill in fortification. He was soon after placed in command of the artillery in New York, took a brilliant part in the battles of Trenton and Princeton, and was thereupon elected by Congress brigadier-general of artillery, and sent to New England to raise a battalion of that arm. In the battles of Brandywine, Germantown, and Monmouth the artillery under Knox bore a leading part. He was a member of the court-martial for the trial of André; was repeatedly sent to New England as commissioner to obtain money and recruits; was at the battle of Yorktown, after which he was made major-general, put in command at West Point, and appointed to superintend the disbanding of the continental armies, and commissioner to arrange with Sir Guy Carleton the terms of the surrender of New York City. In 1785 he succeeded Gen. Lincoln as secretary of war and of the navy, retaining that post for six years of Washington's administration. In 1786 he removed to St. George's in Maine, where he acquired an enormous landed estate, and finally settled at Thomaston, Me., where he d. Oct. 20, 1806. See his *Life and Correspondence*, by Francis S. Drake, Boston, 1874.

**KNOX (JOHN)**, b. at Gallow, in East Lothian, in 1505. His education began at Haddo station. At the University of St. Andrews (1524) he learned from John Major, and never forgot, that counsels are above power, and that nations give authority to kings, can depose kings, and put them to



death. Before 1530 he was ordained priest, in advance of the canonical age. From his favorite Fathers, Jerome and Augustine, he went to Holy Scripture, and the progress of his investigation into those questions which were then convulsing Europe became very marked about 1535. The result was, that he made a distinct avowal of his Protestant convictions in 1542, withdrew from his position as teacher at St. Andrew's, and sought a covert from the wrath of Cardinal Beaton. The shelter needed he found in the house of Hugh Douglas (1543-45). This was at Longniddry, the ruins of whose chapel are still known as "Knox's kirk." Wishart, his dear friend, was tried for heresy Mar. 1, and burned to death Mar. 28, 1545. Cardinal Beaton was assassinated May 29, 1546, and the castle of St. Andrew's was held by Norman Leslie and the other conspirators. Knox took refuge in the castle at Easter, 1547, acted as its faithful chaplain, and when it was surrendered to the French, July, 1547, was among the prisoners. Under the charge of being concerned in the death of the cardinal he was condemned to the galleys and chained to the oar. Sickness was added to his trials (1548). The "sobs of his heart" were heavy when the galley lay tossing in sight of the white steeple of St. Andrew's, "where God first in public opened his mouth to His glory," yet that heart was strong in the uttered assurance, which became prophecy, that Knox should glorify God's name in the same place. He was liberated in Feb., 1549, went to England, was recommended to the English council, and, though unordained as a Protestant minister, was sent by Cranmer to preach at Berwick—out of Scotland, but barely out of it. There he battled with popery, and made many converts. Cited by Tostall, he defended the cause of the Reformation with such ability that he was appointed one of Edward's chaplains (Dec., 1551). He was consulted about the Book of Common Prayer and the Articles. He was summoned to London Apr., 1553, and was in full royal favor at the time of Edward's death, July 6, 1553; he had declined a bishopric. He was married 1553 to Marjory, daughter of Richard Bowes (brother of Sir Robert) of Berwick. The accession of Mary (1553) made England a dangerous place for Knox. He had wisdom as well as bravery. He landed at Dieppe Jan. 20, 1554. In February he went to Switzerland, and was everywhere cordially received by the Reformed divines. In Geneva he found a congenial friend in Calvin. He took temporary charge (Nov., 1554) of the church of English exiles at Frankfort-on-the-Main. His *Faithful Admonition unto the Professors of God's Truth in England* appeared this year. He recrossed the Channel Aug., 1555, saw his wife, preached, and dispensed the Lord's Supper. He returned to the Continent July, 1556, accompanied by his wife. The clergy of Scotland adjudged his body to the flames and burned him in effigy. For the next two years, the most peaceful of his life, he was pastor of the English church at Geneva. The Geneva New Testament (1557) and the Bible (1560) were influenced by him. In 1558 appeared his *First Blast of the Trumpet against the Monstrous Regiment of Women*. The women specially aimed at were Mary of Guise, queen dowager and regent of Scotland, the princess Mary, then heiress, afterwards occupant of its throne, and Queen Mary, Knox's "Jezebel" of England. The prospects of the Reformation seeming brighter, Knox was recalled, and (Jan., 1559) for the last time left Geneva for Scotland. He was refused passage through England, whose "secret and assured friend he had been in cases which herself could not have remedied"—refused under the regiment of Elizabeth, who had just come to the throne, and who was yet to owe as much to Knox as perhaps to any man of the time. Knox in his *Blast* had made too sweeping generalities from particular cases, and Elizabeth stood up for her sex. Knox landed at Leith May 2, and was at once proclaimed an outlaw and rebel. His preaching at Perth was followed by an insurrection, in which the "rascal multitude" committed a number of acts of violence. He was forbidden to preach at St. Andrew's June 9, and preached there with the greater zest June 10-13, and the officials and people destroyed the images and pictures and pulled down the monastery on the 14th. Though the direct personal influence of Knox produced a relatively peaceful abolition of the old worship, the storm against "idolatry" involved the destruction of many precious works of art. "The rooks' nests were pulled down." Knox was formally ordained at Edinburgh in 1560. The Confession of Faith, mainly his work, was adopted by the Parliament Aug. 17. The Reformation was officially established Aug. 24. The first General Assembly of the Kirk was held Dec. 20. Of the forty members, there were but six ministers, of whom Knox was one. Private sorrow came fast on public joy, for this same month he lost his wife. The clouds which had been swept away in 1560 began to gather again in the following year. The young queen of Scotland had returned from France (Aug. 21, 1561).

Never was there a less congenial conjunction between the throne and the people. The first interview of Knox with her took place early in Sept., 1561, and another May 2, 1562, after the queen had been told of a sermon in which he condemned the festivities in the palace, believed to have been prompted by the massacre of the French Protestants in March at Vassy. He did much to preserve the peace in the South while the rebellion of the earl of Huntly was crushed in the North (1562). At Lochleven, Knox again saw the queen (May 2, 1563), who exerted on him all her powers of pleasing. Her success with Knox was little, but it was great with her Protestant nobles at the Parliament May 20, and Knox came to an open rupture with the earl of Murray, whom he had regarded as one of the greatest pillars of the truth. In political sagacity and insight into character Knox took rank with the greatest statesmen of his time. He now spoke in the pulpit with freedom of the apostasy of the nobility, and of the reputed marriage of the queen to a papist. Universal terror and offence followed. Knox was deserted by some of his nearest friends. The queen, whose hand had almost grasped the triumph for which she labored, was overwhelmed with anger that this man should defy and thwart her and the nobles she had won to her side. She sent for him, but she was now too much wounded and angered to dissemble. "I cannot get quit of you," she cried: "I vow to God I shall be once revenged!" and could speak no more for weeping. The moral trial of the position of Knox at such a time is almost inconceivable. It was beyond any mere test of courage. In personal matters Knox was of a loving nature. But as the face of angry men could not move him, neither could the beauty of the young queen charm him, nor her tears melt him. At this time powerful efforts were made to crush Knox. A calumny against his personal purity was set afloat, but was promptly met and exposed. In December he was accused of high treason, and the queen thought she should now "make him weep" whom her tears could not move. But the majesty of Knox's heroic nature made itself felt in the council of the nobles. Knox was not only acquitted, but commended, and "that night was neither dancing nor fiddling in the court." The same year he published an account of his disputation of the year previous with Kennedy, abbot of Cromaguel. Knox married a second time (Mar., 1564). His wife was Margaret Stewart, daughter of Knox's friend, who stood by him when all other men forsook him—Lord Ochiltree, who was of the blood royal by the second son of Robert II. Alliance with kings did not make Knox more courtly. He was brought before the privy council for a sermon preached in St. Giles's (Aug. 19, 1565) in the presence of Darnley, in which he had quoted certain texts which the new-married king, not without good reason, applied to himself and the queen, and was violently offended. Knox was prohibited from preaching while the royal pair remained in the city. They left before Sunday, and when they returned they wisely let the matter drop, for the pulpit of Knox had grown mightier than the throne. Mary entered the Catholic League for the extirpation of the Protestants Feb. 2, 1566. Rizzio was assassinated Mar. 9. On the return of the queen, Knox left Edinburgh. In December he visited his son in England. Knox's prophecy was fulfilled. The queen became the instrument of Darnley's overthrow; he was murdered Feb. 10, 1567. The queen married Bothwell May 15, and one month later, forsaken by her husband, was a prisoner at Lochleven Castle. Ten days later (June 25) Knox was present at the General Assembly in Edinburgh. He preached at the coronation of James VI., an infant thirteen months old (July 29). Knox urged the capital arraignment of Mary on the charge of adultery and murder. The assassination of the regent Murray (Jan. 23, 1570) by a man whom he had pardoned on the persuasion of Knox, and the civil troubles which followed it, greatly depressed him. In October he had a stroke of apoplexy, which left him weak, but did not long keep him from the pulpit. He had enough of his old vigor and his old mode of using it to give such offence to Kirkcaldy, governor of the castle, as to make it prudent to retire (May 5, 1571) to St. Andrew's. Here he published his answer to Tyrie. He returned to Edinburgh Aug., 1572. The tidings of the massacre of St. Bartholomew (Aug. 24) helped yet further to break his declining strength. He made his last appearance in the pulpit Nov. 9, and preached with no abatement of intellectual power. Sick and exhausted, leaning on his staff and the arm of an attendant, with a loving multitude crowding around him, he crept to his home, and there, when speech failed him, with his hand uplifted in token of the faith for which he had fought, he breathed his last in perfect peace, Nov. 24, 1572—one of the most heroic men of a heroic race. Two days later he was buried at St. Giles's. He was followed to the grave by an immense body of mourners, nobles and people, and then were uttered by



Morton, the new regent, the words "he neither feared nor flattered any flesh," which the world has accepted in its later, more graceful phrasing, as the epitome of Knox's character: "There lies he who never feared the face of man." The precise spot where he was buried is no longer known. It is said the highway came to pass over it. Knox was physically small and feeble. His voice was weak. It was its moral power, by which, as the English ambassador wrote to Cecil, "the voice of one man is able in an hour to put more life in us than six hundred trumpets." Knox was profoundly pious, indomitable in purpose, yet not without geniality and humor, not without sensibility and tenderness, and that vein of melancholy which so often attends them. He hated bad things rather than bad men. His animosities were the animosities of principle. None feared him but the enemies of truth. He was above all pettiness. He was a man of thought and a man of action, a statesman as well as a divine, with an acuteness of insight into character and a comprehension of the movements of Providence which gave him almost a prophetic forecast. He abhorred every species of tyranny, and roused a spirit in his native land which broke violence with violence. He had the roughness needed for a rough time and a fierce people. He was intolerant to the intolerant, and, exacting in his conception of his own duty, he was exacting of others. His writings are full of vigor, originality, and simplicity. In his intellectual tone and theological opinions he was in affinity with Calvin, in his personal heroism he resembled Luther; and next to Luther's his story stirs the soul in this great battle-roll of the Reformation. He wanted nothing but a wider sphere to take rank in the first order of the historic men of his age. Perhaps a wider sphere could not have been given him, for as none but Scotland could have produced a Knox, none but Scotland would have endured him. Such a direct and daring conflict as Knox waged with the great would hardly have found out of Scotland such a support; but not in Scotland itself could any man but Knox have developed it. The estimates of so strong a man in so stirring a time, in which the political and religious antagonisms were so violent, vary, of necessity, very much. Hume: "His political principles were as full of sedition as his theological were full of rage and bigotry." Whitaker: "A holy savage." "I happened to ask," says Boswell, "where John Knox was buried; Dr. Johnson burst out, 'I hope in the highway.'" Robertson: "Zeal, intrepidity, disinterestedness, were virtues which he possessed in an eminent degree." Melville: "That most notable prophet and apostle of our nation, John Knox." Bannatyne: "The light of Scotland, the comfort of the Church, the mirror of godliness." Smeton: "I know not if ever so much piety and genius were lodged in so frail and weak a body." Froude: "No grander figure can be found, in the entire history of the Reformation in this island, than that of Knox. But for him the Reformation would have been overthrown among ourselves. . . . He raised the poor commons of his country into a stern and rugged people, who might be hard, narrow, superstitious, and fanatical, but who, nevertheless, were men whom neither king, noble, nor priest could force again to submit to tyranny." Carlyle: "The most Scottish of Scots. . . . Nothing hypocritical, foolish, or untrue can find harbor in this man; a pure and manly silent tenderness of affection is in him; touches of genial humor are not wanting under his severe austerity. A most clear cut, hardy, distinct, and effective man; fearing God without any other fear. There is in Knox throughout the spirit of an old Hebrew prophet—spirit almost altogether unique among modern men. A Heaven-inspired seer and heroic leader of men."

Knox's *History of the Reformation in Scotland* appeared in 1586. His entire works have been edited by Laing (1846-55). The older sketches of Knox are by Beza, Adam, and Verheliden. The best *Lives* are by McCrie (1814), Niemeyer (1821), and Brandes (1862). The general histories of Great Britain and of England covering Knox's time touch upon him with more or less fulness.—Hume, Lingard, Froude. The general histories of the English Reformation and Church of England.—Burnet, Short; of the Protestant Church and sects of Great Britain.—Weber (1845-52); more particularly the histories of Scotland, general—as Robertson, Tytler, Von Raumer, Burton; or special—Thomas McCrie, Jr., *Sketches of Scottish Church History* (1844-46), D'Aubigné's *Three Centuries of Struggle* (1850); Rudloff (2d ed., 1854), Küstlin (1852), are of value. Carlyle has an article in *Fraser's Magazine* for Apr., 1875, on the portraits of John Knox, published by Harper & Bros., 1875. Lorimer, *John Knox and the Church of England* (Lond., 1875), has used important papers to illustrate his work in her pulpit and his influence in various respects.

C. P. KRAUTH.

**Knox** (JOHN JAY), b. in Knoxboro', Oneida co., N. Y.,

Mar. 19, 1828; graduated at Hamilton College in 1849; was a private banker or an officer of a bank until 1862, when he received an appointment from Secretary Chase, and subsequently had charge of the mint coinage correspondence of the treasury department; in 1867 he was appointed deputy comptroller of the currency; and in 1870 his two reports on the mint service, together with a codification of the mint and coinage laws of the U. S., with many important amendments, were published by order of Congress. The bill which he proposed was subsequently passed with a few modifications, and is known as "the Coinage Act of 1873." In 1872 he was appointed comptroller of the currency, and in 1877 reappointed. His six reports published by Congress contain historical sketches of the two banks of the U. S. and of the State and national systems of banking, and statistical information of banking and currency in this country, from the earliest date to the present time.

**Knox** (LOREN L.), D. D., b. in Nelson, N. Y., Jan. 8, 1811; graduated at Wesleyan University 1838; tutor 1838-40; held numerous pastorates and several principalships of seminaries of the Methodist Episcopal Church; was professor in Lawrence University, Appleton, Wis., 1858-64, and was placed on the superannuated list of his Church in 1871.

**Knox Corners** (KNOXBOROUGH P. O.), a v. of Augusta tp., Oneida co., N. Y. Pop. 208.

**Knoxville**, post-tp. of Greene co., Ala. Pop. 1032.

**Knoxville**, post v., cap. of Crawford co., Ga., 15 miles from Fort Valley Station on the South-western R. R.

**Knoxville**, city of Knox tp., Knox co., Ill., 50 miles W. of Peoria and 50 E. of Burlington, Ia. It has 1 newspaper (established 1856), 1 national bank, 6 institutions of learning, 7 churches, 4 hotels, 7 wagon and carriage shops, 2 flour-mills, and 1 woollen-mill. It is largely engaged in coal-mining and wagon manufacturing; is the seat of the Episcopal diocesan school of Illinois for girls, with an attendance of over 100 pupils. Pop. 1883.

O. L. CAMPBELL, FOREMAN "KNOX CO. REPUBLICAN."

**Knoxville**, post-v. and tp., cap. of Marion co., Ia., 40 miles S. E. of Des Moines. It has 2 national banks, 2 weekly newspapers, 6 churches, 3 hotels, 3 steam-mills, 2 woollen-factories, an iron-foundry, more than 20 stores of different kinds. It is situated on the line of the A. K. and D. R. R. Pop. of v. 800; of tp. 1750.

J. L. McCORMACK, ED. "MARION CO. DEMOCRAT."

**Knoxville**, post-v. of Frederick co., Md., on the Potomac River, the Chesapeake and Ohio Canal, and the Baltimore and Ohio R. R. Pop. 320.

**Knoxville**, post-v. and tp. of Ray co., Mo. Pop. 2469.

**Knoxville** (STOCKBRIDGE P. O.), a v. of Stockbridge tp., Madison co., N. Y. It has 3 churches. Pop. 211.

**Knoxville**, a v. of Corning tp., Steuben co., N. Y., on the Chemung River, opposite Corning, with which it is connected by a bridge. Pop. 785.

**Knoxville**, post-v. of Knox tp., Jefferson co., O. Pop. 165.

**Knoxville**, post-b. of Deerfield tp., Tioga co., Pa. Pop. 400.

**Knoxville**, city, cap. of Knox co., Tenn., is situated at the head of navigation on the Tennessee River, on the East Tennessee Virginia and Georgia R. R., and on the projected road from Cincinnati to Charleston, the latter road being completed 40 miles N. to Careyville coal-mines, and 16 miles S. to Maryville. It has 17 churches, 5 banks, 2 daily and 4 weekly newspapers, 3 hotels, an opera-house, numerous and enterprising wholesale houses, a rolling-mill, 3 foundries, a paper-mill, a carriage-factory, sash and blind factories, extensive railroad car and repair shops, several fine flour-mills, and many other industrial establishments. Knoxville is the third city of Tennessee in size, the centre of the great valley of East Tennessee, one of the most beautiful and fertile regions of the U. S., and is noted for the number of its public establishments, which include a marble U. S. court-house (and post-office) recently completed at a cost of \$400,000, in which the Federal courts and the State supreme court meet; the East Tennessee University, the State Agricultural College (\$500,000 endowment), a female institute, and several fine city free schools, free public library, State deaf and dumb school and insane asylum, and an orphans' home. Knoxville University, well endowed by the M. E. Church, is to be erected here, as also a city hospital. It is one of the most important commercial and manufacturing centres in the South. Pop. 8682.

REUBEN A. RICKS, FOS. "DAILY CHRONICLE."

**Knoxville Mines**, a v. of Lake co., Cal. Pop. 164.

**Knyphausen** (DADO HENRY), BARON, b. in Alsace in 1730; entered the military service of Prussia at an early



age, and took part in the campaigns of Frederick the Great against Austria; became lieutenant-general, and was second in command of the Hessian and Waldeck troops sent to America during the Revolutionary war; was engaged in the battles of Long Island, White Plains, Fort Washington, Brandywine, and Monmouth, and was temporarily in command of the forces in New York City in June, 1780, when he made two raids into New Jersey, with but slight advantage beyond the sacking of Connecticut Farms and the burning of Springfield. He was an excellent commanding officer, and notable for taciturnity. D. at Berlin, Prussia, May 2, 1789.

**Koa'la**, the *Phascogaleus cinereus*, a syndactyl marsupial mammal of Australia and of the family Phascolaretidae. It is ursine in its general appearance, nocturnal and arboreal in its habits, and extremely slow in its movements. It is a marsupial sloth, but we are told that it sometimes comes to the earth and digs up succulent roots as food. The female carries her single whelp for a time in the pouch, but soon transfers it to her back, where it clings by the long coarse hair.

**Ko'bell, von** (FRANZ), b. at Munich July 19, 1803, and became professor of mineralogy at the university of his native city in 1834. Of the *Geschichte der Wissenschaften in Deutschland*, a work which was undertaken under the auspices of King Max of Bavaria, he wrote *Geschichte der Mineralogie von 1650 bis 1860*; he also published several popular papers on mineralogy.

**Ko'bold** [Ger.], in German legends, a kind of elf which in some places was believed to be attached to some particular house or place. In general the kobolds were beneficent, but some were malicious. They particularly haunted the mines; they were little, decrepit old men and women, dressed generally in miners' clothes. They heaped up precious stones and valuable metals; and though they dreaded to be seen by men, they were fond of doing mankind favors in secret.

**Ko'brin**, or **Kobryn**, town of Russian Poland, in the government of Grodno, on the Machazica, has some trade and 7550 inhabitants.

**Koch'ville**, tp. of Saginaw co., Mich. Pop. 1070.

**Kock, de** (CHARLES PAUL), b. in Paris in 1794, was the son of the celebrated banker Kock, who conspired under the Revolution and was guillotined. Paul de Kock published his novels during the Restoration and the reign of Louis Philippe. These works are all of a very comical turn and of a light character, sometimes bordering on license. Among the most popular were (for they are now somewhat out of fashion), *M. Dupont, Gustave ou le Merveilleux Sujet*, and *Les Démonstrations de Magasin*. Paul de Kock also wrote many *vaudevilles* for the stage. D. at Paris Aug. 29, 1871.—His son, HENRI, b. in Paris in 1821, follows the literary path trodden by his father, and he has already published many light novels and several *vaudevilles* and comedies.

FÉLIX AUCAGNE.

**Kœchlin' (ANDRÉ)**, b. in Alsace in 1785, the most celebrated of the Kœchlin family, which has established and rendered the print trade of Mulhouse in Alsace so prosperous. Jacques and Nicolas Kœchlin were the first to engage in that industry, but it reached its highest degree through the efforts of André Kœchlin, who can be considered as the head of this family, which does not count less than seven branches, and some members of which are still the greatest manufacturers of Mulhouse prints.

FÉLIX AUCAGNE.

**Koek'koek** (BERNARD CORNELIUS), b. at Middleburg in the Netherlands Oct. 11, 1803; studied the art of painting under his father and at Amsterdam, and settled in 1841 at Cleves in Rhenish Prussia, where he d. Apr. 5, 1862. He painted landscapes, and his pictures are prized very highly. He had three brothers, who all are painters of note.

**Kohat'**, town of the Punjab, in a district of the same name. In its vicinity are rich springs of naphtha and extensive beds of sulphur. It forms an important station for the trade between India and Persia.

**Koh-i-noor'** (the "mountain of light"), a famous diamond which for many centuries was in the possession of the monarchs of India, and now in that of Queen Victoria. Successive cuttings reduced its weight from 900 carats to 792, then to 279, next to 186.6, and at last in 1852 to 103.75, being rose-cut, and valued at about \$600,000.

**Kohl** (JOHANN GEORG), PR. D., b. at Bremen, Germany, Apr. 28, 1808; studied law at the universities of Göttingen, Heidelberg, and Munich; resided for five years (1832-37) as a private tutor in Courland, Russia, and after visiting a great part of that empire settled in Dresden in 1838, where he prepared three works on Russia, all published in 1841. Their success led him to make a similarly careful series of journeys in the Austrian empire, and afterwards

in Great Britain, Denmark, the Netherlands, and the Slavonic portion of Turkey, of all which countries he furnished excellent accounts in his popular books of travel. His writings on Denmark and Sleswick-Holstein (6 vols., 1846-47) were published opportunely just before the political questions regarding the Danish duchies sprang into importance (1848), and they therefore obtained a wide publicity. From 1854 to 1858, Dr. Kohl travelled or resided in North America, and as a consequence prepared several valuable works—*Travels in Canada* (1855), *Travels in the North-western Parts of the U. S.*, and *Kitchi-Gami, or Tales from Lake Superior* (1857). He also communicated to the Smithsonian Institution two essays on early maps and charts of America, and prepared a catalogue of them as a supplement to Hakluyt's great work. In 1861 he published a *Hist. of, and Commentary on, two Maps of the New World made in Spain at the Commencement of the Reign of the Emperor Charles V.*, and almost at the same time a *Hist. of the Discovery of America*. Dr. Kohl resided after his return from America at Bremen, and d. there June 6, 1871. Shortly before his death he communicated to the Maine Historical Society important data respecting the early annals of discovery, exploration, and attempted colonization of the coasts of Maine by French navigators.

**Kohl'-rabi** [Ger., perhaps originally meaning "rape cabbage" or "beet cabbage"—*Kohl-rübe*], a variety of the *Brassica oleracea*, the species which includes the cabbage, turnip, etc. The thickened edible portion is the leafy stem, and above ground, instead of the root beneath, as in the turnip. It is cultivated in the U. S., but much more extensively in Europe, and is prized for cattle and for table use. Its cultivation is precisely that of the cabbage.

**Ko'komo**, post-v., cap. of Howard co., Ind., 54 miles N. of Indianapolis, on the Pittsburg Cincinnati and St. Louis, the Indianapolis Peru and Chicago, and the Fraankfort and Kokomo R. Rs., being the terminus of the latter. It has 5 churches, 1 national and 2 private banks, 2 weekly newspapers, a high-school building (cost \$40,000), machine-shops, hub and spoke, door and sash, chair, furniture, and other factories, 1 woollen and 2 flouring mills. Pop. 2177. T. C. PHILIPS, Ed. "TRIBUNE."

**Ko'kra**, or **Cocus-wood**, the *Aporosa dioica*, a rather small tree of the East Indies, order Euphorbiaceae. The timber is very hard and of a rich handsome brown color. It is imported, and used in making flutes and for ornamental joinery.

**Ko'la**, town of Russia, in the government of Archangel, is the northernmost town of European Russia, situated at the confluence of the Kola and Tuloma, 36 miles from the Arctic Ocean, in lat. 68° 50' N., lon. 33° 15' E., and has a good harbor. It was bombarded by the allied powers Aug. 23, 1854. Pop. about 1000.

**Kolapoor'**, an independent state under English protection, in the presidency of Bombay, partly occupied by the Western Ghats, partly situated on the table-land of Deccan, bordering on the Kistnah. Area, 3445 square miles. Pop. 500,000. Cap. Kolapoor.

**Kolb** (GEORG FRIEDRICH), b. Sept. 14, 1808, at Spire, where in 1830 he founded a liberal journal, which he conducted for more than twenty years, though under many difficulties from the government. As a member of the Bavarian diet he compelled King Louis I., in 1849, by his report on the Greek loan, to repay to the state treasury out of his private means the money which had been lent to his son, King Otho of Greece. Shortly after the reactionary party came into power, and Kolb had to retire to Zurich to escape from the persecutions of the government. He lived here from 1853 to 1860. On his return he became editor of the liberal journal, *Frankfurter Zeitung*. Besides being a journalist and politician, he has acquired a great name as a statistician. He wrote *Handbuch der vergleichenden Statistik* (1858) and *Grundriss der Statistik* (1862).

**Kol'csey** (FERENCZ), b. Aug. 8, 1790, at Szé-Demetér, in Transylvania; studied law, but allied himself very early with that literary movement at the head of which stood Kazinczy. His poems and tales were much appreciated; he exercised the greatest influence, however, by his clear and vigorous criticism. Having been elected a member of the Hungarian diet (1832-36), he showed himself to be one of the most brilliant orators of the country, and a great political career was opened for him when he suddenly d. at Pesth, Aug. 24, 1838. His collected works were published after his death; his *Diary*, during the diet in 1848.

**Koliazin'**, town of Russia, in the government of Tver. It is famous for its shoe-factories. Pop. 5895.

**Kolin'**, town of Bohemia, on the left bank of the Elbe. Here the Austrians under Daun defeated the Prussians under Frederick the Great, June 18, 1757. Pop. 7727.

**Kollar'** (JAN), b. July 29, 1793, at Mossocz, in North-

western Hungary, of Slavic descent; studied theology at Presburg and Jena; was appointed minister to the Slavic congregation at Pesth in 1819, and removed in 1849, as professor of Slavic archaeology, to Vienna, where he d. Jan. 29, 1852. His poems and his edition of the Slavic popular songs exercised a great influence on the development of the Bohemian literature. But a still more intense and much wider attention was attracted by his ideas of Pan-Slavism, which pervade his poetry, his sermons, and his archaeological writings, and which were openly set forth for the first time in his *Ueber die literarische Wechselseitigkeit zwischen den Stämmen und Mundarten der Slawischen Nationen* (1831), written in German.

**Kölliker** (RUDOLF ALBRECHT), b. at Zurich, Switzerland, July 6, 1817; studied at Zurich, Rome, and Berlin; became distinguished for knowledge of histology and skill in microscopical anatomy; was made an instructor at Zurich in 1842, and in 1845 adjunct professor of comparative anatomy and of physiology; received the full professorship of the same branches at Würzburg in 1847, and in 1849 became professor of anatomy there. Author of a series of very valuable works on histology, physiology, and other departments of biology, several of which have been translated into the principal European languages.

**Kolmar**, tp. of Olmsted co., Minn. Pop. 972.

**Kolome'a**, town of Austria, in the province of Galicia, on the Pruth, at the foot of the Carpathian Mountains. It is famous for its pottery. Pop. 14,839.

**Kolom'na**, town of European Russia, in the government of Moscow, on the Moskva, near its confluence with the Oka. It has large silk manufactures and a considerable trade. Pop. 13,703.

**Koloshes**, the Russian name for the Indians of the coast of Alaska. (See KONIAGAS.)

**Kong Mountains**, the name of a mountain range of Central Africa, commencing in lat. 9° N. and lon. 9° 20' W., at a distance of about 200 miles from the Gulf of Guinea, and forming the northern frontier of Ashantee. The height of these mountains is not more than 2500 feet, but very little is known about them. The Kong district is remarkable for its trade in gold, and the town of Kong is quite celebrated for its manufactures of cotton cloth, in which it carries on an extensive trade, being itself a centre of several caravan-routes.

**Kongs'berg**, town of Norway, in the province of Christiania, has a mining school, and in its vicinity silver-mines, discovered in 1623, and still worked with profit. Pop. about 5000.

**Konia'gas**, **Ka'diaks**, or **Southern Eskimos**, a great family of aborigines inhabiting the sea-coast of Alaska for more than 1500 miles from Kotzebue Sound, N. of Behring Strait, across the peninsula of Alaska to the mouth of the Atna or Copper River, and extending inland 100 to 150 miles. They derive their name from the large island of Kadiak, the inhabitants of which called themselves *Koniagists*. They are divided into fourteen tribes—the *Koniagias* proper, who inhabit Kadiak and the neighboring islands; *Chugachies*, on the islands and shores of Prince William Sound; *Aglegmutes*, on Bristol Bay; *Keyataigmutes*, on the river Nushagak and the coast as far as Cape Newenham; *Agnimutes*, on the coast between the Kuskokwim and Kishunak rivers; *Kuskokwigmutes*, on the river Kuskokwim; *Mazemutes*, near Cape Romanzoff; *Kwichpigmutes*, *Kwichluagmutes*, and *Pashtoliks* on Kwichpak, Kwichluak, and Pashtolik rivers; *Chugmutes*, near Pashtolik Bay; *Anlygmutes* of Golovin Bay; *Kaviaks* and *Malemutes* of Norton Sound. All these tribes speak dialects of the same language. For an elaborate account of these little-known races see H. H. Bancroft's *Native Races of the Pacific States*, vol. 1, 1874.)

**Ko'nieh**, the ancient *Iconium*, town of Asiatic Turkey, the capital of the province of Karamania, Asia Minor, situated in lat. 37° 51' N. and lon. 32° 40' E. It has some manufactures of carpets and morocco, but it is mostly in a decaying state, although its walls, surmounted by square towers, its many mosques and minarets, give it an imposing appearance at a distance. Pop. between 40,000 and 50,000.

**König** (HEINRICH JOSEPH), b. Mar. 19, 1790, at Fulda, in the former electorate of Hesse, held different small offices in the civil service at Hanau; retired in 1847; lived for some time at Wiesbaden, and d. Sept. 22, 1869. He wrote a great number of novels and so-called historical romances—*Habsburg, die Waldseer* (2 vols.), *William Shakspeare* (2 vols.), *Die Chulibisten in Mainz* (3 vols.), etc.—which were eagerly devoured by that kind of people who have time to read many novels, but not taste enough to read the good ones.

**Königgrätz**, a fortified town of Bohemia, on the

Elbe. The Austrians under Gen. Benedek were completely defeated here by the Prussians under Gen. Moltke, July 2, 1866. Pop. 5061.

**Kö'niginhof**, town of Bohemia, on the Elbe. It has some manufactures. Pop. 5370.

**Kö'nig-berg**, the capital of the province of Prussia and a fortress of first rank, is situated 20 miles from the Baltic on both sides of the Pregel, whose two arms, the old and the new Pregel, unite within the city. Pop. Dec. 1, 1871, 112,092. It is the seat of a university, of the provincial government, of the staff of the 1st army corps, and has a numerous garrison. It consists of three former towns, Altstadt, Löbenicht, and Kneiphof, which in 1724 were united into one city. It is not a handsome place; the streets are narrow and there are few conspicuous buildings. Altstadt is the oldest part, and contains the palace and the town-house. The palace, with a tower 87 mètres high, forms an oblong square, and stands nearly in the centre of the city. It is rich in historical recollections. It was founded in 1257 by King Ottokar of Bohemia; became the residence of the grand master of the German order in 1466, and in 1525 the residence of the dukes of Prussia. The eastern wing was built in 1532 by Duke Albrecht, the southern in 1551. In the chapel, occupying the western wing, the elector of Brandenburg, Frederick III., crowned himself, Jan. 18, 1701, as the first king of Prussia, under the name of Frederick I. In the same place William I., afterwards German emperor, was crowned as king of Prussia Oct. 18, 1861. Over the church is the large Moskowitzersaal, which is used for great festivals. In front of the eastern gate stands the statue of Frederick I., erected in 1801, of life-size. Other remarkable buildings are—the cathedral, 92 mètres long, situated on an island formed by the Pregel, a Gothic structure commenced in 1335, and containing several interesting monuments; the old university building, Collegium Albertinum, founded in 1544; the new university building, on the parade-ground to the N. of the palace, finished in 1862, with a hall frescoed by Rosenfelder, Gräf, and Piotrowsky. On the parade-ground stands also the theatre, and in the centre of the place rises the equestrian statue of Frederick William III. by Kiss. The museum, the royal library, the observatory, the monuments of the philosopher Kant and the minister Schön, are also interesting. Excellent scientific and benevolent institutions are the botanical garden, the zoological museum, the seminary, three gymnasiums, a mercantile school, an academy of art, asylums for the deaf and dumb, for the blind, lunatics, and orphans, and several hospitals. The manufacturing industry is considerable. Iron-foundries, machine-shops, breweries, and dyeworks are in operation. Iron goods, chemicals, soap, paper hangings, leather, and tobacco are manufactured. To the city belonged in 1872, 15 sea-going vessels, besides 8 river steamboats. At Pillau, the port of Königsberg, entered in 1871, 1322 vessels, with cargoes of 110,050 tons, and 388 vessels without cargoes; and cleared, 1566 vessels, with cargoes of 135,068 tons, and 84 vessels without cargoes. Among the imports were 218,076 cwt. tea, 140,465 cwt. pig iron, 348,493 cwt. rails, 131,238 barrels of herrings, 1,018,255 cwt. coal, 323,485 cwt. salt. Among the exports were 204,808 cwt. tea to Russia, 138,247 cwt. rails, 263,696 cwt. flax and hemp, 997,006 cwt. wheat, 2,130,920 cwt. rye, 401,891 cwt. barley, 133,697 cwt. oats, 510,000 cwt. beans, 710,412 cwt. oil-seeds, 104,833 cwt. rice, 175,230 cwt. salt.

Königsberg was built by the Teutonic order of Knights in 1255 as a fortress against the pagan Samlanders, and rose to importance through its corn-trade. In 1626 its fortifications were reconstructed, and again in 1843. About 1523 it became the capital of the duchy of Prussia. In 1758 it was occupied for a short time by the Russians, in 1807 by the French. The philosopher Kant taught here from 1755 to his death, Feb. 12, 1804.

AUGUST NIEMANN.

**Königsmark** (MARIA AURORA), COUNTESS, b. at Stade, Hanover, in 1666. Her father was a Swedish general, and fell in the Dutch service at Bonn in 1673; her mother was a daughter of the Swedish field-marshal Wrangel. She received a brilliant education at the courts of Stockholm, Hanover, and Brunswick, and she was moreover exceedingly beautiful. In 1694 she went to Dresden, where August II. had just ascended the throne, and in 1696 she bore him a son, the famous Maurice, marshal of Saxony. In 1702 the king, whose friend she became after being his mistress, sent her to the camp of Charles XII. in Poland to persuade him to make peace, but Charles XII. declined to see "the most famous woman of two centuries," as Voltaire calls her. The rest of her life consists merely of anecdotes and gossip more or less creditable. She d. poor and suffering at Quedlinburg Feb. 16, 1728.

**Königstein**, small town of the kingdom of Saxony, on the left bank of the Elbe. Behind it rises a huge rock,



878 feet above the river and 1111 feet above the sea, and entirely inaccessible except through a narrow passage to the N. W. On the top of this rock is built the famous fortress of Königstein with bombproof casemates, and a well 1172 feet deep, to which the crown jewels and the treasury of the kingdom are brought in times of war.

**Königswarth**, town of Bohemia, has iron and tin mines and mineral springs. Pop. 7491.

**Koobetch'i**, town of Russia, in the government of Daghestan, Caucasus, manufactures cloth, shawls, and arms. Pop. 6000.

**Koo'doo**, a splendid antelope of South Africa, the *Strepsiceros koodoo*, one of the largest of the family. It has an extensive range in the wooded regions, is easily domesticated, and its flesh is highly esteemed. Its large and spirally twisted horns are characteristic of the species.

**Koo'fa**, or **Kufa**, town, or rather the ruins of a town, of Asiatic Turkey, in the province of Koordistan, on an affluent of the Euphrates, was founded by Omar, who made it his residence, and who was murdered here. It soon became the seat of Arabic learning, and the ancient Arabic characters called *Cufic* received their name from this place. When, at the end of the eighth century, the residency was removed to Bagdad, Koo'fa declined, and sank into ruins.

**Kool'fo**, or **Kulfo**, town of Western Africa, in the dominion of Gando, stands on the Mayarrow, in lat. 10° 10' N., lon. 6° 45' E., and is surrounded with high walls. It has an important trade, and about 12,000 inhabitants.

**Koom**, or **Kum**, town of Persia, in the province of Irak-Ajeme, is partly in ruins since its destruction by the Afghans in 1722, but is at present rising once more. The district in which it stands is very fertile, and its position on the road between Teheran and Kasbin gives it considerable commercial importance. Pop. about 12,000.

**Koondooz'**, **Khoondooz**, or **Kunduz**, a small province of Northern Afghanistan, lying between the frontier of Bokhara and the Bolor Mountains, formerly an independent khanate of Tartary, but now owing allegiance to the Ameer of Cabool. The greater part of the province is mountainous, but there are some fertile valleys where excellent grain is raised. The capital, Koondooz, has a population of 2000.

**Koordistan'**, or **Kurdistan**, the name of an extensive region of Western Asia, situated between lat. 31° and 38° N., and between lon. 42° and 47° E. It forms no independent political unit, but is divided between Turkey and Persia, though its relations to both of these two powers are somewhat loose. Its area is estimated at 100,000 square miles; the number of its inhabitants at 3,000,000, of whom four-fifths are Koords. The country is mountainous, some of the peaks rising to the height of 13,000 feet, intersected by beautiful valleys along the rivers, which in great number flow down to the Euphrates and Tigris. The Koords, who are Mohammedans, live mostly as nomads. They are a proud and fierce race, engaged in the rearing of cattle, sheep, goats, and horses, of which great numbers are annually exported both to Turkey and to Persia, where they are highly esteemed—the goats for their silky hair, the horses for their strength and fierceness. Generally, their looks, characters, and habits correspond perfectly with the description Xenophon gives of them.

**Koorile Islands**. See **KURILE ISLANDS**.

**Koorsk**, or **Kursk**, government of European Russia, between the Don and the Dnieper. Area, 17,385 square miles, with 1,866,859 inhabitants. The surface is mostly low but undulating, and the soil very fertile. Large crops of wheat are raised, besides hemp, tobacco, and fruit.

**Koorsk**, or **Kursk**, town of European Russia, the capital of the government of Koorsk, on the Seim. It is a flourishing town, with an extensive trade in tallow, rope, and fruit, and many good educational institutions. In the neighborhood of Koorsk is held an annual fair in the month of July, which is one of the greatest fairs of the country. Pop. 28,921.

**Koo'tenais**, **Kitunaha**, **Coutanics**, **Cottonois**, or **Flatbows**, a tribe of Indians in British Columbia, Washington, Idaho, and Montana Territories, called by themselves *Skalzi*. They are classed by H. H. Bancroft (*Native Races of the Pacific States*, vol. i., 1874) in the Shushwap family of the Columbian or Nootka-Columbian group; by others they are placed in the Salish or Flathead family, and are sometimes considered a family by themselves, though closely allied to the Atnas and Okanagans. Amid a multitude of authorities, frequently at variance with each other or defective upon essential points, the tribal distribution of this entire group is still problematical. The original *habitat* of the Kootenais is in British Columbia, in the space bounded by the Columbia and Clark rivers and the Rocky Mountains, where about 400

still remain upon the Kootenai or Flatbow Lake. Some hundreds now live in Washington Territory, on the great reservation bounded N. by the U. S. frontier, E. and S. by the Columbia, and W. by the Okanagan River; 400 live in Idaho, near the Cœur d'Alène mission; and 320 are settled with the Kalispels, on the Jocko reservation in Montana. They are generally peaceable and self-sustaining, hunting the buffalo with bows and arrows, and have had little dealing with the government. They have made some progress in civilization under the auspices of Father de Smet and other Catholic missionaries.

**Koo'tenay**, county of N. Idaho, bounded N. by British Columbia, E. by Montana, S. by Cœur d'Alène River, and W. by Washington Territory. It is partly mountainous, but contains large and fertile prairies. It is traversed by Clark's River, and contains several large lakes. Gold is reported to be found.

**Ko'pel**, a v. of Marion tp., Mercer co., O. Pop. 305.

**Kopp** (JOSEPH EUTYCH), b. in 1793 at Münster, in the canton of Lucerne, Switzerland; was director of the Lyceum at Lucerne from 1819 to 1841, and president of the board of education to 1845, in which position he became conspicuous by his opposition to the Jesuits. His principal works are—*Urkunde zur Beleuchtung der Geschichte der eidgenössischen Bünde* (2 vols., 1835–51) and *Geschichte der eidgenössischen Bünde* (5 vols., 1845–62), by which he threw new light on the relation between the house of Hapsburg and their possessions in Switzerland, and dissolved the story about Tell into a myth. D. at Lucerne Oct. 25, 1866.

**Kop'parberg**, or **Stora-Kopparberg**, the name of a political division of Sweden, situated on both sides of the Dal River, and comprising those regions which formerly were so celebrated in the history of the country under the name of Dalarne (Lat. *Dalecarlia*). It is a wild but beautiful mountain-region, covered with forests of fir and birch, and rich in copper and porphyry, but ill suited for agriculture. The inhabitants, numbering about 180,000, form one of the finest types of the Scandinavian race. They are valorous, hardy, ingenuous, and trustworthy, and nearly in all crises in the Swedish history the *Dalecarliar* have made the decision. As the country is unable to support them, they spread over Southern Sweden and Denmark seeking for work, but they always return to their native vales with their earnings. Cap. Falun.

**Köp'pen, von** (PETER), b. at Kharkow, Russia, Feb. 19, 1793; studied at the university of his native city, and devoted himself throughout life to researches concerning the ethnology, archæology, and history of Russia. His principal works are—*Materialien zur Culturgeschichte Russlands* (1827), *Die Geschichte des Weinbaues und Weinhandels in Russland* (1832), *Taurica* (1840), *Ethnographische Karte des europäischen Russland* (1851), and an exhaustive memoir on the census of 1850. The Russian government presented him with an estate in the Crimea, Karabagh, where he d. June 4, 1861.

**Ko'ran**, the book of the Mohammedan religion and the foundation of the Mohammedan literature. It may be also regarded as the conservative power of the widely-spoken Arabic language and the source of its refined system of grammar. Its religious and intellectual influence extends from India to Morocco, from Turkey and the borders of the Russian empire to the central and southern parts of Africa. In comparing it with the Bible, it may be said that the latter differs from it, and from every other book called sacred, in having been, so far as its human production is concerned, a growth of many ages and of many minds. It lies in history as a stream of supernatural influences, events, and teachings, extending from the patriarchal times to the complete introduction and establishment of Christianity upon the earth. In this respect the Bible differs wholly from the Persian, Indian, Buddhist, and Chinese books with which it is so often ignorantly compared. So the Koran is also the product of one mind and of one age. In certain features, however, it bears a much closer relation to the Jewish and Christian Scriptures than the other writings referred to. It may be regarded, in fact, as a lateral wave from that great tide of religious thought and feeling which came down from the earliest times of human history, bearing in its mid-channel the Jewish theocracy, and culminating in the Christian Church. In other words, the Koran may be regarded with some reason as an apocryphal book of the Bible, bearing to it a relation similar to that of the weird visions of the Second Esdras, the Wisdom of Solomon, or the sententious book of Sirach. It is still the heaving of the ground-swell from that old fountain-flood of religious power. Without Judaism and Christianity, Mohammedanism and the Koran would never have had an existence. Without Abraham and Moses and Christ the Arabian prophet would never have made the appearance he presents in history as the reaffirmer of the Divine Unity, the



rebeluker of idolatry, and the restorer of the primitive patriarchal or Abrahamic religion.

The name Koran (*Al Koran*, with the article, *The Koran*) is derived from an Arabic verb *qara*, to "read," and this from the older Shemitic, meaning to "cry aloud" (*קראו*, *קרא*), to "pronounce," "utter," "dictate." It is in this respect like the name *Miqra* (מקרא), from the cognate Hebrew root, and which the Jews gave to their Scriptures. This probably suggested it to Mohammed, though the application he makes of it is somewhat different. The Jewish name was from the public reading—the Koranic, from the idea of recitation or dictation to Mohammed himself. Sometimes a word expressly denoting this is used for the purpose; as in Sura xxx, 6, 7: "And the unbelievers say, This is a lie which he hath contrived: they are traditions of the ancients which he has caused to be written down, saying that they were dictated (*tumla*) to him, morning and evening. Say unto them, He hath revealed it who knoweth the secrets of heaven and earth; He the Gracious, the Merciful." The medium of this dictation was the angel Gabriel, who is elsewhere called, in the Koran, *Ruh-ul-Qudus*, the Holy Spirit (see xvi, 104, etc.), and sometimes simply *Ruh*, The Spirit, as in lxx, 4. Hence also the Koranic name *Tanzil*, or the "descent," defined in the book *Tarif* as "the declaration or revealing of the Koran by means of the angel (or spirit) descending on the heart of the Prophet." Some regard the word *Tanzil* as denoting the literal descent of the book in successive folios or portions from the heavens; but the other view is most in accordance with the spirit of the passages in which the term is used.

This has been commonly treated by the earlier Christian writers as all a designed imposture, very much as it was viewed by the scoffing Arabian Kafir whom Mohammed pathetically rebukes. Later German authorities, on the other hand, especially Sprenger in his *Leben und Lehre des Mohammed*, go to the other extreme in ranking the Arabian reformer with the prophets and apostles of the Christian Scriptures, and even with the Founder of Christianity itself. This, however, is evidently done not so much in honor of Mohammed as for the disparagement of Isaiah, Paul, and Christ. There is unquestionably a deep conviction of truth, a strong sense of some destined mission, and a fervent enthusiasm prevailing throughout this remarkable work. No man can carefully study it without feeling its subjective truthfulness—that is, without being impressed by the thought that the writer, or the preacher, is delivering what he believes to be a true message from a superhuman sphere, whatever may have been the mode and influences through which that conviction was produced. The explanation which would so easily resolve it all into a studied deception comes from a shallow overlooking of well-established facts in the human psychology. The earnestness and strong devotional spirit manifested in the Koran repel the idea. There is, moreover, a tenderness of conscience in respect to his supposed mission which one guilty of a long and studied imposition would seem incapable either of feeling or affecting. There is a striking instance of this alluded to in Sura xvii, 75, where there is related a rebuke Mohammed had received for seeming, on a certain occasion, to have swerved from his instructions under the temptation to palliate some forms of idolatry among his followers. It was at this time that he offered the touching prayer recorded by Al Zamakhshari in his commentary on the passage: "We have it from the Prophet, Allah bless him! that when this weakness was revealed to him, he prayed and said, 'O Allah, never again leave me to myself for the twinkling of an eye.'" It is not easy to reconcile such emotion as this, and such utterances, with a protracted scheme of hardened and deliberate lying. To a similar end may be cited the instances of tender and charitable feeling that characterize the earlier parts of the Koran, though in the later chapters strife and oppression had tended to make his utterances more fierce and fanatical. See Sura ii, 59: "Verily they who believe, and those who are Jews, and the Christians, and the Sabaeans, yes, every one who believes in God and in the day of judgment, and who does that which is right,—to all such is there recompense from their Lord; they have nothing to fear; they shall not be grieved." A different language is found in some other parts, which commentators, Christian as well as Mohammedan, have labored to reconcile; but it is better to admit the inconsistency. A deliberate deception would have avoided or suppressed it. As having the same bearing, may be mentioned the places where he speaks not only reverently but tenderly and lovingly of Jesus, or "Isa ben Maryam (son of Mary), Word of truth," as he calls him, Sura xix, 35, acknowledging him as one greater than himself—a reverence which he also pays to Abraham and Moses. Passages elsewhere which are interpreted as teaching persecution, or the enforcement of religion by the sword, are to be regarded in the same light as

coming from a change of temper, and as having been still further perverted by the fanatical bigotry of his immediate followers. It may be doubted, however, whether they were ever meant to be applied to Jews and Christians, of whom Mohammed speaks so charitably in the passage cited. Throughout the better part of the book the Kafir, or unbeliever, who are to be forced into truth and purity by the cleansing sword of Islam, are the unclean and bloody pagan idolaters whom he regards as in alliance with Shaitan (Satan, Eblis) and the Jins.

As the idea of crude imposture is untenable, so also does the more plausible explanation of an excited enthusiasm fail to remove all the difficulties of this remarkable literary and religious phenomenon. The Koran is a book which can only be interpreted on the ground that the author himself strongly believed in it as coming from some other source than his own conscious and voluntary mental exercises regarded in their normal condition. There have been, even in modern experience, too many well-attested cases of the ecstatic trance, of abnormal visionary states, of clairvoyant and somnambulist utterances, to warrant the summary rejection of such explanations. Mohammed's epileptic condition of body made him a fit subject of such influences, from whatever sphere we may regard them as coming. His high genius gave them a more intensive form and a more elevated character than ordinarily characterize such utterances in our own times. We know, too, that similar claims have been put forth by men characterized not so much by imagination as by the loftiest reason. The *daimonion* of Socrates, so solemnly asserted by him in his last moments, belongs to this class of psychological phenomena. The power and value of the utterances produced are to be judged by the evidence they give of the genius and mental rank of the one from whom they proceed, and the coloring received from the outward influences of the age in which they appear. They may be trifling, they may be unmeaning, or they may rise to an eloquence and a dignity producing, as in this case, the mightiest effects, and demanding, therefore, our awed respect, though higher evidence may be required to certify them as an actual and direct revelation from the Divine sphere. The careful and intelligent reading of the Koran furnishes the best proof here. Let a man carry steadily along with such reading the thought of cold artifice, of deliberate lying, or studied imposture, and the idea is continually refuting itself. It would have been a very different book produced in that way. Its very extravagances, its rhapsodies, its sudden emotional transitions, its weird pictures, mingled at times with the sublimest ideas, give conclusive proof of a deeper and more mysterious origin.

There are other names for the Koran to be found in the book itself, such as *Al Kitab*, "the Scripture," *Dikr*, "memorial" (used like the Hebrew *zeker*, זכרון), *Al Fackan*, etc., which are of little significance in determining either its form or the nature of its contents. The latter would strictly mean, the book divided into sections, as the Hebrew *perak* is used for the shorter divisions of the Talmud. Regular division, however, is very far from being a feature of the Koran. Its one hundred and fourteen chapters vary greatly in their length, from forty octavo pages, which is the length of Sura ii, in Flügel's edition, to a short paragraph containing a verse or two, which is the extent of a large number towards the end. Besides this, there is an artificial division, subsequently made, into sixty-five equal portions, called *Ahzab*, and each of these again subdivided into four equal parts. Another makes thirty portions, but all these are simply for the use of readers, and made in imitation of the synagogue sections for the worship of the Jews. There are mentioned seven principal editions or ancient copies—two named from Medina, one from Mecca, one from Cufa, one from Basra, a sixth called the Syrian, and a seventh styled the common or vulgar edition. They differ slightly in the reckoning of the whole number of the verses, a variation arising from a few differences of division; but they all agree in the same total of words, which they make to be 77,039, and the same total of letters, 323,015; the Mohammedans, as Sale says, having imitated in this respect the superstitious carefulness of the Jewish Masorites. There can be no doubt of a very ancient writing, whether made by Mohammed himself, or by some of his devoted followers, but the principal means of promulgation in the beginning was most probably by oral recitations made by those who had committed to memory particular Suras, and in some cases the entire Koran. That this is by no means incredible appears from the same fact and the same practice as now exhibited in the Mohammedan schools in India, and even in the interior of Africa. The solemn recitation of Mohammed, believed, as it was, to have come from the angel, must have made a deep impression upon the minds of his early disciples, thus aiding the memory in receiving and retaining the remarkable words. The



belief in this is also aided by the fact of a class of men in after times professionally devoted to this practice, and deriving from it a special name. They were called *huffadzun*, *custodes*, *conservatores*, *qui Koranum memoria tenent*; resembling in some respects the old Homeric chanters. They are referred to in Ahmed's *History of Time* (Manger ed.), p. 871, where the names of a number of them are given. (See also Herbelot, *Bibl. Orient.*, 202, and Pocock, *Specim.*, 378.) So the Koran itself is called *Mahfadz*, "the book preserved." The term is used Sura lxxv. 22, though there applied to a tablet, whether literal or as figurative of the memory: "Nay, it is a glorious Koran, preserved (in memory) as on a tablet;" though some would interpret it as meaning a tablet kept in heaven—the original in the Divine mind.

The Koran, as has been said, is a reflection from the Bible, however distorted and apocryphal the image it presents to the Christian mind. It admits the divine authority of the Jewish Scriptures. It may be said, too, that its influence as a book gives a more encouraging basis for Christian missionary effort than can be found in the worn-out religions of Buddha, Brahma, and Confucius. In distinction from them it is a live book and the text of a living religion. It belongs to the side of positive theology, having for its ground, like the Jewish and Christian, the *gloriosa Yehovah*, "the fear of God"—of a personal God—instead of the empty theosophy or mystic nature-worship that characterizes those systems of the remoter East. In opposition to their materialistic dualism, their elusive pantheism, their cold subjectivity, stand out the glowing devotion, the sublime earnestness, the pure, distinct, and lofty theism of the Koran. Its doctrine of Allah's sovereignty, of his immovable throne, of his eternal decrees, of his continual personal providence, is the antithesis of their physical fide. So, too, does its teaching in respect to a great judgment to come, a resurrection-day of final account, "the book" in which each man shall read the true value of the life lived by him in this preparatory world, the "meeting of his sins that have gone before him," and above all, its sublimely rigorous doctrine of prayer, place it in direct contrast with the poor, barren worldliness which is all that we get from the best selections made from the writings of Confucius. In view of these facts we cease to wonder at its triumph wherever it has met those lifeless creeds. It is all the more hopeful for Christianity that it should have had such a pioneer or forerunner in India and China. Better to contend with Mohammedanism itself, when the time comes, than with those dead systems, whose inertia or want of religious susceptibility presents a harder and more hopeless antagonism than the vitality of even Mohammedan error. The very fact that the Koranic religion is sharply controversial gives all the more encouragement. It is evidence of some kind of life; it shows that it has something to contend for. It is better to meet the zealous Islamite in this way than to encounter the meaningless pantheism of the Hindoo or the stolid indifference of the Chinese. With the first there is a common ground, giving hope of ultimate agreement. The Koran has all those grand theistic elements of religion that demand the Christian *specialty*—that is, the doctrine of the *cross*, or that mediatorial idea which may be said to be the great lack of Islamism. When other enemies are slain, clear discussion may bring that mediatorial idea to light, and thus show that the Arabian enthusiast had really something which may be called a mission for that dead Eastern world.

Neither can it be denied that the Koran produced a most salutary reformation in its own times. Neither the Ishmaelite nor the Joktanite Arabians had wholly lost the old patriarchal or Shemitic monotheism. But it had become much darkened and corrupted by Sabæanism, and some still grosser forms of creature-worship that had come in. The Koranic name for this, *Moshre kuma* ("who make sharers, partners"), is suggestive of Paul's description of the beginnings of idolatry—"The worship of the creature along with the Creator, or beside the Creator (*παρά τὸν κτίοντα*, Rom. i. 25. See especially Koran, Sura xvi. 102). Some had gone farther than this, even to what might be called demon-worship, accompanied with the foulest practices. The change in this respect produced by the promulgation of the Koran was sudden and extensive. It was also the means of a reformation of morals, and the putting away of some exceedingly barbarous and revolting customs. Thus, infanticide was very commonly practised, especially the putting to death of female children, and even burying them alive. There is a most touching allusion to such a horrid custom in Sura lxxxi. The passage is given at some length, as a specimen also of the peculiar Koranic rhythm, and of the weird style that especially characterizes some of these later chapters. It is entitled *Takwim*, or the "Folding up," from the verb in the first verse, *Idh' ash-shamau kowwerat*. It is a description of the day of

judgment, and we have rendered it almost word for word, with a few slight freedoms in the use of the active for the passive, in order to preserve something like the rhyming cadence:

"When the sun [its face] is shrouding,  
When the stars are downwards gliding,  
When the hills are lightly moving (Jer. iv. 24; Ps. cxiv. 4),  
When the camels ten months gone,  
Unweaned for now, are left alone;  
When the rabid beasts are gathering,  
When the seas are hotly boiling,  
When [to bodies] souls are joining,  
When the buried babe is asking  
For what crime its ruthless slaying;  
When the sealed books are opening,  
When the heavens are departing;  
Then when hell is fiercely burning,  
And when Paradise draws near,  
Knows each soul what to the presence it hath sent before."

The Koran abolished the cruel practice alluded to in the verse above, and others of a similar kind. This was done, not in a cold humanitarian way, which is seldom long or intensely efficacious, but by an appeal to the deepest religious feeling.

Personifications of nature are not frequent in the Koran, but there are some examples that present a striking combination of the moral and physical sublime. Thus, in Sura xxxiii. 72, God is represented as offering "the faith" (truth, law, conscience, accountability) to nature, to the heavens, the earth, the mountains. They are "afraid of it;" they "shrink away from the tremendous charge." But man undertook it—presumptuous man, "ignorant and unjust (to himself)." Hence his peril and his woe. It is, however, in its descriptions of the Divine justice, the Divine unity, the *Throne of Allah*—an expression Mohammed so frequently uses—and the Divine majesty generally, that the Koran is especially magnificent. See, among other similar examples, Sura lix. 22: "God, beside whom there is no God, who knoweth the future (the hidden), as he knows the present—God most merciful, God the King, the Holy, the Giver of peace, the Ever-to-be-trusted, the Keeper, the Almighty, the Great, the Most High; God the Creator, the Maker, the Former, exalted above all idols, all partners of His throne. Whatever is in heaven and in earth, let it praise Him, the Strong, the Wise."

Aside from the great defect before referred to, there are two things in the Koran which may be regarded as positive deformities. One is its doctrine of polygamy, and the other the too sensual aspect it gives to the happiness of Paradise. In regard to the second, however, it may be said that the representation of the beautiful females was adapted to the Arabian ideas, and is therefore adopted among the other symbols of spiritual joy, such as "the gardens, the fair rivers, the perennial fruits," which enter also into the biblical pictures. There is an evident intention to make it as pure as the human conception will allow. That a degree of spirituality is intended is shown by the Arabic words which the Koran brings into use respecting the two worlds. The great idea in the one is *certainty, assurance, eternity*. Hence the phrase that occurs so frequently in connection with the "garden and the fair rivers," *Chalidina fika abdan*—"they abide there for ever." In contradistinction to this there are two names for the present world that are most expressive. They are *Dunya* and *Al-ajlat*; the first denoting the *near* world, the world of sense, the common, and sometimes the *mean* world, in distinction from the glorious and the strong; the second is literally the *rolling* or *hastening* world, the transitory, quick-vanishing world, the failing world, *mundus caducus*, in distinction from the permanent and the immutable. (See Sura xvii. 19, 20, and many other places.) Besides these, there is the general term for the other or after-life, *Acherat*, corresponding to the Hebrew אַחֵרֵית, as we may suppose it to be used in the prayer of Balaam (Num. xxiv. 14).

For the fullest details respecting the Koran, see Sprenger's *Leben und Lehre des Mohammed*; Freytag, *Einleitung in das Studium der arabischen Sprache*; Herbelot, *Bibliothèque Orientale*, arts. "Koran" and "Mohammed;" and Sale's *Introduction*. The last is especially to be commended for candor and fidelity. Much valuable information, especially in regard to the influence of the Koran in Central and Western Africa, may also be obtained from an article by Prof. Glyden of Liberia College in the *Methodist Quarterly Review* for Jan., 1867. Among native Arabian authorities that give the fullest information may especially be mentioned the two great commentators, Al Beidawi and Al Zamakhshari. The former is the better known and the most frequently referred to. The latter (see the latest edition, published by W. Nassau Lees, Calcutta, 1856, in 2 quarto vols., pp. 1647) is an immense mine of theology, philosophy, Arabic grammar and lexicography, besides abounding in copious citations from Arabic poetry and general literature.

TAYLER LEWIS.

**Korat'**, a small independent territory lying between Siam and Cambodia, situated on an elevated table land. Copper-mines are worked by the natives, and the sugarcane is cultivated. Pop. about 60,000; of capital, also called Korat, 7000.

**Kordofan'**, a territory of Soudan, Central Africa, belonging to Egypt, and situated between lat.  $11^{\circ}$  and  $15^{\circ}$  N. and between lon.  $28^{\circ}$  and  $32^{\circ}$  E., bounded on the E. by Senaar, from which it is separated by the White Nile, and on the W. by Darfour. Area, 12,000 square miles. Pop. 500,000. The inhabitants are a mixture of negroes and Arabs professing Mohammedanism. Kordofan is a savanna, dry in the hot season, but covered with luxuriant verdure during the rainy season. The breeding of horses, cattle, and camels is the chief pursuit of the inhabitants. Cap. El Obeid.

**Kornegat'**, or **Koornagal'lee**, town of Ceylon, 55 miles N. E. of Colombo, beautifully situated. It is a resort of pilgrims, on account of an ancient temple where a footprint of Buddha is adored.

**Körner** (KARL THEODOR), b. at Dresden, Saxony, Sept. 23, 1791; fell in a skirmish at Wöbbelin, in Mecklenburg, Aug. 26, 1813. His whole life was consecrated to the one idea of rousing his countrymen against the humiliating and almost infamous despotism which Napoleon exercised over them; and although he died in the twenty-second year of his age, he saw the idea of his life realized, and he heard the world say that this great result was in no small degree due to him. Even when a very young man, studying in Freiberg and Berlin, he spoke with such vehemence against the French that it was considered necessary for the sake of his safety to send him to Vienna. Here he began to write for the stage, and was very successful, but of his dramas *Zriny* is the only one which deserves attention. After the disastrous issue of Napoleon's campaign in Russia, Körner left Vienna and volunteered as a private in the Prussian light-horse of Lützow, and his great personal valor in connection with his inspiring war-songs made him in a few months the pride and the enthusiasm of his countrymen. After his death his songs were collected under the title *Leier und Schwert*, and several of them are as thrilling with their genuine beauty as exciting with their wild inspiration. CLEMENS PETERSEN.

**Körös.** See KIS-KOROS and NAGY-KORÖS.

**Kortetz'**, or **Cortitz**, an island of Russia, in the government of Yekaterinoslav, is formed by the Dnieper, and rises 165 feet above the river, framed in on all sides by granite cliffs. It was one of the strongholds of the Cossacks, but after their removal in 1784 by Catharine II. it was settled by German Mennonites.

**Kortright**, post tp. of Delaware co., N. Y. Pop. 1812.

**Korvey**, or **Corvey**, village of Westphalia, on the Weser, is celebrated for its Benedictine abbey, founded in 816 by Louis the Pious. It was during the Middle Ages a famous centre of learning, and from it issued Ansgarius, Bruno, Wittekind, Wibald, and others. The massive buildings of the former abbey are now occupied by the prince of Hohenlohe-Schillingsfürst as a residence.

**Koscius'ko**, county of N. Indiana. Area, 558 square miles. It is very fertile, and is generally undulating. Cattle, grain, wool, and lumber are staple products. The county is traversed by the Pittsburg Fort Wayne and Chicago and the Cincinnati Wabash and Michigan R. R's. Cap. Warsaw. Pop. 23,531.

**Kosciusko**, post v., cap. of Attala co., Miss., the present northern terminus of the New Orleans Jackson and Great Northern R. R., is situated nearly at the geographical centre of the State; has 3 churches, 2 hotels, 25 stores, 15 shops, and 2 weekly newspapers. Principal business, raising cotton, of which 25,000 bales are shipped yearly. Pop. 577. R. WALPOLE, Ed. "CENTRAL STAR."

**Kosciusko** (THADDEUS), [*Thadéus Kosciuszko*], b. Feb. 12, 1746, at Mierozowszczyzna, in Lithuania, of an ancient princely race. Educated in Warsaw, Paris, and other European capitals, he was made an officer in a regiment; but having sued in vain for the hand of a daughter of the vice-grand general of Lithuania, and the king of Poland himself being unable to forward his suit with the unwilling father of the young lady (to whom Kosciusko had been a tutor), the young soldier sailed in 1775 from Dantzic for the U. S., by way of Martinique. In 1776 he was made colonel of engineers. He served gallantly through the war of the Revolution, was made a member of the Cincinnati, a brigadier-general by brevet, and received the thanks of Congress. Returning to his native land, he fought for his country in the wars of 1792-94 against the partitioners of Poland; but, notwithstanding the prodigies of valor performed by the unhappy Poles, with Kosciusko at their head,

they were totally overpowered at Maciejowice, where their commander fell covered with wounds. Imprisoned at St. Petersburg, he was set free in 1796 by the emperor Paul, from whom he refused the offer of a sword. He revisited the U. S., where he received a pension and a grant of land, but in the following year he retired to France, displeased, we are told, by the passage of the Alien law. In 1816 he fixed his residence at Soleure, Switzerland, and in the following year set free the serfs on his paternal estate. D. at Soleure Oct. 16, 1817. The statement very often made with regard to Kosciusko (that he exclaimed "*Finis Polonia!*" as he fell wounded in his last fight) he always indignantly denied. (See J. L. Chodzko, *History of Kosciusko, Military, Political, and Private*.)

**Kosciusko, Mount**, the highest peak of the Australian Alps, 7176 feet high, is situated nearly in lat.  $36^{\circ}$   $30'$  S. and lon.  $134^{\circ}$   $30'$  W., on the boundary between the provinces of New South Wales and Victoria, about equidistant between Sydney and Melbourne. The chain of mountains to which it belongs affords the most picturesque scenery on the Australian continent. The great Murray and Murrumbidgee rivers take their rise nearly at the base of Mount Kosciusko.

**Koshkonong'**, tp. of Jefferson co., Wis. It includes FORT ATKINSON (which see). Pop. 3202.

**Köstin'**, town of Prussia, in the province of Pomerania, on the Mühlenbach. It has considerable manufactures of ribbons, stockings, tobacco, paper, and soap. Pop. 10,848.

**Koslov'**, town of European Russia, in the government of Tambov, on the Voronezh. It has large manufactures of woollen and linen fabrics. Pop. 28,613.

**Kosse**, post-v. of Limestone co., Tex., on the Houston and Texas Central R. R., 13 miles N. of Bremond.

**Kosuth**, county of N. Iowa. Area, 432 square miles. It is traversed by the Des Moines River and the Iowa and Dakota division of the Chicago Milwaukee and St. Paul R. R. The soil is fertile. Grain is the staple product. Cap. Algona. Pop. 3351.

**Kossuth**, post-v. of Des Moines co., Ia., 2 miles from Kossuth Station (Medapolis P. O.) on the Burlington Cedar Rapids and Minnesota R. R.

**Kossuth**, post-v. of Salem tp., Auglaize co., O., on the Ohio Canal. It is also called Six-mile Aqueduct. Pop. 112.

**Kossuth**, tp. of Manitowee co., Wis. Pop. 2186.

**Kossuth** (LOUIS, or, strictly, LAJOS), b. at Monok, Hungary, Apr. 27, 1802, of a family originally Slavic, and not Magyar, but of noble rank and of the Lutheran faith. Louis was carefully educated, and in 1822 became a successful advocate of Monok; removed in 1831 to Pesth; was a member by proxy of the upper house of the diet of 1832-36; and by his ceaseless activity as a writer and journalist did much to disseminate liberal principles; was imprisoned at Buda 1837-40 as a political offender; was editor of the *Pesth Journal* 1841-43; entered the lower house of the diet in 1847, and became the leader of the liberals; headed the deputation of 1848 demanding a new ministry, in which he became minister of finance; proposed in 1849 the independence of Hungary; was during the Hungarian war for liberty provisional governor of Hungary, Apr.-Aug., 1849, and was succeeded by Görgei; escaped to Turkey, where he was protected, notwithstanding the demands of Austria and Russia for his extradition. In 1851 he was allowed to go on board the U. S. steamer Mississippi, which had been sent out for him by the U. S. government; visited England; made the tour of the U. S. 1851-52, and delivered many eloquent though fruitless appeals for the influence of the U. S. in behalf of the principle of non intervention, believing that if Russia had not assisted Austria in 1849, Hungary would have become free; has since 1852 resided chiefly in London and Turin, engaged in political projects, in public speaking, in writing for liberal journals, and latterly in scientific observations. During the wars of Austria against France (1809) and Prussia (1866) he was actively engaged in preparing for insurrections in Hungary, but the speedy termination of both wars frustrated his hopes. He has been several times elected in his absence to the diet of Pesth, and since the reorganization of the Austro-Hungarian empire (1867) has been free to return to his native land, but has declined to do so, condemning the arrangements which were accepted by the Hungarian liberals. Kosuth in his best days was one of the most impassioned and effective of public speakers, and possessed a marvellous capacity for the acquisition of languages.

**Kostro'ma**, government of European Russia, situated nearly in the centre of the country, and traversed by the Volga. Area, 30,834 square miles. Pop. 1,101,029. The surface is low and flat, dotted with lakes, and covered with dense forests. The climate is severe, yet good crops



of grain are produced. Tar, pitch, and potash are manufactured, and much timber is exported.

**Kostroma**, town of European Russia, the capital of the government of the same name, on the Kostroma, near its influx into the Volga. It has 40 churches, 2 monasteries, a seminary, a gymnasium, and several other educational institutions, large manufactures of leather and linen, and an important trade in corn and timber. Pop. 24,419.

**Ko'tah**, one of the independent Rajpoot states, under English protection, in Hindoostan. Area, 4400 square miles. Pop. 440,000. Its capital, Kotah, is situated on the Chumbul, in lat. 25° 9' N. and lon. 75° 5' E.; it is fortified, and is a town of some importance, having good bazaars, many temples, and substantial houses.

**Kö'then**, town of Germany, in the duchy of Anhalt, has a handsome ducal palace with several fine collections, is the seat of civil and military authorities, has good educational institutions, breweries, tanneries, iron-foundries, and manufactures of tobacco, vinegar, carriages, and brass articles. Pop. 10,593.

**Kot'zebue, von** (AUGUSTUS FRIEDRICH FERDINAND), b. in Weimar May 3, 1761: studied law at Jena, and after finishing his studies he went in 1781 to St. Petersburg, where he was introduced to the empress. From that time he was always more or less intimately connected with the Russian court. Catharine nominated him a counsellor, and gave him a pension. Paul sent him to Siberia, but recalled him and gave him an office. Alexander used him first to stir up the popular hatred against Napoleon, and then after the Restoration he kept him in Germany with a salary of 15,000 roubles a year to report on the liberal movements. This was by the Germans considered as a sort of espionage, and under the general excitement a young student, Sand, broke into his study and stabbed him at Mannheim, Mar. 23, 1819. Even before he went to St. Petersburg the first time, in the twentieth year of his age, he had written quite a number of tragedies, comedies, dramas, and farces, and he continued during his whole life to evince the same versatility and prolificness. He wrote about 100 plays. He attempted every description of drama and every style, and, in a certain sense of the word, he succeeded in them all. His plays were translated into every language which had a stage, and for more than a generation they reigned absolutely in the whole theatrical world. But between 1820 and 1830 they disappeared, succeeded by those of Eugène Scribe, and now only a very few of them—as, for instance, *The Stranger*, *Pizarro*, *The Indians in London*, *The Two Klingenbergers*, etc.—can be met with, and even these only in the suburbs of their native country. CLEMENS PETERSEN.

**Kou'ba**, town of Southern Russia, at the foot of the Caucasus, on the Kouban River. It has considerable trade with Astrakhan and Persia, and some silk manufactures. Pop. 9,105.

**Kouban'**, a river of Southern Russia, rises in the El-brooz Mountains, flows between the governments of Stavropol and Circassia, and empties itself partly into the Black Sea, partly into the Sea of Azof.

**Kouli Khan**. See NADIR SHAH.

**Kou'miss**, **Kumys**, or **Kumiz** [Russ. *kumys*, of Mongolian origin], a fermented beverage made from mare's milk in the steppes of Russia by the Kirgheez, Tartars, Bashkeers, Calmucks, etc. The alcohol is derived from the milk-sugar, which is present in mare's milk in larger quantity than in the milk of other animals, as is seen in the following table by Jagielski:

Composition of Milk.

	Mare.	Ass.	Woman	Sheep	Goat.	Cow.
Sugar.....	7.3	6.4	1.8	5.4	4.3	4.6
Butter.....	2.1	1.3	2.9	2.4	3.4	3.6
Caseine.....	1.5	1.9	2.9	4.8	4.4	5.1
Salts.....	10.9	9.6	10.8	13.5	12.9	13.9
Water.....	89.1	90.4	89.2	86.5	87.1	86.1
	100.0	100.0	100.0	100.0	100.0	100.0

The fresh milk is diluted with one-third to one-sixth water, and placed in a sack of goat skin or the skin from the entire hind quarter of a horse, the wider end serving for the base, and the leg portion for the neck. There is generally added some yeast, the sediment from a previous brewing, called *kor*, to induce fermentation. Frequent stirring or shaking is essential to success. In from twelve to twenty-four hours the fermentation is complete, the product being known as "young koumiss" or *sauomal*. Fresh milk is added daily, and as the product is concentrated by the evaporation of water from the surface of the hide, the old koumiss is much stronger than the new. Koumiss is an acid

liquid of a not unpleasant pungent taste and an ethereal bouquet. It effervesces when poured into a glass. It is very intoxicating to persons not accustomed to its use, and produces drowsiness. Besides alcohol and carbonic acid, it contains the other constituents of the milk, except the sugar, and is consequently very nourishing. It is easily assimilated, even by invalids, and the hardy vigor of the Tartars is attributed to its general use among them. Koumiss yields by distillation a strong liquor called by the Calmucks *arraca*, *ruck*, or *racky*. From the residue in the still they make a kind of hasty-pudding.

Beverages somewhat similar to koumiss have long been made in the Orkney and Shetland islands, in Arabia (called *leham*), and in Turkey (called *yamist*).

Koumiss has recently attracted much attention among European physicians, and its manufacture has been introduced at Moscow, St. Petersburg, Vienna, and London. It may be made from the milk of any animal. The following analysis was made by Wanklyn of the contents of a bottle of koumiss, twelve days old, made from cow's milk at the establishment of E. Chapman & Co. in London:

Water.....	10,662 grains.
Alcohol.....	192 "
Caseine and albumen.....	128 "
Sugar lactose.....	582 "
Lactic acid.....	130 "
Fat.....	36 "
Ash.....	90 "
Carbonic acid.....	180 "
	12,000 grains.

It is claimed that koumiss is most valuable for the treatment of extreme debility and all the phases of impending marasmus. It is said to have specific action in diabetes. (For further information consult Johnston's *Chemistry of Common Life*; Wagner's *Lehrbuch*, vol. ii. 243, and vi. 421; *The Milk Journal*, i. 64; *British Med. J.*, Feb. 21, 1874; *Pharm. J. and Trans.*, Feb. 28, 1874; *The American Chemist*, vol. v., June, 1875.) C. F. CHANDLER.

**Kous'so**, or **Cusso** [an Abyssinian term], a drug consisting of the flowers and unripe fruit of *Brayera anthelmintica*, a small rosaceous tree of E. Central Africa. It is an efficacious and safe remedy for tapeworm, but costly.

**Kouznetsk**, town of Russia, government of Saratov, has large tanneries and trade in timber. Pop. 13,107.

**Kov'no**, government of Western Russia, bounded by Prussia and Poland, and watered by the Niemen and its tributaries. Area, 16,115 square miles. Pop. 1,131,248, most of whom are Roman Catholics, many Jews. The surface is low and flat, and more than two-thirds of it are covered with lakes and dense forests. Besides rye and wheat, flax and hemp are extensively cultivated.

**Kovno**, town of Western Russia, the capital of the government of Kovno, at the confluence of the Vilja and the Niemen. It has many good institutions for military, theological, and scientific education, but its manufactures and trade are insignificant. Pop. 34,612.

**Koyl'ton**, tp. of Tuscola co., Mich. The principal industries are farming and cattle-raising. Pop. 122.

**Kozelsk'**, town of European Russia, in the government of Kalooga, on the Jizdra. It has large manufactures of sailcloth and trade in flax and hemp. Pop. 8387.

**Krackowizer** (ERNST), M. D., b. in the duchy of Styria, Austria, in 1822; studied medicine at Vienna and Padua; as captain of the Students' Legion was involved in the insurrection of 1848, and finally came to America; practised at Brooklyn, N. Y.; removed to New York City; established the German dispensary; was member of the committee of seventy during the municipal reform; assisted in reorganizing the Bellevue Hospital Medical College in 1874, and contributed to several medical periodicals. D. Sept. 23, 1875.

**Krajo'va**, the capital of Little Wallachia, on the left bank of the Schyl. It has several good educational institutions and a beautiful public park. Pop. 25,000.

**Kra'ken** [Norse], a fabulous sea-monster described first under this name by Pontoppidan, although Olaus Magnus, Gesner, and other old writers have substantially the same accounts. The tales of the kraken seem to have been exaggerated reports of large cephalopods and whales. Stories of its devouring ships, of its back being taken for an island and men landing upon it, etc., recall similar fables in Lucian's and Pliny's works and the *Arabian Nights*; but Lucian's narrative is a witty satire on the credulity of other writers, who in all ages have seriously recorded these monstrous fables.

**Krasie'ki** (IGNACY), b. at Dubiecko, Galicia, 1734; studied theology in Rome; was made bishop of Ermland in 1767, archbishop of Gnesen in 1795, and d. at Berlin Mar. 14, 1801. As Ermland was annexed to Prussia in 1772,

Krasicki became a Prussian subject, and his talents and elegant attainments soon made him a favorite of Frederick II. His writings, which were collected in Warsaw in ten volumes in 1803, are mostly satirical, and procured for him the name of the Polish Voltaire. His *Monumachia* ("War of Monks"), a satirical epic, and his fables have been translated repeatedly both into German and French.

**Krasinski** (ZYGMENT NAPOLEON), COUNT, b. in Paris Feb. 19, 1812, a son of Count Wladyslaw Krasinski, who after the fall of Napoleon held the highest position in the Russian government. The son, however, declined all offers from Russia. When he became of age he left his native country, lived in different European capitals, and d. in Paris Feb. 21, 1859. But his poetical productions were received by all Poles with the greatest enthusiasm, and caused now and then considerable excitement. His principal works are *Niechaska Komedia*, a drama in three parts (1837-38, "Proceedings Before Dawn"), and *Psalmi przyszlosci* ("Hymns of the Future"), lyrical poems in which a glowing patriotism is combined with a deep piety.

**Krasnoslobodsk'**, town of Russia, in the government of Penza, on the Moksha, carries on an extensive trade in corn. Pop. 7762.

**Krasnovodsk'**, a Russian fortress, on a bay of the same name, on the south-eastern shore of the Caspian Sea, in lat. 40° N., is an important starting-point for scientific and military expeditions to Central Asia. Peter the Great understood the importance of the point, and used it in an undertaking against Khiva, but afterwards it fell into decay, until it was once more occupied and fortified in Nov., 1869. From here the savants Kadde and Siewers explored the flora and fauna of the adjacent steppes; fifteen meteorological stations were established in Toorkistan; and the engineer Koschkul made a geological map of the vicinity. In connection with a military expedition against the Toorkoman fortress Kysyl-Arwat, about 150 miles to the S. E. of Krasnovodsk, important geodetic labors were undertaken under the leadership of Col. Stebnitzky, purporting to re-establish the old water-road between the Caspian Sea and the Sea of Aral by employing the old bed of the Oxus. During the great expedition against Khiva, led by Gen. Kauffmann in 1873, one of the three advancing columns started from Krasnovodsk. AUGUST NIEMANN.

**Krasnoyarsk'**, town of Siberia, in the government of Yeniseisk, on the Yenisei. It is a neat town, with considerable trade in fur and leather, and important gold-mines in the vicinity. Pop. 7628.

**Kraszewski** (JOZEF IGNACY), b. at Warsaw in 1812; studied at Vilna; settled in Volhynia; went in 1860 to Warsaw as editor of *Gazeta Polska*, and removed in 1863 to Dresden. He is the most prolific writer in the modern Polish literature, and he has both talent and education. He has written a large epic, *Amfion* (3 vols., 1840-43), treating a subject of the history of Lithuania; a great number of novels and romances depicting Polish life; several historical works; and a multitude of monographs, travelling sketches, critical essays, etc., the whole comprising over 300 volumes.

**Krause** (KARL CHRISTIAN FRIEDRICH), b. at Eisenberg, in the duchy of Saxe-Altenburg, May 6, 1781; studied at Jena; lectured on philosophy at Berlin, Göttingen, and Munich, but lived for the most time at Dresden as a private man, and d. at Munich Sept. 27, 1832. His views of the human race, as forming part of a higher and more spiritual realm, led him to peculiar ideas concerning the destiny of mankind, the development of human life, and the organization of human society; and these ideas brought him in connection with the Freemasons. His writings in this line, *Die drei höchsten Kausalkräfte der Freimaurereicheitschaft* (1810), *Höhere Vergeistigung der echt überlieferten Grundsätze der Freimaurerei* (1810), and *Uebild der Menschheit* (1811), attracted much attention.

**Krauth** (CHARLES PHILIP), D. D., b. in Montgomery co., Pa., May 7, 1797; received a thorough education at home, and early showed a talent for philology. At the age of eighteen he commenced the study of medicine, but a change in his religious views led him to enter the ministry of the Lutheran Church. He was licensed 1819, and became pastor in Martinsburg, Va.; went to Philadelphia in 1827; was president of Pennsylvania College 1834-50; professor of biblical and Oriental literature in the theological seminary of the General Synod at Gettysburg 1833-67; d. May 30, 1867. Dr. Krauth had every quality which ensures a large distinction, except ambition. His mind was of a very high order; his learning extensive and exact; his power of moving men as a preacher extraordinary; and his character one of the most exquisite purity and completeness. He wrote much, but published comparatively little. His theological position was that of uncon-

promising adherence to the doctrines of evangelical Protestantism, of great moderation on points in dispute, and of cautious adjudication between the claims of conservatism and progress. A very complete sketch of his life and labors was given in the *Evangelical Review*, Jan., 1868, by Prof. M. L. Stoeber. (See also McClintock and Strong's *Cyclopedia*, v. 160.)

**Krauth** (CHARLES PORTERFIELD), S. T. D., LL.D., son of Charles Philip Krauth, b. Mar. 17, 1823, at Martinsburg, Va.; graduated at Pennsylvania College, Gettysburg, 1839; became a licentiate in 1841; labored at Baltimore, Md., 1842-47; ordained 1842; pastor in Winchester, Va., 1848-55; in Pittsburg, Pa., 1855-59; in St. Mark's, Philadelphia, 1859-64; had temporary charge of St. John's 1864-65 and 1874-75; labored in mission churches at Canton, Md., 1841, and in St. Stephen's and St. Peter's, Philadelphia. He spent ten months, 1852-53, in St. Thomas and Santa Cruz, D. W. I.; for nearly three months during the prevalence of yellow fever officiated as pastor in St. Thomas; subsequently published *Sketches of a Winter and Spring in the Danish West Indies*. He became editor of the *Lutheran* 1861; in 1864, Oct. 4, was inaugurated as Norton professor of systematic theology and ecclesiastical polity in the Lutheran Seminary in Philadelphia, and is the author of its constitution. In 1868 the chair of intellectual and moral philosophy in the University of Pennsylvania was offered to Krauth; he was chosen its vice-provost in 1873; in 1874 the department of logic was attached to his chair. He is a member of the Historical Society of Pennsylvania; of the Philosophical and Oriental Societies; of the American committee (Old Testament Company) co-operating with the British revisers of the authorized version; and of the American Bible Society's committee on versions. Besides numerous translations from different languages, and many critical and annotated editions, he has written in the line of practical theology—*Pastoral Office* (1845), *Chrysostom* (1849), *Transfiguration* (1850), *Popular Announcements* (1851), *The Bible a Perfect Book* (1852), *The Old Church on the Hill* (1854), *Poverty*, three essays (1858), *Christ and His Kingdom in Shadows* (1874). His published sermons on national occasions are—*The Former Days and These Days* (1856), *The Altar on the Threshing-Floor* (1857), *The Two Pageants*, on the death of Pres. Lincoln (1865). In illustration of the doctrines, history, and usages of the Lutheran Church he wrote *The Torgau Articles* (1850), *The Lord's Day*, *Theological Encyclopedia from the Seventeenth to the Nineteenth Century* (1857), *Christian Liberty* (1860), *The Evangelical Mass and the Roman Mass* (1861), *The Lutheran Church, Her Glory, etc.* (1863), *The Augsburg Confession*, translated and annotated (1869), *The Conservative Reformation, and its Theology as represented in the Augsburg Confession and in the History and Literature of the Evangelical Lutheran Church* (1871, 8vo, pp. 858). Dr. Krauth has been a constant laborer in the liturgical movements in the Lutheran Church, and written in this line *Sunday Services of the Churches of the Reformation* (on the basis of Alt's *Cultus*, 1853), *The Jubilee Service* (1867), *Common Prayer, arranged from the Collects in Ancient Use in the Lutheran Church; The Church Book of the General Council* (1869); *The Liturgical Movement in the German Reformed and Presbyterian Churches*. He has been associated with the organization of the general council of the Lutheran Church in America; wrote the *Reply to the Pope's Letter*, adopted Nov. 6, 1869; the *Theses on Justification* (1870-74); was elected president of the council 1870, has held that office to this time (1875), and is chairman of its committee for the preparation of a constitution for congregations and synods.

Dr. Krauth's library is one of the most carefully selected in our country, and contains about 13,000 volumes, largely of the class of books which are the primary sources of information in the departments of his investigations. He has published a number of papers on "the internal history and relations of the Authorized English Version of the Scriptures, and of the Translations and Texts which have influenced it."

**Krebs** (JOHN MICHAEL), D. D., b. at Hagerstown, Md., May 6, 1804; graduated at Dickinson College in 1827 and at Princeton Theological Seminary in 1830; was 1830-67 pastor of the Rutgers street church, N. Y., and held many prominent positions in the Old School branch of the Presbyterian Church. He was the author of several devotional and other works, chiefly of a religious character. D. in New York Sept. 30, 1867.

**Kremenets'**, town of European Russia, in the government of Volhynia, on the Irwa, which, however, is not navigable. It has seven annual fairs. Pop. 10,486.

**Kremenchoug'**, town of European Russia, in the government of Poltava, on the Dnieper. It has manufactures of rope, leather, tallow, and a brisk trade. Pop. 25,848.

**Kremlin**. See MOSCOW.



**Krem'nitz**, town of Hungary, situated in a deep valley among barren mountains, and provided with water by an aqueduct 50 miles long. Its gold and silver mines are the richest in Europe. Pop. 6,339.

**Krems**, town of Lower Austria, on the Krems, at its influx into the Danube. It is famous for its mustard and wine. Pop. 5,400.

**Krem'sir**, town of Austria, in the province of Moravia, is beautifully situated on the March; it is well built, the seat of several civil and ecclesiastical authorities, and has good educational institutions, many fine buildings, and an active general trade. Pop. 9,110.

**Kreutz'nach**, town of Rhenish Prussia, on the Nahe, at its influx into the Rhine. It has celebrated salt springs, much used for bathing, and large manufactures of brandy, champagne, chocolate, and tobacco. Pop. 10,935.

**Kreuz'er**, the name of a small coin which originated in the Tyrol in the thirteenth century, and became very common all over Germany since the fifteenth. At present, since 1858, it is made only in the South German states of copper, 100 to a gulden. It received its name, *cruciatius*, *crucifer*, from a cross imprinted on it.

**Kris**, or **Crease**, the dagger of the Malays, often curiously twisted, the more seriously to mangle those who are wounded by it. It is of native manufacture and extremely well tempered.

**Krishna**. See HINDU RELIGION, and MAHABHARATA.

**Krishna River**. See KISTNAH.

**Kroe'ger** (ANDRÉ E.), b. in 1837 at Schwabstadt, near Friedrichstadt, in the duchy of Sleswick, where his father was a minister. In 1848 the whole family emigrated to America, and settled at Davenport, Ia., and soon after young Kroe'ger entered into business life as clerk in a banking-house. From 1857 to 1860 he was engaged as translator on the *New York Times*. During the war he served on the staff of Fremont. After the war he settled at St. Louis, Mo., where he is still residing. Both by his translations of Fichte and by numerous essays in different periodicals he has contributed much to a better understanding of and a more widely spread interest in German literature and philosophy. He is a steady contributor to the *St. Louis Journal of Speculative Philosophy*. In 1873 he published *The Memorings of Germany*, containing translations of Walter von der Vogelweide, Ulrich von Lichtenstein, etc.

**Krolevets'**, town of European Russia, in the government of Tchernigov. It has a much-frequented annual fair. Pop. 6,317.

**Kro'nenberg**, town of Rhenish Prussia, on the Wip-per, has manufactures of silk and of iron and steel goods. Pop. 7,874.

**Kron'stadt**, town of the Austrian empire, in Transylvania. It is an old city, consisting of an inner town surrounded by walls, its three suburbs respectively inhabited by Germans, Szeklers, and Wallachs. It is a thriving and very neatly built town, with many beautiful gardens and promenades. Pop. 28,014.

**Kroos**. See LIBERIA.

**Krotoszyn'**, or **Krotoschin**, town of Prussia, in the province of Posen. It has manufactures of tobacco and linen, and a large trade in wool. Pop. 7,688.

**Krozet'** (or **Crozet**) Islands, a group of four small islands in the Indian Ocean, between Kerguelen and Prince Edward islands. They are uninhabited, and visited only by sealers. The easternmost, situated in lat. 27° S., lon. 48° E., was selected in 1874 as a station for the observation of the transit of Venus by the American astronomers; but owing to tempestuous weather the party were unable to land, and the station was unoccupied.

**Krü'dener**, von (JULIAN), b. at Riga Nov. 21, 1764, a daughter of Baron von Wietinghoff, one of the wealthiest Livonian noblemen, and a granddaughter of the famous Russian field-marshal Münch. In 1783 she married Baron von Krüdener, whom she accompanied to Venice and Copenhagen, and to whom she bore two children. In 1789 she made a journey to France, from which she sent her husband a milliner's bill of 20,000 francs for the first three months, and from which she returned in 1791 with M. de Frégevill, a young lieutenant of hussars, disguised as her footman. After that time the couple lived separated. The fame of Madame de Staël tempted her into literature. *Va-Urié, ou lettres de Gustave de Linar à Ernest de G—*, was produced, corrected, read aloud in the salons, and at last published at Paris in 1803, after the most careful preparation. The result was a perfect success, quite a sensation, which, however, did not satisfy the authoress. Her connections with Jung-Stilling and the Moravian Brethren had now the ascendancy over her mind, and she

appeared in the world as a Sister of Charity, a preacher, a prophetess. In 1815 she held a sort of religious reunions in her hôtel in Paris, and people of the highest rank crowded her salons; the emperor of Russia, Alexander, was among her visitors. He invited her to the grand review over the Russian troops in the plain of Châlons, and the sight inspired her as the beginning of the "reign of Christ on earth." From Bâle, where she attempted to continue her religious assemblies, she was expelled; also from Baden, Württemberg, Bavaria, Saxony, and Prussia. In 1818 she was escorted by the Prussian police to the Russian frontier, and on entering her native country she was forbidden to preach and to appear in St. Petersburg and Moscow. She found, nevertheless, an opportunity of visiting St. Petersburg, and attempted to renew her friendship with the emperor. But her enthusiasm for the Greek revolution, and her indiscretion in working for her ideas, were too great for the Russian diplomacy. She was banished from St. Petersburg, and went in 1824 to the Crimea in order to found a colony in accordance with her own ideas of human society. On this expedition she d. at Karassubasar Dec. 25, 1824. Her life and character have been subject to much curiosity and speculation; at present, however, most critics agree in considering her a specimen of a not uncommon kind of female character, only that peculiar circumstances forced her gifts and her weaknesses into caricature.

**Krug** (WILHELM TRAUOGT), b. at Radis, in Prussian Saxony, June 22, 1770; studied at Wittenberg, Jena, and Göttingen; was appointed professor in philosophy at Frankfort-on-the-Oder in 1801; at Königsberg in 1804, as the successor of Kant; at Leipsic in 1809; resigned in 1834, and d. Jan. 13, 1842. He took part with great eagerness and with a certain adroitness in all literary and political movements in his time. He was president of the Tugendbund, formed after the Peace of Tilsit for the regeneration of Germany. He joined a Saxon regiment in the campaign of 1813. In politics he stood foremost among the liberal agitators; in theology he wrote *Briefe über die Möglichkeit der gegenwärtigen Religion* (1795); in philosophy he pretended to have found the true reconciliation between idealism and realism, which he presented in a quite popular form. *Fundamental philosophic* (1803), and afterwards in a more scientific form in his *Allgemeine Handbuch der philosophischen Wissenschaften* (4 vols., Leipsic, 1827-28). His writings are very numerous and varied; they were popular in their time, but are now superseded.

**Kru'mau**, town of Bohemia, on the Moldau, consists of Krumau proper, Latron, six suburbs, and an immense palace or castle with five courtyards. Krumau has large breweries, and a famous beer-vault excavated in a solid rock. Pop. 6,600.

**Krum'macher** (FRIEDRICH ADOLF), b. at Tecklenburg, in Westphalia, July 13, 1768, and d. as minister of the Reformed congregation at Bremen, Apr. 11, 1845. His *Pantheismus* (1805) became a very popular book, ran through many editions, and was translated into English. He wrote several other works, poetical and religious, none of which attained great popularity.—His son, FRIEDRICH WILHELM, b. at Duisburg, in Rhenish Prussia, Jan. 28, 1796, and d. as chaplain of the court at Potsdam, Dec. 10, 1868, was a rather harsh opponent of the rationalistic school of theology, but he was a very eloquent preacher. Of his writings, *Elia's Tishbit's*, *The Last Days of Elisha*, *Salomon and the Shulamith*, *Glances into the Kingdom of Heaven*, *David, King of Israel*, and his *Autobiography* have been translated into English.

**Krupp** (FRIEDRICH). The Krupp cast-steel works at Essen, in Rhenish Prussia, were founded in 1810 by Friedrich Krupp. After his death, in 1826, his widow and sons took charge of the establishment in company until 1848, since which time one of the sons, Alfred Krupp, carries on the business alone under the firm-name of Friedrich Krupp. Like his father, he had many difficulties to overcome before he achieved any signal success, but the introduction of steel for cannons exercised a decisive influence on the prosperity of the works. At present the establishment covers an area of more than 400 hectares and employs over 12,000 hands, besides about 5000 men engaged in the mines and smelting-houses, 2000 in the building department, and 739 in the administration. The quantity of steel produced and consumed for casting amounted in 1872 to more than 125,000,000 kilogrammes: the articles manufactured comprised axles, tires, wheels, etc. for railways; rails and springs for railways and mines; axles for steamboats; different parts of machinery, rollers, etc., and cannons, gun-carriages, and guns. In 1873 there were 1100 furnaces of different kinds in operation; 275 coke-ovens, 264 smiths' forges, 240 boilers; 71 steam-hammers, of which 3 were of 100 cwt., 1 of 200, 1 of 400, 1 of 1600; 286 steam-engines,



of which 5 were of 150, 1 of 200, 1 of 500, 3 of 800, and 1 of 1000 horse-power; and 1056 machine-tools. In 1872 500,000,000 kilogrammes of coal, 125,000,000 kilogrammes of coke, 5,500,000 cubic metres of water, and 5,000,000 cubic metres of gas were consumed. Of means of communication the establishment possesses 32.9 kilomètres of railway, 15 locomotives, 800 cars, and a complete system of telegraph; 206 dwelling-houses for officials, 2948 for workmen, several hospitals, a chemical laboratory, a photographic and a lithographic establishment, etc. belong to the works; 414 mines and several smelting-houses, with 11 blast-furnaces, produce annually about 10,000,000 kilogrammes of pig iron. Rich deposits of iron ore in Northern Spain belong to Mr. Krupp.

Most artilleryists consider the Krupp cannon to be the best in the world. They are most extensively used; more than 13,000 pieces have already been produced. Since 1872 the whole German army has been provided with a new field-gun invented by Mr. Krupp. The system of his cannon is the breech-loading; their peculiarity consists partly in the appropriateness of the metal, partly in the construction. At the Vienna Exposition he exhibited the following cannons: I. 305 mm. cannon; calibre, 305 mm.; length of tube 6.7 m.; length of bore, 5.77 m.; weight of tube, 36,600 k.; of the filled steel grenade, 296 k.; of charge, 60 k.; of cast-iron long grenade, 257 k. II. 28 cm. howitzer; calibre, 280 mm.; length of tube, 3.2 m.; length of bore, 2.5 m.; weight of tube, 10,000 k.; of filled grenade, 199 k.; of charge, 20 k. III. Short cm. ship cannon; calibre, 260 mm.; length of tube, 5.2 m.; weight of tube, 18,000 k.; of grenade, 184 k. IV. Long 24 cm. cannon for casemate ships; calibre, 235.4 mm.; length of tube, 5.23 m.; weight of tube, 155,000 k.; of steel grenade, filled, 135 k.; of cast-iron grenade, filled, 118.5 k. V. Long 21 cm. cannon; calibre, 209.3 mm.; length of tube, 4.708 m.; weight of tube, 10,000 k.; filled steel grenade, 95 k. VI. 21 cm. siege cannon; calibre, 209.3 mm.; length of tube, 3.400 m.; weight of tube, 3900 k.; filled grenade, 79 k. VII. Long cm. cannon; calibre, 172.6 mm.; length of tube, 4.250 m.; weight of tube, 5600 k.; filled steel grenade, 55 k. VIII. 15 cm. siege cannon; calibre, 149.1 mm.; length of tube, 3.44 m.; weight of tube, 3000 k.; filled grenade, 28 k.; charge, 6 k. IX. Long 15 cm. cannon; calibre, 149.1 mm.; length of tube, 3.85 m.; weight of tube, 4000 k.; filled steel grenade, 35 k.; filled cast-iron long grenade, 28 k. X. 12 cm. cannon; calibre, 120.3 mm.; length of tube, 2.925 m.; weight of tube, 1400 k.; filled steel grenade, 17.5 k.; filled cast-iron grenade, 15.5 k. XI. 9 cm. field cannon; calibre, 91.5 mm.; length of tube, 2.04 m.; length of bore, 1.819 m.; weight of tube, 425 k.; filled grenade, 6.9 k.; charge, 0.6 k. XII. 8 cm. field cannon; calibre, 78.5 mm.; length of tube, 1.935 m.; weight of tube, 295 k.; filled grenade, 4.3 k.; charge, 0.5 k. XIII. 6 cm. mountain cannon; calibre, 60 mm.; length of tube, 1.25 m.; weight of tube, 107 k.; filled grenade, 2.3 k.; charge, 0.2 k. AUGUST NIEMANN.

**Krusenstern, von** (ADAM JOHANN), b. Nov. 19, 1770, at Haggud, Esthonia, and educated at the naval academy of Kronstadt; served 1793–99 in the British navy, and undertook, from Aug. 7, 1803, to Aug. 19, 1806, a scientific and commercial expedition at the expense of the Russian government to the northern coasts of the Pacific. The expedition was a great success, and has been described by Krusenstern himself in his *Reise um die Welt* (3 vols., 1810–12, translated into English by Hopponer in 1813). From 1821–27 he published *Atlas de l'Océan Pacifique* (2 vols.; and *Recueil de mémoires hydrographiques, pour servir d'analyse et d'explication à l'Atlas de l'Océan Pacifique*. In 1829 he was made a vice-admiral, in 1841 an admiral, and d. Aug. 24, 1846.

**Kryloff** (IVAN ANDREIVITCH), b. Feb. 14, 1768, d. Nov. 21, 1844; passed the early years of his boyhood in the distant province of Orenburg, where his father was serving against the rebels of Pugatcheff, and subsequently in Tver. His father died when he was fourteen, and he was then obliged to enter the government service in Tver, and afterwards in St. Petersburg, at a salary of two roubles a month. He received a good education from his mother. His first production, at the age of sixteen, was *Columbus*. In 1788 he entered into journalism, in which he continued until 1796, when all the private printing-offices were closed by the emperor Paul. For some years after he resided on the estate of Prince Galitzin, teaching the children and acting as a friend to the family. On the accession of the emperor Alexander in 1801, Prince Galitzin was made governor of Livonia, and appointed Kryloff his secretary. His passion for cards caused him to leave the service and to wander about Russia for two years. In 1805 he wrote his first fables, which had a great success, and from this time on his literary activity was entirely confined to fable-writing.

VOL. II.—100

His first essays were chiefly adaptations and translations of La Fontaine, but he afterwards wrote wholly in the national vein, touching sometimes on politics, especially on the stirring events of 1812, though principally on moral and social topics. From 1812 to 1841 he occupied a position in the imperial public library. He never married, and particularly in his latter days led an almost solitary life, confining himself to occasional visits at the houses of one or two friends.

EUGENE SCHUYLER.

**Ku'blai Khan**, the founder of the twentieth or Mongol dynasty of emperors of China, was a grandson of Genghis Khan, b. early in the thirteenth century in Tartary, of which country he was the reigning sovereign, when about 1250 his aid was invoked by Li-Sung, emperor of China, against the Oriental Tartars. This task having been successfully accomplished, Kublai Khan remained in China with his large and well-disciplined army. After the death of Li-Sung and of his imbecile successor, Kublai Khan assumed the title of emperor of China, excluding the infant claimant of the throne. His undisputed reign dates from 1279, after which he extended his empire by the conquest of Tonquin, Cochin China, and other adjoining countries, until his limits reached the Arctic Ocean, the Straits of Malacca, and the Euxine. He sent a naval expedition for the conquest of Japan, but it was partially destroyed by a tempest, and the remainder easily defeated by the Japanese. Under his reign the celebrated Venetian traveller Marco Polo resided many years at the imperial court, of which he has given so vivid a description. (See KATHAY, by Col. HENRY YULE.)

**Kuenlun', or Koukoun**, the name of a mountain-range of Central Asia, which commences near the point of lat. 35° N. and lon. 75° E., from which the Himalayas, the Hindoo-Koosh, and the Bolor-Tagh radiate in three different directions, and stretches eastward, forming the northern boundary of Tibet. The eastern parts of this mountain-range, which extends into China proper, are almost unknown to us, but the western part, generally known by the names of Karakorum and Mustagh, rises to a height of 21,000 feet, is covered with tremendous glaciers, which sometimes descend to 10,000 feet, and forms deep, wild, but beautiful and exceedingly fertile valleys. Karakorum is properly the name of a pass, 18,000 feet high, leading from Tibet into Chinese Tookistan.

**Kufic Writing.** See CURVE WRITING.

**Kug'ler** (FRANZ THEODOR), b. at Stettin Jan. 19, 1808; studied history, philology, and art in Berlin, Heidelberg, and Italy, and was appointed professor in the fine arts at the University of Berlin in 1833. His *Handbuch der Geschichte der Malerei von Konstantin der Grosse bis auf die neuere Zeit* (2 vols., Berlin, 1837), and his *Handbuch der Kunstgeschichte* (2 vols., Stuttgart, 1841–42), are excellent productions—clear, comprehensive, and very instructive: the former of them has been translated into English. His *Kleinen Schriften und Studien zur Kunstgeschichte* (3 vols., Stuttgart, 1853–54) contains many valuable essays on the history and philosophy of the fine arts. Very little interest, on the contrary, have his dramas and poems, and his *History of Frederick the Great*, though the latter is very much read in Germany. D. at Berlin Mar. 18, 1858, in the midst of a large work on the *Geschichte der Baukunst*, of which he finished only the three first volumes.

**Kuhn** (ADALBERT), b. at Königsberg in der-Neumark, in the Prussian province of Brandenburg, Nov. 19, 1812; studied philology at the University of Berlin since 1833, and became teacher at the gymnasium of Cologne in 1841, and in 1856 professor. As editor of *Zeitschrift für vergleichende Sprachforschung und Beiträge zur vergleichenden Sprachforschung* he has contributed much to the growth of comparative philology, and by his *Die Herabkunft des Feuers und des Göttertrunks* (Berlin, 1859), as well as other researches in the same line, he inaugurated the new science of comparative mythology.

**Kuhn** (FRANZ), baron von Kuhnfeld, b. in 1817; entered in 1837 the 1st regiment of infantry as a lieutenant; distinguished himself in 1848 and 1849 in the war in Hungary and Italy; was employed on the staff and as teacher of strategy at the Military Academy of Vienna, and occupied in 1859, in the war in Upper Italy, the important position of chief of staff to Gyulay. After this unfortunate war he received the command of the 17th regiment of infantry, and in the war of 1866 he was made a major-general and charged with the defence of the Tyrol against Garibaldi. He was successful in the performance of this task, and was promoted to be field-marshal-lieutenant. In 1868 he was appointed minister of war for the whole empire, and devoted himself with great energy to the reorganization of the army, managing with decency and prudence the many difficulties which arose from the discrepancies between Austria and Hungary. In June, 1874, he retired from this



position, in consequence of one of those fluctuations so common with the Austrian government, and assumed the command of Grätz.

AUGUST NIEMANN.

**Küh'nöl**, or **Kuehnoel** (CHRISTIAN GOTTLIEB), b. at Leipzig Jan. 2, 1768; studied theology in the university of his native city, where he began to lecture on biblical exegesis and hermeneutics at the age of twenty; became professor of philosophy in 1790, and preacher in 1796. In 1801 he accepted a professorship at Giessen, and remained there until his death, Oct. 15, 1841. His earliest original work was on *Messianic Prophecies* (1792), in German, after which he published (in 1794) *Notes on the New Testament, from the Apocryphal Books of the Old Testament*, in Latin, and in 1799 *The Psalms in Meter*, in German. The great work of his life was his Latin *Commentary on the Historical Books of the New Testament* (Leipzig, 4 vols., 1807-18; 4th ed. 1837), which had great popularity, and was reprinted in London (1837, 3 vols.), with the addition of the Greek text. Kühnöl is credited with many of the best qualities of a biblical interpreter, and held a middle ground between orthodoxy and neology.

**Ku'ka**, or **Kukawa**, town of Central Africa, the capital of Bornoo, in lat. 12° 55' N. and lon. 13° 26' W., on the western shore of Lake Tchad. Pop. 8000.

**Ku-Klux Klan**, or **Ku-Klux** [named, we are told, in imitation of the click heard in cocking the rifle: *klan* is the word *clan* in a new orthography], a former secret association of ex-Confederate soldiers, first heard of in Tennessee in 1863. The society soon spread into several other States of the South, and many murders and other crimes were committed by its members, who were dressed in fantastic disguises. The victims were chiefly freedmen, persons of Northern origin, and Southerners accused of favoring the reconstruction acts of Congress. The great body of the Southern people never approved of this method of settling the questions involved, and greatly deplored the crimes of the Ku-Klux. In Apr., 1871, Congress made these offenders punishable in the Federal courts, and authorized the President to suspend the habeas corpus act when necessary to the preservation of order. These measures, and the employment of U. S. troops in the troubled districts, soon brought the disturbances to an end.

**Kula'**, town of Austria, in the province of Serbia, with some manufactures and a lively trade. Pop. 6908.

**Kul'ja**, or **Kuldsha**, province of Asiatic Russia, in the government of Toorkistan. Area, 25,500 square miles. Pop. in 1871, 114,337. It was formerly Soongaria, the extreme N. W. province of the Chinese empire, but a few years since it declared its independence under a native sultan, and in May, 1871, the Russian government seized and annexed the country in accordance with a previous agreement with China. The capital, Kulja, called also *Eelee*, is situated on the Eelee River, and has considerable trade. Pop. 30,000.

**Kulm** [Bohemian *Chlum*], village of Bohemia, 8 miles N. E. of Teplitz, is noted for the battle which took place here Aug. 29-30, 1813, and in which a French corps under Vandamme was surrounded by the allied Russian-Austrian army, and compelled to surrender after a desperate resistance, with 80 pieces and 10,000 men, having lost 5000 men.

**Kulm**, town of Prussia, in the province of Prussia, on the Vistula. It has some manufactures of linen and some trade in corn. Pop. 7263.

**Kumaon'**, territory in the north-western part of Hindostan, forming a province of the presidency of Agra, British India, and situated between 29° and 31° N. lat. and between 78° and 81° E. lon. Area, 11,000 square miles. Pop. 605,910. It is mostly covered by the Himalaya Mountains, with the exception of a belt of lowland from 2 to 15 miles broad extending along the foot of the mountain-range. Two crops are gathered here yearly; rice, sugar, and indigo form the one—wheat and European fruits and vegetables the other. The tea-plant has been introduced with success. The capital is Almora, situated 5337 feet above the sea.

**Kumquat**, the *Citrus Japonica*, a variety of the orange which is perfectly hardy in Japan and China, and would probably succeed in many parts of the U. S. The shrub and its fruit are both very small, but the fruit is of excellent quality.

**Ku'nersdorf**, village of Prussia, in the province of Brandenburg. Here Frederick the Great was utterly defeated by the combined Russian and Austrian forces, Aug. 12, 1759.

**Kung**, PRINCE, b. in 1835, was uncle of the late emperor of China, and as regent became the virtual ruler of that country at the accession of the former in 1861. In 1860, at the time of the capture of the Pei-Ho forts and of the summer palace of Peking, he advised the emperor

to sign the peace with the French and English. Prince Kung is the leader of the small party in China which advocates friendship with Christian nations, and the introduction in the Celestial empire of their industrial, scientific, and manufacturing processes. He agreed with Anson Burlingame, then American minister at Peking, to send him in 1868, as envoy extraordinary of China, to the U. S. and European powers, in order to form with them all alliances on a very enlightened basis. He became afterwards prime minister, and concluded peace with Japan, after the Formosan troubles, Nov., 1874. On that occasion he was accused of having given way to foreign influence, and was even condemned to death, but on the following day an imperial decree reinstated him in all his offices, which he retained until the death of the young emperor, Jan. 17, 1875.

FÉLIX AUCAGNE.

**Kungur'**, or **Koongoor**, town of European Russia, in the government of Perm. Its manufactures of Russian leather are celebrated as the best in the world. Its vicinity has very rich iron-mines. Pop. 8298.

**Kun-Hegyes'**, town of Hungary, on the Theiss, has 7113 inhabitants, mostly Calvinists.

**Kuunouj'**, town of British India, in the presidency of Agra, on the Kali Nuddi, 3 miles from its junction with the Ganges, was at one time a flourishing town, but is now only a vast field of ruins, of which some Mohammedan tombs are interesting, and bear witness to the former splendor of the place. Pop. 15,000, who live miserably.

**Kun-Szent-Martony'**, town of Hungary, on the Körös, has 9091 inhabitants.

**Kun-Szent-Miklos'**, town of Hungary, on the Danube, has 5751 inhabitants, chiefly Protestants.

**Kunth** (KARL SIGISMUND), b. at Leipzig June 18, 1788; studied natural science at Berlin; lived 1813-19 at Paris, engaged in the editing of Humboldt's and Bonpland's botanical collection; was appointed professor of botany at Berlin in 1820, and d. Mar. 22, 1850. His principal works are—*Enumeratio plantarum omnium hucusque cognitarum* (5 vols., Stuttgart, 1833-50), and *Lehrbuch der Botanik* (1847).

**Kunze** (JOHN CHRISTOPHER), D. D., b. in Saxony about 1740; studied at Leipzig and Halle; entered the Lutheran ministry, and came to Philadelphia in 1770 as associate pastor of the German churches in that city. For several years he was a professor in the University of Pennsylvania. In 1784 he accepted a pastoral call to the city of New York, where he resided for twenty-three years, until his death, July 24, 1807. He added to his pastoral duties those of the professorship of Oriental literature in Columbia College. He was celebrated as a Hebrew scholar, being consulted even by the rabbins upon the philological interpretation of their Scriptures. He published several works, among which were a *History of the Christian Religion and of the Lutheran Church*, a *Catechism and Liturgy*, and a *Lutheran Hymn and Prayer Book*.

**Kuper** (SIR AUGUSTUS LEOPOLD), K. C. B., G. C. B., b. in 1809; entered the royal navy in 1823; served on South American and Mediterranean stations and in China, attained the rank of rear-admiral in 1861, and was appointed commander-in-chief on the East India and China stations, conducting with success the operations in 1864 on the coast of Japan, and for which services was created a K. C. B.; subsequently promoted in the navy to be full admiral.

**Kupperwunje'**, town of British India, in the presidency of Bombay, in lat. 22° 37' N., lon. 73° 9' E., is fortified and has some trade. Pop. 13,000.

**Kur**, or **Koor**, a river of the Caucasus, rises in Turkish Armenia and flows to the Caspian Sea. Its course is so irregular and its currents so rapid that it is entirely unfit for navigation. In most places it is even impossible to bridge it.

**Ku'rite** (or **Koorite**) **Islands**, a group of twenty-six islands in the North Pacific Ocean, near the Asiatic coast, forming a chain 700 miles in length, from Kamchatka to Yesso, the northernmost island of Japan. Estimated area, 3000 square miles. Pop. uncertain, but very small. The surface is irregular and mountainous, with eight or ten active volcanoes, one of which is from 12,000 to 15,000 feet high. The inhabitants of the northern islands resemble the natives of Kamchatka; those of the southern are chiefly Ainos, a race found also in Yesso. These islands are divided into Great and Little Kuriles, the former belonging to Japan, and the latter to Russia, but by a treaty signed June, 1875, Japan has acquired sovereignty over the whole group. There are iron and copper mines; the seal-fishery and fur-trapping is of some value.

**Ku'rische-Haff**, a lagoon on the northern coast of Prussia, extending from Labian to Memel, separated from

the Baltic by a narrow belt of land called "Kurische Nehrung," and communicating with it through a channel of hardly 1000 feet width, called "Memel Deep." Its water is fresh and in most places shallow.

**Kurnool',** or **Kurnul**, town of British India, in the presidency of Madras, the capital of a district of the same name. It is situated on the Tanbudra, is strongly fortified, and has about 20,000 inhabitants.

**Kurrachee'**, town of Sind, on an inlet of the Arabian Sea, 18 miles N. W. of the mouth of the Indus. As all the branches of the Indus are barred by sandbanks, Kurrachee is the only seaport on these coasts, and as it has railway communication both with Hyderabad and with Lahore, it carries on an important trade. Pop. 22,000.

**Kur'shee**, town of Central Asia, in the dominions of Bokhara, has some fine mosques, bazaars, and public baths, and carries on a considerable trade in cattle, carpets, and horsecloths. Tobacco is extensively cultivated in the vicinity. Pop. about 10,000.

**Kurtz** (BENJAMIN), D. D., LL. D., b. at Harrisburg, Pa., Feb. 28, 1795; was at fifteen years of age an assistant teacher in the Harrisburg academy, and afterwards gave private instruction in ancient and modern languages; studied theology at Lebanon, Pa., under the direction of Rev. Dr. George Lochman, and was licensed to preach in 1815 by the Lutheran synod of Pennsylvania. He was successively assistant at Baltimore to his uncle, Rev. Dr. J. D. Kurtz, pastor at Hagerstown, Md., and at Chambersburg, and in 1833 settled at Baltimore as editor of the *Lutheran Observer*. He conducted that paper for twenty-nine years, making it a leading representative of the Lutheran culture in America. Dr. Kurtz took an active part in founding the theological seminary of his denomination at Gettysburg, spending two years in Germany (1825-27) seeking aid for it; he was also a leading manager of the Lutheran Book Company established at Baltimore in 1840, and was the chief founder of the Missionary Institute at Selinsgrove, Pa. He wrote several theological books, was an eloquent speaker, and was recognized as a leader and a great power in the Lutheran Church. D. at Baltimore Dec. 29, 1865.

**Kurtz** (JOHN DANIEL), D. D., b. at Germantown, Pa., in 1763; studied Lutheran theology under the direction of his father, Rev. John Nicholas Kurtz, and subsequently under that of Rev. Dr. H. E. Mühlenburg of Lancaster, and was licensed to preach by the synod of Pennsylvania in 1784. In 1786 he was ordained pastor of the principal Lutheran church at Baltimore, Md., and held that post for nearly half a century, until in 1832 he resigned on account of advancing age and infirmity. He was one of the founders of the General Synod of the Lutheran Church, a director of the theological seminary, and closely identified with all the benevolent institutions of his Church. D. at Baltimore June 30, 1856.

**Kurtz** (JOHN NICHOLAS), b. at Lutzelinden, Nassau, Germany, about 1720; studied theology at Giessen and Halle, and in 1745 came as a missionary to his countrymen in Pennsylvania. He was the first Lutheran minister ordained in the British colonies in America, labored successively at New Hanover, Tulpehocken, Germantown, and York, Pa., and spent much time in perilous missionary journeys through the frontier settlements, exposed to the tomahawk and the scalping knife. He was pastor at York when the Continental Congress held its sessions there during the Revolution, and gave evidence of his patriotism by his solicitude to relieve the sufferings of the soldiers. At the age of seventy he retired from the ministry, and spent his remaining years with his son, Rev. Dr. J. D. Kurtz, at Baltimore, where he d. in 1794.

**Kuskoquim'**, a river of Alaska, rises in the Chignik Mountains at about lat. 61° N., and flows S. W. more than 500 miles into Kuskoquim Bay. Its course has never been explored by white men, and its valley is occupied only by a few wandering Indians and Esquimaux, the former being Kenaians, and the latter a sub-tribe of the Koniags, called Kuskoquimutes.

**Kussnacht**, a v. of Switzerland, in the canton of Schwytz, on an arm of the Lake of Lucerne, at the foot of the Rigi. Here is Tell's chapel, and many localities relating to the myth of Tell are shown in and around the village. Pop. 2500.

**Kustendji**, or **Kistendjeh**, small town of European Turkey, on the Black Sea, near the termination of Trajan's Wall. It carries on some trade in corn. Pop. about 5000.

**Küstrian'**, town of Prussia, in the province of Brandenburg, at the confluence of the Warta and the Oder. It is a fortress, but only of the third rank, and has 9554 inhabitants.

**Kutai'eh**, or **Kutaya**, town of Asiatic Turkey, in Asia

Minor, on the Pusak. It has many mosques, palaces, public baths, and promenades, and a considerable trade in meerschaum, opium, tobacco, and goats' hair. Pop. 28,963.

**Kutais'**, government of Asiatic Russia, in Caucasus, is bordered W. by the Black Sea, S. by Asiatic Turkey, and E. by the government of Tiflis. Area, 8000 square miles. Pop. 605,000. The surface is mountainous. The capital, Kutais, is situated on the Rion (the ancient *Thakes*), and has 8263 inhabitants. It stands on the site of the ancient *Untatinium* or *Cytaea*, the capital of Colchis, is fortified, and carries on some trade in corn, wine, and cattle.

**Kutchin**, an Indian nation of Alaska, occupying the upper valley of the Yukon (or Kwichpak) River through a great part of its course. They are found as far E. as Mackenzie's River, and are divided into a large number of petty tribes.

**Kut'tenberg**, town of Bohemia, has large cotton manufactures, and in its vicinity important copper and lead-mines. Pop. 12,727.

**Kutusoff** (MIKHAIL or MICHAEL), b. 1745; entered the Russian army at the age of sixteen; became major-general in 1784; was the leader under Suvoroff in the memorable assault and capture of Ismail; became lieutenant-general in 1791; was ambassador to Constantinople in 1793, and filled other diplomatic posts up to the Russian war against Napoleon, when his services were put in requisition. In 1805 he entered Germany at the head of 50,000 men, defeated Mortier at Dürrenstein, and disapproved of the plan followed by the allies at the battle of Austerlitz. His greatest title to glory is in the final results which he obtained in the Russian campaign. In Aug., 1812, he was appointed general-in-chief, and though he lost the battle of Borodino, and could not prevent the capture of Moscow, still, his energy caused the Russians to recover confidence, and he received the baton of a field-marshal. After the evacuation of Moscow, Kutusoff hotly pursued the French, inflicted on them great losses in the battles of Malo Jaroslavatz, Krasnoï, and Smolensk, for the latter of which he was created prince of Smolensk, and while pursuing the French in Prussian Silesia, d. of a malignant fever at Bunzlau, Apr. 28, 1813. FÉLIX AUCAIGNE.

**Küt'zing** (FRIEDRICH TRAGOTT), b. at Kitzburg, in Thuringia, Dec., 1807; studied at Halle; travelled in Southern Europe, especially exploring the flora of the coasts of the Adriatic, and was appointed in 1835 professor of natural science at Nordhausen. His principal works are *Die Umrundung niedriger Alpenformen in hohes* (1839), *Phycologia generalis* (1843), *Phycologia germanica* (1845), *Species Algarum* (1849). His researches have principally concerned the Algae, and led him to the same fundamental ideas as those of Darwin.

**Kutz'town**, post-b. of Berks co., Pa., on the Allentown branch of the Philadelphia and Reading R. R., has 2 weekly newspapers, an iron-foundry and furnace, and a coachmaking establishment. It is the seat of the Keystone State Normal School, which has 400 students. Pop. 945.

REV. A. R. HORNE, Ed. "NATIONAL EDUCATOR."

**Kwang-Sec.** See QUANG-SEE.

**Kwang-Tung.** See QUANGTUNG.

**Kwei-Chu**, **Kweichow**, or **Queichow**, province in the S. W. of China, lying between Se Chuen, Hu Nan, Quang-Sec, and Yun-Nan. Area, 64,547 square miles. Pop. 5,228,219. It is a rugged, mountainous country, of which copper, iron, lead, and quicksilver are the most valuable products. Cap. Kwei-Yang.

**Kwichpak River.** See YUKON.

**Ky'ante** [Gr. *kyaneos*, "blue"], a natural silicate of alumina, crystallizing in the triclinic system, commonly of a pale-blue color (whence its name), but occasionally white, gray, or black, and generally occurring in long-bladed crystallizations.

**Kyanizing.** See TIMBER, PRESERVATION AND FIRE-PROOFING OF.

**Kyle's Springs**, tp. of Jackson co., Ala. Pop. 167.

**Kymul'ger**, tp. of Talladega co., Ala. Pop. 161.

**Kyrie**, the first word in Greek of "*Agnus dei*," "Lord, have mercy," a petition often occurring in the liturgies, masses, and other offices of the Catholic Church. Hence the name *Kyrie* is used to designate the opening movement of musical masses, requiems, and various services which commence with the words *Agnus dei*, *Agnus dei*, *Agnus dei*. For this reason the term is applied in the American Church to the responses between the commandments in the Communion office, "Lord, have mercy upon us."

**Kythul'**, town of British India, in the presidency of Bengal, the capital of a district of the same name. It is a well-built city, with a magnificent palace and 30,000 inhabitants.



# L.

**L**, one of the consonants called liquids, representing a sound found in almost every language. It quite constantly stands for the same sound in all languages using the Roman alphabet; although *ll* in French (*mouille*) undergoes a peculiar softening in certain situations, while *ll* in Spanish (*ll* in Portuguese) has a sound like *l* followed by *y* as a consonant. *Ll* in Welsh has a peculiar aspirated sound not found in English. *L* is to some extent interchangeable with other consonants, particularly with *R* and the mutes. As a numeral, *L* stands for fifty; as an abbreviation, it represents the Latin proper name *Lucius*.

**Laa'land**, or **Lolland**, an island of Denmark, in the Baltic, separated from Falster by Guldborgsund. Area, 452 square miles. Pop. 56,000. It is low and flat, but fertile and well cultivated. Large crops of wheat are raised; fine forests of oak and beech cover a large part of the island. Principal towns are Maribo and Naskov.

**Labadie'** (JEAN), b. Feb. 13, 1610, at Bourg-en-Guienne, and educated at Bordeaux by the Jesuits, in whose order he became a distinguished professor. In 1639 he left the Jesuits, and commenced preaching peculiar doctrines of his own, having considerable success at Paris, at Amiens, at Bazas, and at Toulouse. He obtained many followers through his eloquence and learning, claimed to have received the spirit of John the Baptist, and predicted the end of the world in 1666. Finding no rest in the Roman Catholic Church, and being subject to persecutions, he publicly embraced the Reformed creed in 1650 at Montauban, where he preached for several years a return to apostolical religion on pietistic principles. In 1657 he became pastor at Orange, and in 1659 at Geneva, where he gained many proselytes, but created such disturbances that he soon withdrew, and for several years travelled through Germany and Holland. In 1666 he became pastor of a Walloon church at Middelburg, Holland, where several persons of importance embraced his doctrines. His most celebrated disciples were two ladies, Anna Schurmann and Antoinette Bourignon, the former distinguished for her learning in the Oriental languages, the latter as authoress of many devotional publications. In 1669 he removed to Amsterdam, and formed a body of followers known as Labadists. Expelled from Holland in 1670 as a dangerous sectarian, he went to Erfurt, where the princess palatine Elizabeth protected him and became his disciple. He afterwards went to Bremen, and finally to Altona, where he d. Feb. 2, 1674. His disciples settled in the duchy of Cleves, where they existed for nearly a century. Early in the eighteenth century some Labadist missionaries settled on the banks of the Hudson in New York, but do not seem to have founded any churches. Labadie's doctrines were a combination of mysticism with Calvinism; he held to illumination by the Holy Ghost as the means of salvation superseding the Bible, rejected infant baptism and the observance of the Sabbath, and taught communism in property. The Roman Catholics circulated many charges of immorality against his teachings, but without reason, his practices having been ascetic in the extreme. He left numerous writings, now extremely rare.

**Lab'aree** (BENJAMIN), D. D., LL. D., b. at Charlestown, N. H., June 3, 1801; graduated at Dartmouth in 1828, and at Andover Theological Seminary in 1831; was ordained at Bradford, Mass., 1831; was professor of Latin and Greek in Jackson College, Tenn., 1832-36, its president 1836-37; president of Middlebury College, Vt., 1840-66; held a pastorate at Hyde Park, Mass., 1869-71.

**Labarraque's' Solution** (*Liquor Sodæ Chlorinatæ*), a solution of chlorinated soda formed by mixing the solution of sodic carbonate with that of the best quality of bleaching-powder (the so-called chloride of lime). It is very valuable, both as a remedy and as a general disinfectant. Its chemical constitution is indefinite. See **SODIUM**.

**Lab'arum** [etymology doubtful], the name of the principal standard of the Roman armies after the conversion of Constantine. It was a banner borne upon a cruciform standard, and had the monogram of Christ, with the letters alpha and omega. It was designed to commemorate the conversion of Constantine, and was an object of adoration to the troops.

**Labat'** (JEAN BAPTISTE), b. at Paris in 1663; entered the order of the Dominicans in 1685; was appointed professor in mathematics and philosophy at Nancy in 1687, and went in 1693 as a missionary, first to Martinique, and then to Guadeloupe, where he remained till 1705. He

worked not only as a missionary, but also as a scientist, besides being a man of great practical ability. He founded the city of Basse-Terre and took part with great energy in the defence of the island against the English. On his return to Europe he lived for some years in Spain, then in Italy, and afterwards in Paris, where he d. Jan. 6, 1738. His principal writings are *Nouveau voyage aux îles de l'Amérique* (6 vols., 1722), *Voyage en Espagne et Italie* (8 vols., 1730), *Relation historique de l'Éthiopie occidentale* (5 vols., 1722).

**Lab'danum**, or **Lad'anum**, the resin of *Cistus creticus*, *laurifolius*, and *ludaniferus*, small evergreen shrubs of the order Cistaceæ, growing chiefly in the Levant. It is combed from the beards of goats and the fleece of sheep that browse upon the hills where it grows, and is also collected by drawing a rake over the plants. Leathern thongs are attached to the rake, and to these thongs the resin adheres. It is used as an incense and as a fumigation; also sometimes in plasters. It was formerly valued as a stimulant and expectorant.

**La Bédollière, de** (ÉMILE GIGAULT), b. at Paris 1814. He is especially known as one of the most assiduous contributors to the journal *Le Siècle*, which he recently left for *Le National*, another republican paper of Paris. La Bédollière began his literary life by writing the *Political Life of the Marquis de La Fayette* in 1833, which work attracted public attention to him. He has translated many English and American books—*Uncle Tom's Cabin*, the novels of Fenimore Cooper, etc. He has written also *History of the National Guard*, *History of the Manners and Private Life of the French*, *The New Paris*, *History of the Mexican War*, etc. All these works are animated with a high spirit of liberalism.

FÉLIX AUCAIGNE.

**La Bédoyère, de** (CHARLES HUCHET), COUNT, b. at Paris 1786; shot there Aug. 19, 1815. His historical fame is due to the fact that he was the most exact personification of the persecutions which the Bonapartists had to suffer at the hands of the Bourbon restoration after Waterloo. La Bédoyère, though of an ancient legitimist family, had become the admirer of Napoleon and taken service in his armies. He did not resign his military functions on the first fall of Napoleon in 1814, and was colonel of an infantry regiment when the emperor landed in France from the island of Elba in 1815. La Bédoyère, like the whole army and the whole of France, joined Napoleon at Vienne, who, on arriving in Paris, made him his aide-de-camp, general of division, and senator. On the return of the Bourbons after the "Hundred Days," La Bédoyère was arrested, tried by a drumhead court-martial, and shot.

FÉLIX AUCAIGNE.

**La'bel** [Lat. *labellum*, "lip" or "tassel"]. In its original sense *label* meant a narrow strip of paper or parchment used in affixing a leaden seal to a deed or other instrument of writing. Verification is still the intrinsic idea of the label, although its mechanical function has disappeared, and in its legal sense it has been justly termed a *quasi* trade-mark. Like the trade-mark, it implies proprietary rights defensible both by common law and statute (see **TRADE-MARKS**), but differs from it in including proper names, descriptive terms, etc., and in excluding merely arbitrary symbols. Although the distinctions between a label and a trade-mark may appear at first glance shadowy and uncertain, they are substantial and readily deducible from the ethics of the numerous judicial decisions on record; provided always that the character of the specific matter decided upon be considered without regard to the terms used by the court in its designation; for the word "trade-mark" has been frequently applied even by learned judges to indicate a label, and hence the confused ideas current as to the true nature of the latter.

In the U. S. previous to the act of Congress approved June 18, 1874, and which went into effect Aug. 1 of the same year, no provision existed for the registry of labels, and infringements were tried in equity under rulings similar to those governing trade-mark cases, but based more upon the substantial justice of each suit, as in cases of unfair competition in trade, than upon the clearly defined axioms that govern the disposal of trade-marks. The act just mentioned, however, although faulty in many respects, affords a basis for the building up of a system of law and practice which will undoubtedly ensure to labels a defined status and value which the isolated and to some extent



discordant decisions of different State courts have failed to give them. As officially stated, the scope of this act is as follows: "Sec. 3. That in the construction of this act the words 'engraving,' 'cut,' and 'print' shall be applied only to pictorial illustrations or works connected with the fine arts, and no prints or labels designed to be used for any other articles of manufacture shall be entered under the copyright law, but may be registered in the patent office. And the commissioner of patents is hereby charged with the supervision and control of the entry or registry of such prints or labels, in conformity with the regulations provided by law as to copyright of prints, except that there shall be paid for recording the title of a print or label, not a trade-mark, six dollars, which shall cover the expense of furnishing a copy of the record, under seal of the commissioner of patents, to the party entering the same. Sec. 4. That all laws and parts of laws inconsistent with the foregoing provisions be and the same are hereby repealed. Sec. 5. That this act shall take effect on and after the first day of August, eighteen hundred and seventy-four. Approved June 18, 1874."

"By the word 'print,' as used in the said act, is meant any device, picture, word or words, figure or figures (not a trade-mark), impressed or stamped directly upon the articles of manufacture, to denote the name of the manufacturer or place of manufacture, style of goods, or other matter. By the word 'label,' as therein used, is meant a slip or piece of paper, or other material, to be attached in any manner to manufactured articles, or to bottles, boxes, and packages containing them, and bearing an inscription (not a trade-mark), as, for example, the name of the manufacturer or the place of manufacture, the quality of goods, directions for use, etc. By the words 'articles of manufacture'—to which such print or label is applicable by said act—is meant all vendible commodities produced by hand, machinery, or art. But no such print or label can be registered unless it properly belongs to an article of commerce, and be as above defined; nor can the same be registered as such print or label when it amounts in law to a technical trade-mark."

It will be seen that the act in question excludes trade-marks *per se*, together with matter relating to the fine arts and belles-lettres. In addition to these, it also excludes designs or articles the form and configuration of which are intended for the decoration or artistic improvement (as distinguished from the mechanical or functional) of manufactured articles.

The registry of a label is specially desirable in those cases wherein business interests are identified with the sale of an article known by the term by which it would naturally be designated, as, for example, the word "Akron," for a material produced at Akron, an illustration taken from the noted case of *Newman vs. Alford*, 19 Barbour's Reports, p. 588, in which the cement obtained from a bed in the village of Akron, Erie co., N. Y., was designated as Akron cement. Any one could quarry and prepare cement in the village, and sell it as Akron cement, for such is the proper term to indicate the article. But parties in Syracuse, N. Y., made a cement obtained from another locality, and sold it as Akron cement. The court enjoined them. It was shown that the plaintiffs had made known to the world the merits of the cement-bed in Akron, and the market of the product depended essentially upon the title given it. The sale of another article under the name, therefore, not only defrauded plaintiff of the profits that would otherwise accrue, but deluded the public into purchasing what it did not wish. The label, therefore, although lacking the inherent characteristic of a trade-mark, that of exclusive proprietorship, excludes competition from all except those in co-equal possession. The question as to whether the registry of the term as a label would exclude another in the same locality from using it has never yet been decided, but in all probability a decision would be in the negative. If, however, the party registering owned the entire source of supply, as of cement, iron, or other product, in the locality, the term, under the practice of the patent office, would become a trade-mark, and would be registered as such, and not as a label.

As with a geographical, so with a proper name; for although the arbitrary form of a person's signature may constitute a trade-mark, his name alone cannot. Any one named Holloway has a right to make Holloway's pills, but one Holloway must not so frame his labels as to deceive the public with the idea that the articles vended by him are the wares of another. This was decided in the rolls court in England about twenty-five years ago, and the principle holds good in American practice. The master of the rolls declared that "the defendant's name being Holloway, he has a right to constitute himself the vendor of Holloway's pills and ointment. . . . But he has no right to do so with such additions to his own name as to deceive

the public, and make them believe that he is selling the plaintiff's pills and ointment." In *Burgess vs. Burgess*, in chancery, 1853, another English case, the court affirmed the right of any one bearing the name of Burgess to make and vend "Burgess's Anchovy Sauce," but compelled the defendant to remove certain accessories from his store which tended to mislead the public into the belief that they were purchasing from another person of the same name. But had some person, not of this name, adopted the term, there is no doubt that a permanent injunction would have issued. And could it have been shown that a person named Burgess had used the label, not in the *bona fide* pursuit of a legitimate business, but with intent to trade on the reputation of another dealer, an injunction would have issued as a matter of course. As the law concerning labels, although now embodied in statutes, rests fundamentally upon commercial equity, the jurisprudence of different countries shows, in the main, great uniformity in the drift of decisions. For instance, the view just previously expressed is sustained by a noted French case, in which an association organized by one Th. Roederer was enjoined, with especially humiliating conditions, from using the name Roederer except in a manner so conspicuously distinctive as to show at a glance that the article sold was *not* that of the celebrated wine-merchants of the name. An action brought in a U. S. court would, so far as the above points are concerned, be decided in accordance with the above acknowledged principles; in other respects the analogies of the law of trade-marks would prevail. In some of the States local laws provide for the punishment of infringers upon a label, and in such instances the courts of the State are the proper tribunals. Even where no such laws exist, an action under the common law may be maintained, the choice of courts resting with the lawful owner of the label. But registry in the U. S. patent office is always desirable, not only as bringing the matter within the scope of the U. S. courts, but for the reason that it defines the precise character of the label, and because it is notice to the public that it is claimed, so far as his option and volition can secure it, exclusively by the party registering the same.

Strictly speaking, the so-called copyrighting of labels never gave any security or protection to them in point of law, although to a certain extent useful in advising the public of the asserted proprietorship. But as this is now forbidden by law, no further consideration need be given it. Pictures, engravings, etc. relating to the fine arts, and printed matter considered apart from a commercial product or article to which it is attached, are subjects for copyright, and no matter embraced within either of these divisions can be protected either under the act of Congress or by State or common law. A "design" being in the nature of things arbitrary, and distinct in configuration from any other, may be used as a trade-mark, provided that its use for this purpose is by its originator, patentee, or owner as a design, but as for trade purposes it may thus be brought within the scope of a trade-mark, it cannot properly be registered as a label.

JAMES A. WHITNEY.

**Laberge** (CHARLES JOSEPH), b. in Montreal in 1827; was educated at the college of St. Hyacinthe, and became a lawyer in 1848; in 1854 he entered the Canadian Parliament as a liberal; in 1858 he was solicitor general for Canada East. He was an able public speaker, and was for a time editorially connected with the *Franco-Canadian* of St. John's, Quebec, and was later chief editor of *Le National*, Montreal. He was for a time a lieutenant-colonel of volunteer troops. D. in Aug., 1874.

**Labette'**, county in the S. E. of Kansas, bounded on the S. by Indian Territory. Area, 624 square miles. It is drained by the Neosho and its branches, and by affluents of the Verdigris. Valuable coal is found, and the county is generally level and fertile. Grain and stock are staple products. The county is traversed by the Missouri Kansas and Texas R. R. Cap. Oswego. Pop. 9973.

**Labette**, post-v. and tp. of Labette co., Kan., on the Labette River and the Missouri Kansas and Texas R. R., 9 miles S. of Parsons City. Pop. 282.

**Labiata** [Lat. *labia*, "lips," from the two lipped corolla], one of the larger of the monopetalous orders of phanerogamous plants, well marked by the opposite and mostly aromatic leaves, square stems, labiate corolla, four didynamous, or only two stamens, and a four-parted ovary, forming four seed-like millets (naked seeds of the old botanists) around the base of a single style. No plants of the order are known that are in the least degree hurtful. The essential oils which give an aromatic character to many of them are separated by distillation for medicinal purposes or for use in perfumery. Several, such as thyme, summer-savory, and the like, are the "sweet herbs" of kitchen gardens. *Lavandula vera*, a shrub cultivated throughout



Germany, and widely in England, has fragrant flowers, from which the official oil of lavender is produced. *Rosmarinus officinalis* is an evergreen shrub of the S. of France and the contiguous coast of Italy, the leaves and flowering tops of which yield the volatile and fragrant oil of rosemary. It is believed that the essential oils just referred to are constituents of eau-de-cologne. *Montha piperita* is the well-known peppermint. It is cultivated on a vast scale in Southern Michigan, Western New York, and Ohio. In St. Joseph co., Mich., there were in 1858, 2000 acres devoted to its growth. A ton of dried peppermint yields about 3 pounds of the essential oil. Spearmint is a closely allied species, cultivated for its aromatic oil. Many other plants of the order are widely known and safely used in domestic medicine—pennyroyal, American pennyroyal, hyssop, horehound, and the like. A few are cultivated for ornament, such as Chinese *Perilla*, several scarlet and blue sages, and *Calceus*, with richly-colored and often variegated leaves.

ASA GRAY.

**Labienus** (TITUS), b. about 98 B.C.; tribune in 63 B.C., when Cicero was consul; accompanied Cæsar as his lieutenant to Gaul, and distinguished himself in 54 B.C. by his two victories over the Treviri, and in 52 in the campaign against Vercingetorix. Although he entered public life under the auspices of Cæsar, and served him for many years, he nevertheless sided with Pompey when the civil war broke out, and made himself conspicuous by the meanness and cruelty with which he treated those of Cæsar's soldiers who fell into his hands at the battle of Dyrrhachium. After the defeat of Pharsalia he fled to Africa, and thence to Spain after the defeat at Thapsus. In Spain he fought against Cæsar at Munda, and by his mistakes the battle was lost. D. 45 B.C. He was not without literary ability, but he was a loose and vain character, and his blunders and crimes have thrown his successes into the shade.

**Labienus, Les Propos de**, the title of a bitter satirical invective against the second French empire, and personally against Napoleon III., which appeared in Paris in 1865, immediately after the publication of the first volume of Napoleon's life of Julius Cæsar. Labienus is represented to be a soured, disgusted, and obstinate republican living under Augustus, against whose usurpation and tyranny he perpetually chafed. He is represented to have written a history of his country, of which he read passages in secret to his friends. His grandfather is said to have served under Julius up to the crossing of the Rubicon, and his father to have joined the Parthians rather than support the triumvirate. This was supposed to point to Victor Hugo, whose father was a general under the first republic; but as this latter also served the empire, the coincidence is not complete. The duc d'Aumale wrote a life of the great Condé which was printed privately for his friends, and was seized and confiscated. This was a point of similarity with Labienus, who, however, by hypothesis, could not have been of royal extraction. The author probably did not mean to point definitely to any individual. The appearance of a volume of *Memoirs* by Augustus is the occasion of a special outburst of the spleen of Labienus, with which the satire concludes. The author was M. A. Rocheard, an ex-professor in a provincial college. His name was on the title-page, and he was condemned for his pains to four or five years' imprisonment, but escaped by taking refuge in Brussels.

F. A. P. BARNARD.

**La Billardière, de** (JACQUES JULIEN), b. at Alençon Oct. 23, 1755; studied medicine and botany at Montpellier; travelled in France, England, and Italy; made in 1786-87, at the expense of the government, a journey in Syria and Palestine; accompanied the expedition of D'Entrecasteaux in 1791; was taken prisoner in 1793 by the Dutch at Java, while his botanical collections were carried to England; was liberated in 1795, and resided afterwards in Paris, where in 1800 he was elected a member of the Institute. D. at Paris Jan. 8, 1834. He wrote *Icones plantarum Syriæ rariorum* (1791-1812), *Nova Hollandiæ plantarum specimen* (1804), *Relation du voyage à la recherche de La Pérouse* (1800), besides a great number of monographs and essays.

**Lablache** (LÉGER), b. at Naples Dec. 17, 1794; made his début as a basso in 1812 in his native city; achieved his first great success in Vienna in 1824, and sang from 1830 to 1857 alternately in Paris and London, making occasional trips to St. Petersburg and Naples. D. at Naples Jan. 23, 1858. His principal performances were Figaro, Leporello, Dulcamara, Don Pasquale, etc., but he also sang Henry VIII. in *Anna Bolena*, and Giorgio in *I Puritani*, making a most powerful impression.

**La'bor** [Lat.], in political economy, denotes one of three great agencies by which wealth is produced, the others being land, or nature, and capital. A celebrated German economist divides industrial history into three periods, in

the first of which nature is the chief productive agent; in the second, labor; in the third, capital. In the first of the three periods wealth consists mainly of natural produce, as in the hunting and pastoral stages, and likewise in the early stage of industrial progress in new and prolific regions, where wealth lies, as it were, on the surface. In the second period—the later centuries of the Middle Ages, for example—agriculture progresses, handicrafts multiply, considerable manual skill is developed, and labor plays the principal part. In the third period production takes place on a large scale, machinery supersedes handicrafts, as in the case of the handloom, and labor and land become the ministers of the mechanical powers, materials, money, and credit, at the command of the capitalist. This generalization, though rough and needing some qualification, puts in a strong light one truth in particular which it is of great importance to the working classes to recognize—namely, that labor is not the only productive agent, that capital gains ground with industrial progress in respect of the contribution which it makes to production, and that all theories on behalf of labor which omit to take this fundamental economic fact into account are fallacious. Thus, the leading doctrine of some German Socialists, that all wealth is the product of labor, capital itself only accumulated labor, and that the working classes are therefore entitled to the whole produce of every country, is unsound and delusive. The steam-engine is the typical feature of modern industry, and it was mainly the product, not of manual laborers, but of the genius, enterprise, perseverance, and command of funds of two employers of labor, Watt and Boulton. With the steam-engine came production on a great scale and for distant markets, needing large advances of capital and new powers of direction and enterprise. Yet, although capital has become the dominant element in most of the chief departments of industry, both labor and the powers of nature do absolutely much more in our day, though relatively less, for the production of wealth than formerly. Watt complained that the main difficulty of constructing his steam-engine arose from the unskilfulness of his workmen; workmen now easily and rapidly make far more perfect machines. Again, wealth increases fastest, and both profits and wages are highest, in the civilized world where natural resources and advantages, such as fertile soils, mines, water-communication, are greatest. Coal and iron, for example, played an insignificant part in mediæval industry; the natural riches of whole continents lay idle; and numerous products of nature which were then unknown or valueless are now sources of wealth. A still more important consideration in reference to the three great productive agents, land, labor, and capital, is that their separate ownership is not an essential or a universal condition of things. A peculiar course of national history and a peculiar legal system led to a separation of society in Great Britain into three great classes—landlords, capitalists, and laborers; and English economists, with the tendency to premature generalization which characterizes infant philosophy, were led to reason as though this were the natural and necessary consequence of industrial progress, and as though rent, profit, and wages must belong everywhere and always to different classes. But the severance of the laborer from landed property is an exceptional fact in the modern world, being peculiar to British industrial economy. And although co-operation is in its infancy, it has succeeded in several forms; and in Great Britain itself the recipients of wages are in a considerable number of cases partners also in profits.

There is, however, in all civilized countries—and there must for generations to come, if not always, be—a large class living by manual labor and in the receipt only of wages. The causes which determine the material condition of this class and their real income must long retain the highest importance. These causes are not to be summed up, as some eminent economists have supposed, in any single law or formula, such as the proportion of capital to laborers; they vary in different circumstances, in different places, and in different stages of economic progress. Thus, the effect of an increase of population on wages is very different in different regions. In Flanders, for example, wages are kept down by excessive population, but in new countries, such as the Western States of America and in Australia, an increase of laborers may raise in place of reducing wages, by rendering possible a better division of industry and the development of the immense resources of nature. In such regions, too, wages are often paid chiefly not out of capital, but out of the ultimate produce. Even in old countries, where they are paid chiefly out of capital, it is an error to suppose that the rate of wages is absolutely fixed by the ratio of the amount of capital to the number of laborers. (See STRIKES, TRADES UNIONS, WAGES.) What it is desirable to draw particular attention to here, however, is that the rate of wages, or the price of



labor, does not in the majority of cases by itself determine the amount of the real income of the working classes, though it is one of the conditions which do so. Where the laborer is paid altogether in food and other commodities, his wages and his real income are identical. In mediæval Europe this was for the most part the case. And in many parts of Germany to this day, and in some parts of England, the farm laborer receives part of his wages in kind. In the U. S., likewise, and in Australia, board or food sometimes forms part of the price of labor. Nevertheless, the decided tendency of modern industrial economy is to substitute money payments for wages in kind; and wherever this change takes place, or in so far as it does so, the real income of the laborer becomes subject to more complex conditions, and ceases to depend solely on the rate of wages or on the terms of the exchange between employer and employed. For the workman then makes not one exchange only—namely, the sale of his labor for food and other articles—but a number of exchanges, by means, first, of the sale of his labor, and subsequently of the purchase of the various commodities which he consumes. The term “real wages,” which is still sometimes employed, is in this case inappropriate and misleading, as tending to shut out of consideration some most important elements of the real income of the working classes. Two workmen may be earning exactly the same wages, yet the real income of the one may be increasing, that of the other decreasing, because the articles which the former buys are falling, those on which the latter spends his wages rising in price. There are places where the laborer contracts to work for a year at a fixed rate of monthly or weekly wages; here the amount of commodities constituting his real income depends partly on the seasons, on taxation, and on various circumstances quite independent of his wages, some of which were not even in existence when his wages were fixed. It is one of the most important results of the introduction of money as the medium of exchange that the working classes have become directly and deeply concerned in matters—improvements in production, tariffs, taxes, laws, forms of association, investments for savings—which otherwise would only remotely affect them, or not at all. That admirable modern institution for the economical purchase of commodities, the co-operative store, owes its origin to the change in industrial economy which substituted payments of wages in money for payments in kind. The immense purchases of land which the working classes have made in France and other parts of the continent of Europe are among the results of money-wages. The legal system which has excluded the British laborer from the ownership of land has led some British economists to look to co-operative association, by which the workman becomes a partner in capital, as the only mode by which any considerable number of the working class can be raised from the condition of living from hand to mouth, and the only solution of the labor question. But in France there are 4,000,000 land-owners cultivating their own ground, besides many more whose land is farmed by tenants, and the number yearly increases by the purchase of little plots; in Germany, Switzerland, and Belgium the number of small proprietors, who would otherwise be only laborers for hire, is very large, and land in those countries is the favorite investment for savings from wages. In the U. S. there are now probably 3,000,000 farms, and the rapidity with which the number increases is shown by the following figures: in 1850, 1,449,073; in 1860, 2,044,977; in 1870, 2,659,985. Even in England a great number of working men are owners of house-property, and hundreds of thousands of the English working classes of both sexes have invested savings in building, benefit, and friendly societies. The insecurity, indeed, of many of these investments shows the loss which the laborer in Great Britain sustains from the inaccessibility of land. In countries, moreover, in which land is accessible to the working classes, it not only provides a healthful occupation and a secure investment for those who acquire it, but also raises the standard of wages in other occupations. An American employer pointed out to the English trades-union commission that in the States the price of labor is in a great measure regulated by what a man can make out of land, which there competes with capital in the labor-market. What is called the labor question is not, however, susceptible of any single solution, be it co-operation, a good land system, secure savings banks, or any other method. All the methods, moral and intellectual as well as material, which benefit and elevate all classes, and not the working classes alone, must concur in the solution of the problem. The advantages which the laborer derives from education, newspapers, books, cheap postage and locomotion, sanitary improvements, medical science, show how his condition depends on the general progress of civilization; and the future doubtless has in store additions to his welfare undreamt of at present.

T. E. CLIFFE LESLIE.

**Laboratory, Physical and Chemical.** For the first fourteen or fifteen hundred years of the Christian era the grand sciences now known as physics and chemistry, so far as they had advanced, were known under the names of the “Egyptian art” or the “black art” (whence the word “Chemistry” or “Chémie,” from *Chem*, Egypt), and were chiefly cultivated in secret, being condemned as shameful and illegitimate by the State, and as impious and dangerous by the Church. The amazing power and progress lying here in latent forms were no doubt instinctively felt and recognized; and from the element in human nature which holds *omne ignotum pro terribili*, these studies were rightly regarded as fraught with peril to all existing institutions and authorities, and to the perpetuity of the prevailing ideas that had been carefully inculcated in the minds of the illiterate mass of men—ideas which were naturally contrived with the most anxious care to assist in upholding those authorities and institutions. Thus it was that the laboratory—which in our day is claimed to be the fountain-head of our greatest arts of civilization, and which is the sphere that now absorbs many young men who feel within them the God-imprinted ambition to add something to the sum of real knowledge, and to die that death which comes to all with a consciousness that life has not been spent in vain,—thus it was that philosophical and chemical labor of all kinds, during all these centuries, was driven into holes and corners, and classed with astrology, alchemy, jugglery, diabolism, spiritualism, and all that genus of mysticism, quackery, trickery, and fraud. Thus, as we recede, in trying to trace the past history of civilization, before the present epoch of printed books, we find it almost or quite impossible to obtain satisfactory ideas of laboratories or of their occupants antecedent to this epoch. The records of those days, consisting of manuscripts and pictures, are both rare and inherently defective. The true students of science then rarely wrote books, and still more rarely painted pictures. The only branches of chemistry and natural philosophy which received any countenance from the powers that were, and any aid from the possessors of the existing wealth, were such as presented the promise of immediate and direct additions to that power and wealth. The only natural science held to be “practical” in its character—as held even now by many—was such as would help to *make money* for individuals; additions to the sum of human knowledge, involving the greatest good to the greatest number, being as dust in the balance.

Naturally and necessarily, such books as may have been written by true men of science were not valued, copied, or preserved; probably not sought after for public libraries, nor even admitted therein, unless they bore the stamp and held the jargon of mysticism of some sort—astrology, gold-making, miracle-mongery, or the preparation of nostrums and specifics. Paintings—of engravings there were none—were founded almost wholly upon the popular ideal of the haunts of these popularly-reputed mystics, and are not, of course, to be fairly or justly accepted as representing the real science of those days. The engraving we present with this, therefore, of a mediæval laboratory of a date nearly 300 years ago, must be viewed with due allowance, no doubt, for the necessary coloring of the mind of the artist with the prevalent idea of such places and such pursuits. The artist in this case was the elder Teniers, and the date of the original painting—in the Gallery of the Louvre in Paris—somewhere about the close of the sixteenth century. Students of the history of science will remember that this was a generation previous to the birth of Becher, and two generations before that of Stahl, the two chemists who were the founders of the first scientific system of chemistry, the phlogistic system; which, with the substitution of the idea of *vis viva* for that of phlogiston, may be held as still standing at this present day. The art of printing was then a century and a half old, and printed books appear in this painting, prominently exhibited. We know, from very numerous facts on record, that the chemists of the day of this painting, the sixteenth century—many of whose names even are uncertain or unknown—made great discoveries—discoveries which we are sure could not have been made without long, exhaustive, and unselfish labor and research. In spite of the assertion, oft repeated, but not by those who *make discoveries*, that they are “mostly made by accident,” we do not find at the present day that accident plays any important part in the progress of human discovery. All new methods, materials, arts, theories, generalizations, and principles, all that is entitled to the rank of a discovery, come in these days to men in the laboratory, as the sequences of indefatigable study and labor, inspired by a patient enthusiasm, devoid of all tincture of sordid calculation, and certainly conducted with as great an avoidance of the element of accident or random-work, as in any human pursuit whatever. Those who pursue science consider themselves justified in



believing, therefore, that it has always been thus; and that the many fundamental discoveries, the new materials, methods, and arts which came from the laboratory during the so-called alchemical times, were neither accidental nor

the results of empirical work, but arose from the same identical sort of research, by the same sort of men, as in our own day.

To illustrate this assertion, the cut is presented of the

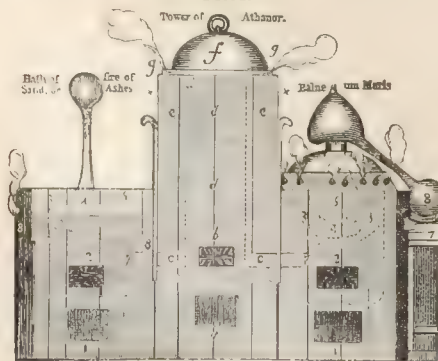
FIG. 1.



A chemist's laboratory of the sixteenth century, from a painting by the elder Teniers.

ancient laboratory furnace of the famous Geber, 1100 years old. It will be observed that this apparatus involves a number of inventions and principles often supposed to be of modern origin, among them that of the so-called "base-burning" stoves. The name *Athanasior* was derived from this feature, meaning "deathless" or never-expiring.

FIG. 2.



Geber's Tower of Athanasior (about A. D. 790).

- |   |   |   |
|---|---|---|
| <p>1, the ashe hole; 2, the focus or fire-room; 3, the place where the ashes or Sand for the Bath are placed; 4, a Matrasse; 5, a glasse dish; 6, the Register of fire; 7, the entrance of the fire or heat from the Tower of Athanasior; 8, the Iron plate or Vessel containing the Sand or ashes.</p> | <p>a, the ashe hole; b, the focus or fire-room; c, the passages made for communication of the fire; d, the empty place of the Tower; e, the solid part of the Tower; f, the cover of the Tower; g, two several circles where-in the cover is in-laid.</p> | <p>1, the ashe hole; 2, the focus; 3, the kettle where the water of the Balneum is put; 4, a round (of wood, hay, or some other soft matter) to keep up the Limbeck body; 5, the cucurbit, with its Limbeck head; 6, the Registers of fire; 7, the stool or table to keep up the Recipiem; 8, the Recipiem.</p> |
|---|---|---|

Chemical Laboratories are at present too numerous and too easily accessible to make it necessary to illustrate their

arrangements by a graphic representation. In well-appointed institutions, as at the School of Mines of Columbia College, distinct laboratories are now provided for each kind of study and investigation. Thus, there is a qualitative laboratory, a quantitative laboratory, an assay laboratory, a photometric laboratory, a photographic laboratory, a laboratory for gas analysis, and a blowpipe laboratory, each of which is provided with the apparatus and fixtures required for the work for which it is designed.

A *Physical Laboratory*, as its name would indicate, is an establishment provided with all the appliances needed in the prosecution of research in subjects of physical investigation, such as those of heat, light, electricity, etc. Such an establishment may moreover be specially adapted to each or all of the following objects: 1st, The instruction of students in such general methods of accurate measurement in the various subjects as lie at the foundation of all researches in each of these departments. 2d, The prosecution of original investigations by which new facts and laws may be discovered, and additions made to the general stock of human knowledge in these directions. 3d, The application of scientific methods to the examination of commercial products or materials, to test their value, efficiency, or improvement under treatment by new processes.

To present an interesting and instructive contrast with the laboratory of mediæval times, above depicted, and to furnish an index of progress in this regard, an interior view of the physical laboratory of the Stevens Institute of Technology, prepared at our request by President Henry Morton, is given here. The space occupied by this department in the Stevens Institute is as follows: 1st, A large room 40 by 60 feet, illustrated on the next page, and which is used as a general laboratory for such work as can be pursued under ordinary conditions. 2d, An optical room, containing a large collection of rare instruments, especially for polarization, and used chiefly by students engaged on problems in that subject. 3d, An optical room, especially arranged for observations in diffraction, spectrometry, and the like. 4th, A large room employed chiefly for investigations in acoustics, although used also from time to time as a lecture-room. 5th, A photometric room, provided with a complete set of photometric apparatus by Sugg of London. 6th, A photographic room, with dark closet, cameras, and lenses of various sorts. 7th, An elec-



trical measurement-room, containing a complete set of instruments for this purpose, including Thompson's static galvanometer of high resistance and a water-battery of 550 cells.

The large room represented in the cut is divided by double cases into ten alcoves on the sides, each devoted to

the use of special instruments, and each occupied by an appropriate table. The middle of the room is occupied by a series of tables and of large pieces of apparatus, such as the great induction coil in the foreground, the large electro-magnet in the distance, etc. etc.

FIG. 3.



The new Laboratory for research and instruction in Physics or Natural Philosophy at the Stevens Institute of Technology, in Hoboken, N. J.

At the present day, so many different branches of applied sciences are undergoing rapid development that specific kind of *technical* laboratories exist in considerable variety, in which the analytical and experimental researches are carried on exclusively that pertain to special technological arts. These special laboratories are so numerous that we can do little more than mention some of the more important.

*Metallurgical Laboratories.*—These are of several kinds. Attached to our mints and assay offices are special assay laboratories, in which immense numbers of delicate assays of gold and silver bullion are continually conducted; and in the same establishments are melting and refining laboratories, in which vast quantities of gold and silver are parted, refined, melted, cast, and prepared for the coining departments by methods of high interest. Other metallurgical laboratories are specially devoted to the assaying of iron and steel, and their ores, slags, etc., by methods chiefly volumetric, for the sake of rapidity.

*Gas Laboratories,* such as should be attached to all our gasworks, the operations of photometry and eudiometry being specially carried on in these, with many others.

*Agricultural Laboratories,* as in our agricultural schools, and in the agricultural department at Washington.

The *sugar refining* art requires at the present day laboratories in which peculiar operations are carried on, as, for instance, with the polariscope.

The arts of *dyeing, calico-printing, and bleaching* require also chemical and analytical investigations of various kinds, so that many special laboratories exist devoted to these. The same may be said of *soap and candle making*.

In England, at the present time, many special and very important government laboratories are being organized and perfected—which it is to be hoped will be imitated soon among us—to prosecute continual and special analyses of all articles of *food and medicine*, to ensure purity and detect fraud.

We may add to these *pharmaceutical* laboratories, in which medicines are elaborated; *electro-metallurgical* laboratories, in which electro-plating and electrotyping are prosecuted; and *telegraph* laboratories, in which numerous special arts are practised, arising out of the great development of electro-telegraphy.

HENRY WURTZ.



**Laborde'** (MAXIMILIAN), M. D., b. in Edgefield, S. C., June 5, 1804; graduated at the College of South Carolina in Columbia in 1821; took the degree of M. D. in the Medical College of Charleston in 1826. His tastes, however, led him more toward the pursuits of literature and science than to the practice of medicine. He soon became a distinguished contributor to *Russell's Magazine*, the *Southern Quarterly Review*, and other like periodicals. In 1842 he became professor of logic and belles-lettres in his alma mater. This position he held until the close of the late war. In the reorganization of that institution subsequently to the war, whereby it is no longer styled the College (but the University) of South Carolina, Dr. Laborde was assigned the chair of rhetoric, criticism, elocution, and English language and literature. This position he assumed, and filled with great ability. He also wrote several books of merit, especially the *History of South Carolina College*. In conjunction with other labors he had for a number of years performed the high trusts of the office of president of the board of regents of the State lunatic asylum. D. at Columbia, S. C., Nov. 6, 1873. A. H. STEPHENS.

**Laborde, de** (ALEXANDRE LOUIS JOSEPH), COUNT, b. at Paris Sept. 15, 1774; served in the Austrian army in the first campaign against the French republic; returned to France after the peace of Campo Formio; filled several diplomatic missions under Napoleon; was elected a member of the chamber of deputies in 1822; took part with great energy in the revolution of 1830; was made a brigadier-general and aide-de-camp to Louis Philippe, and d. at Paris Oct. 24, 1842. His *Voyage pittoresque et historique en Espagne* (4 vols. fol., 1807-18, with 900 engravings) is a work remarkable for its learning and accurateness, and unique in its elegance. It was followed by *Itinéraire descriptif de l'Espagne* (5 vols., 1809-27). He also wrote *Les monuments de la France* (2 vols., 1832-36, with 259 plates), *Versailles, ancien et moderne* (1839-40), etc.

**Laborde, de** (HENRI), VISCOUNT, b. at Rennes, France, May 2, 1811; studied under Delaroche; exhibited in 1836 *Hagar in the Wilderness*. His *Capture of Danietta* (1841) and *Knights of St. John of Jerusalem* (1845) are at Versailles. He wrote *Lugres, sa Vie et sa Doctrine* (1870).

**Laborde, de** (LÉON EMMANUEL SIMON JOSEPH), MARQUIS, son of Count Alexandre, b. at Paris June 12, 1807; studied at Göttingen; travelled in the East; held several diplomatic positions; was curator of the antiquities of the Louvre from 1848 to 1854, and director of the archives of the empire from 1856 to his death, Mar. 30, 1869. He wrote *Voyage de l'Arabie Pétrée* (1830-33), *Voyage en Orient* (1837-64), and several other works relating to archaeology and art.

**Labouchere'** (HENRY), BARON TAUNTON, b. in London, England, Aug. 15, 1798; was educated at Oxford; travelled in the U. S. with Mr. Stanley (afterwards Lord Derby), making the acquaintance of the leading members of the government and Congress at Washington; entered Parliament in 1826, and soon became recognized as one of the Liberal leaders; was member for Taunton from 1830 to 1859, when he was made a peer; filled many administrative posts, having been lord of the admiralty (1832), chief secretary for Ireland (1846), president of the board of trade (1847), and colonial secretary (1855-58). D. July 13, 1869, leaving no male heir.—His nephew, HENRY DU PRE LABOUCHERE, b. at London in 1831, served ten years in the diplomatic service; became a member of Parliament in 1865, and attracted attention by his able letters written from Paris to the *Daily News* during the siege of that capital by the Germans. They were published in a volume with the title *Diary of a Besieged Resident in Paris* (1871).

**Labouchère** (PIERRE ANTOINE), b. at Nantes Nov. 26, 1807, pursued a mercantile career till 1836; then studied painting in Italy and under Delaroche, and became known especially by his representations of subjects from the time of the Reformation. *Luther at the Diet of Worms* (1837) and *Luther's Death* (1866) became very popular.

**Laboulaye'** (ÉDOUARD RENÉ LEFFÈBRE), b. at Paris, France, Jan. 18, 1811; studied law while following a mechanical trade, and astonished the literary world in 1839 by publishing a learned *History of Landed Property in Europe from the Time of Constantine to the Present*, on the title-page of which the author announced himself to be a type-founder. The book was *couronné* (crowned) by the Academy of Inscriptions. In 1842, after being admitted to practise before the royal tribunal at Paris, he published an *Essay on the Life and Doctrines of Sappho*, and in the following year *Researches on the Civil and Political Condition of Women from the Times of the Romans to the Present*. In 1845 he wrote an *Essay on the Roman Criminal Legislation respecting the Responsibilities of Magistrates*, which again won the crown of the Academy of Inscriptions, and procured for its author an election as one of the members of

that body. In 1849 he became professor of comparative legislation at the Collège de France, and distinguished himself by the clearness with which he expounded the principles of legal science. He also began from this time to take a prominent part in politics as an ardent republican, and during the eighteen years' existence of the Second Empire there was in France no more able, active, and vigilant worker in the committees and public meetings of the Liberal opposition than M. Laboulaye. His attention was attracted to the institutions of the U. S. as affording some useful models for introduction in France, and he devoted much time for several years to their careful study. He published a valuable *Political History of the U. S. from the First Attempts at Colonization to the Adoption of the Federal Constitution*, of which vol. i. appeared in 1855, and vol. iii. and last in 1866. He translated W. E. Channing's works on social topics (1854), prefixing a life of Dr. Channing and an essay on his doctrines, and brought out in 1855 that author's work on slavery. He wrote largely for several years in the *Revue de Legislation* and other periodicals, from which he collected in 1855 a volume of *Contemporary Studies on Germany and the Slavic Countries*, and in 1856 another on *Religious Liberty*. In 1862 he rendered a vast service to the U. S. by an exposition of the causes of the American civil war in the work entitled *The United States and France*, and lost no opportunity to inculcate his opinions by speeches. In 1863 he published perhaps the most popular of his works, *Paris in America*, an amusing study of American characteristics, which has been republished in eight or ten editions in the republics of Spanish America, where it now forms one of the principal sources from which opinions are formed about the U. S. In 1865 he wrote the *Programme of the Liberal Party*, and edited in 1866-67 the *Memoirs and Correspondence of Franklin*. He was many times an unsuccessful candidate for a seat in the National Assembly. In 1870 he inclined to favor the reforms proposed by Napoleon and E. Olivier, and from his professional chair advocated an affirmative vote in the plebiscite of May. He was elected to the National Assembly in July, 1871, was made chairman of the committee on the higher education, and in 1874 secretary of the committee of thirty on the (republican) constitution, in which capacity he maintained (1875) a prolonged battle with the monarchists of every type. In 1873 he was made director of the Collège de France. Of all living Frenchmen, he is perhaps the best entitled to the admiration and gratitude of Americans. PORTER C. BLISS.

**Labourdonnais', de** (BERTRAND FRANÇOIS MAHÉ), b. at St. Malo, France, Feb. 11, 1699; entered the navy early, and became a captain in 1724. Having served for some time in the Portuguese navy, returned to France in 1733, and was made governor in 1734 of Isle de France and Bourbon, which colonies prospered much under his rule through the introduction of cotton, sugar, and indigo culture, and the building of fortifications, canals, aqueducts, hospitals, and shipyards. His administration has become celebrated through St. Pierre's romance, *Paul and Virginia*. During the war between England and France was very successful in his undertakings against the English in the East Indies. In 1746 bombarded and took Madras, and levied a war contribution of 9,000,000 francs. But the French governor-general, Dupleix, became jealous, and discharged him. On his return to Paris in 1748, was thrown into the Bastille, where he lay for three years. In 1751 a commission declared him innocent of all the charges brought against him by Dupleix. Liberated, but broken in spirit, he d. Sept. 9, 1753. His widow received a pension. In 1859 a statue was erected to him in the Isle of Bourbon, now Réunion.

**Labrador'** [Port. *Labrador*, "laborer," or *terra laborador*, "cultivable land"], a name vaguely applied to that part of the peninsula lying between the Atlantic Ocean and Hudson's Bay, of which the waters flow neither into Hudson's Bay nor Hudson's Strait. The land whose waters flow into the bay and strait above mentioned was for two centuries the property of the Hudson's Bay Company, and was (1869-71) sold by them to the Dominion of Canada. Labrador proper consists of two parts. That part whose waters flow into the Gulf of St. Lawrence formerly belonged likewise to the Hudson's Bay Company, and now constitutes the district of Labrador, in Saguenay co., province of Quebec, Canada. This coast is inhabited chiefly by Indians and by Canadians, mostly of French descent. In 1873 the country was reported to be in a prosperous condition. The catching of seals, herring, codfish, mackerel, salmon, trout, halibut, and fur-bearing animals is the principal industry. The population is increasing, the houses generally neat and comfortable, and the prices of goods very moderate. The eggs and feathers of wild fowl are gathered to some extent. At Moisie there are



quite extensive iron-works. The Indians have been partly civilized by the efforts of Roman Catholic missionaries. They are of the Micmac, Mingan, Seven Island, Betsamite, and other tribes. Pop. in 1871, exclusive of Anticosti Island (pop. 102), and inclusive of the three last-named tribes of Indians, 3597.

That part of Labrador whose waters flow directly into the Atlantic, and which lies between Cape Chudleigh on the N. W. and the Straits of Belle Isle on the S. E., is the region more generally called Labrador. It belongs, like the former region, to the British empire, but not, like it, to the Dominion of Canada. It is at present under the jurisdiction of Newfoundland. It is governed by a summary court of civil and criminal jurisdiction, whose judge is also magistrate and coroner. There is a bailiff attached to the court, and there are several justices of the peace. The court is held upon a revenue cutter. The revenues are in the care of a collector and his deputy, whose principal office is at Blanc Sablon. There are usually but one or two government mails despatched to Labrador during the summer. The people are not litigious. Most of the cases before the court arise from disputes with regard to the herring fishery. This coast is rocky and precipitous, much broken by bays and inlets. Small islands abound. The native inhabitants are mostly of the Esquimaux race. Nearly all of them have been converted to Christianity by the labors of Moravian missionaries. The principal mission-stations are Nain, Okkak, Hopedale, Hebron, Zoar, and Rama. There are other missions, Roman Catholic and Protestant, the former among the Indians of the interior, who are very few in numbers. The country is so rocky and rough, and the climate so intensely cold in winter (when the temperature averages lower than that of Greenland), that Labrador would be worthless were it not that its coasts abound in the harp and hooded seals (whose fur and oil are very valuable), and that the sea is abundantly stocked with codfish and herring of the best quality. The streams, too, abound in salmon-trout, which are extensively taken and salted. Furs and feathers are collected to some extent. Seal and fish-offal are beginning to be exported for fertilizers. The land-products are few in number. The flora is limited. The forests consist of stunted birch, willow, juniper, and poplar trees. The interior is rough and barren, having a rocky surface, with sandy valleys and numerous swamps and lakes. Near the settlements a few potatoes and other vegetables are raised. During the short summer the coast is visited by great numbers of vessels, mostly from Newfoundland, England, Jersey, and the U. S. The Newfoundland seal fisheries employ numerous sailing vessels and quite a number of steamers. The population of that part of Labrador under the jurisdiction of Newfoundland in 1869 was 2479, exclusive of the aborigines. Disease and famine have greatly reduced the numbers of the latter. In 1870 the mission-station of the Moravians numbered only 1201 souls. This gives for this whole peninsula, with 500,000 square miles of area, a population, exclusive of a few wild aborigines, of only 7277 souls; 3597 of whom, on the S. coast, belong to the province of Quebec (1871); 2479 to the Newfoundland settlements (1869), and the remainder (1870) to the Moravian missions. (See Hind's *Explorations of the Interior of the Labrador Peninsula*, 1865.)

CHARLES W. GREENE.

**Labradorite**, a soda-lime feldspar (see **FELDSPAR**) crystallizing in the triclinic system, and originally obtained from the coast of Labrador. Some specimens when turned in different lights display to perfection a "change of colors."

**Labrador Tea** (*Ledum latifolium*), an evergreen shrub of the heath family found in marshy soils from Pennsylvania northward. The natives of Labrador use the leaves as a substitute for tea.

**Labran'da**, in classical geography, a city of Caria, Asia Minor, near Mylasa, celebrated for its temple of Jupiter (*Zeus Stratos*). The ruins found at Iahh, near Kizeljik, where sixteen columns of an Ionian temple are still standing, were identified by Chandler and by Sir Charles Fellows as those of Labranda, but Lenke believes the true site of the city to have been in the hills N. E. of Mylasa.

**La Brea**, a small town on the South western extremity of the island of Trinidad, in the West Indies, 10 miles from San Fernando, is noteworthy from its extensive exportation of asphaltum.

**Lab'ridæ** [from *Labrus*, the typical genus, and *ida*], a family of acanthopterygian teleostephidous fishes, having the lower pharyngeal bones united in a solid mass, and the upper chiefly or wholly represented by the third bone, which is fixedly articulated to the fourth superior branchial; the form is oblong or elongated; the scales cycloid; the upper maxillary bones articulated in a complex manner; the teeth conic or confluent into an osseous ridge, the

dorsal entire, and with its spinous portion generally larger than the soft, and the ventral fins jugular. The family is a large one, embracing our blackfish (*Tautoglabrus*) and burgall (*Tautoglabrus adspersus*). THOS. GILL.

**La Bruyère, de** (JEAN), b. at Dourdan, in Normandy, probably in 1646, and held a little office in the civil service at Caen, when Bossuet called him to the court of Versailles as teacher to the prince of Condé. The rest of his life he spent at Versailles, Chantilly, and Paris, always belonging to the court, where he enjoyed a pension of 1000 francs a year, but occupying a retired though dignified position. D. May 11, 1696. In 1688 he published his *Caractères de Théophraste, traduits du grec, ou les mœurs de ce siècle*. Two more editions followed in the same year, nine during the lifetime of the author, and a great number in the next century. It has been translated into most European languages—into English by Rowe in 1709—and its reading is still found both interesting and instructive. It is a work of insight, not of inspiration. There is nothing in it of a creative imagination which reveals the depths of human nature through immediate intuition. But it contains much of that fine and acute observation which arrives at a full understanding of human characters through actual experience. Its style is elegant and its tone noble. After his death was published, under the title of *Dialogues posthumes sur le Quétisme*, a work which he left unfinished.

CLEMENS PETERSEN.

**Labuan'**, an island in the Malay Archipelago, or rather in the China Sea, 60 miles from the N. coast of Borneo and 600 miles N. E. of Singapore. Area, 45 square miles. Pop. 4893. The island was ceded to Great Britain in 1846 by the sultan of Brunai (Borneo), and a settlement called Victoria has been made at the S. E. extremity. Its chief importance is derived from its central position with regard to Borneo, Anam, the French colony of Cambodia, and the Spanish colony of the Philippines. There is a fair port, a good supply of water, and abundant mines of coal, for conveying which a railway 5 miles long has been built. Sago, camphor, birds' nests, and pearls are the chief exports. Labuan is the seat of a colonial bishopric; it had in 1872 a tonnage of 7000 and an export trade of £135,000.

**Laburnum** [Lat.], the name of the *Laburnum vulgare* and *alpinum*, two highly ornamental European small trees or shrubs of the order Leguminosæ, cultivated in shrubberies in the U. S. They have abundant yellow flowers in early summer. The wood is hard, heavy, dark-colored, and valuable to the carver and turner. The bark, leaves, and seeds are poisonous. The first-mentioned species is called English, the other Scotch laburnum.

**Labye** (DIEUDONNÉ), a French theologian, b. at Revin, department of Ardennes, France, Mar. 31, 1712; entered the Dominican order in 1728; studied theology at the University of Douai; taught for some time in the College of St. Thomas, but retired afterward to his native town, where he formed an excellent library, with which was connected a cabinet of natural history. D. Jan. 7, 1792. He wrote *Summa Summi I. Thomæ, sive compendium theologiæ scholasticæ et moralis* P. Billuart (6 vols., Liege, 1754).

**Labynetus**, a name frequently occurring in Babylonian history, but uncertain with respect to its significance. It is applied only to the monarchs, but whether it is used as a proper name or a title cannot be decided. One Labynetus is mentioned by Herodotus (i. 74) as mediating, in conjunction with a prince of Cilicia, a peace between Cyaxares and Alyattes. From the chronology it is evident that this Labynetus must have been identical with Nebuchadnezzar. Another Labynetus is mentioned by the same author (i. 77) as a contemporary of Cyrus and Croesus, with the latter of whom he was in alliance. This Labynetus is the same as the Belshazzar of the prophet Daniel.

**Lab'yrinth** [Gr. λαβύρινθος], in Greek archaeology, a subterranean cavity, natural or more frequently artificial, with intricate passages. The most famous, that of Egypt, one of the Seven Wonders of the World, was near Arsinoë and beyond Lake Mæris. It had 1500 subterranean rooms, and as many above ground, and had a wall around it. It is believed to have been a royal sepulchre. The Cretan labyrinth, where the Minotaur was kept, is believed to be mythical. Samos, Lemnos, and other ancient places had labyrinths in imitation of that of Egypt.

**Labyrinthodon**. See **APPENDIX**.

**Lac** [Fr. *laque*; Ger. *Laack*], **Stick-lac**, **Seed-lac**, **Lump-lac**, **Shell-lac**, and **Lac-dye**, a resinous substance produced by the puncture of the female insect of *Coccus lacca* or *C. persici* upon branches of several plants, as the *Ficus religiosa* (the bo tree or religious tree of the Hindoos), the *Rhusanum purpurea*, the *Cassia laccaferum* (or bilhar tree), and the *Butea frondosa* (or the butea tree), which grow in Siam, Assam, Pegu, Bengal,



and Malabar. The female insect is of the size of a louse—red, round, flat, and wingless. The male is twice as large as the female, and has four wings. Soon after it is punctured the twig becomes incrustated with a mammillated resinous substance, red, hard, and nearly transparent. It serves the double purpose of protecting the eggs and of supplying food for the young maggots in a more advanced state. The mothers are held by the adhesive fluids which exude from the punctures, and contribute their substance to the mass. The characteristic constituents of the incrustation are the lac-resin, derived from the tree, and the lac-dye, analogous to that of the cochineal, *Coccus cacti*, contained in the insects. The most valuable product is obtained by breaking off the twigs before the brood escapes, and drying them in the sun.

**Stick-lac.**—These dried twigs are called stick-lac, and from them the other products are prepared. That from Sum is the best, the incrustation being often a quarter of an inch thick all around the twig; that of Assam ranks next. Dr. John gives the following analysis of stick-lac:

Anhydrous resin .....	66.65
Resin insoluble in ether .....	16.75
“ lac in .....	3.75
Coloring-matter (analogous to that of cochineal) .....	0.62
Lac-dye .....	3.92
Extractive .....	2.08
Skins of insects .....	1.67
Wax .....	1.04
Salts .....	0.62
Sand .....	2.90
Loss .....	100.00

It is insoluble in water, to which it, however, imparts its red coloring-matter. It is partially soluble in alcohol, coloring it red; is insoluble in fatty and essential oils.

**Seed-lac** is the resinous concretion separated from the twigs, coarsely pounded, and washed with water, by which much of the coloring-matter is removed. When it is desired to secure the lac-dye also, hot water is used, to which a little soda is often added.

**Lump-lac** is simply seed-lac melted into lumps.

**Shell-lac** is prepared from seed-lac by placing it in bags of cotton, about 4 feet long and 6 inches in circumference, and warming it over a charcoal fire. When the resin begins to melt the bag is twisted, and the clear resin is allowed to flow over the smooth stems of the banyan tree or planks of fig-wood, when it cools in thin layers or scales. Hatchett has published the following analyses of these different forms of lac:

	Stick-lac.	Seed-lac.	Shell-lac.
Resin .....	68.0	88.5	90.9
Coloring-matter .....	10.0	2.5	0.5
Wax .....	6.0	4.5	4.0
Gluten .....	5.5	2.0	2.8
Foreign bodies .....	6.5	0.0	0.0
Loss .....	4.0	2.5	1.8
	100.0	100.0	100.0

**Lac-resin** is very valuable, much harder than colophony, and easily soluble in alcohol. It may be obtained pure by treating shell-lac with cold alcohol, and filtering the solution in order to separate a yellow-gray pulverulent matter. When the alcohol is again distilled off, a brown, translucent, hard, and brittle resin, of specific gravity 1.139, remains. It melts into a viscid mass with heat, and diffuses an aromatic odor. Anhydrous alcohol dissolves it in all proportions. According to John, it consists of two resins, one of which dissolves readily in alcohol, ether, the volatile and fat oils; while the other is little soluble in cold alcohol, and is insoluble in ether and the volatile oils. Unverdorben, however, has detected in shell-lac—(1) a resin soluble in alcohol and ether; (2) a resin soluble in alcohol, insoluble in ether; (3) a resinous body little soluble in cold alcohol; (4) a crystallizable resin; (5) a resin soluble in alcohol and ether, but insoluble in petroleum, and uncrystallizable; (6) the unsaponified fat of the *Coccus* insect, as well as oleic and stearic acids; (7) wax; (8) the *laccine* of Dr. John; (9) an extractive coloring-matter. Dilute hydrochloric and acetic acids dissolve shell-lac readily; nitric acid slowly; strong sulphuric acid not at all. Like most other resins, it has a strong affinity for bases, with which it forms definite compounds. It dissolves in aqueous potash, soda, carbonate of soda, etc. It deprives the caustic alkalis of their alkaline taste. The solution in caustic potash is of a dark-red color, and dries into a brilliant, transparent, reddish-brown mass, which may be redissolved in both water and alcohol. Borax renders five times its weight of shell-lac soluble on boiling with water. This solution is equal for many purposes to spirit varnish, and is an excellent vehicle for water-colors, as when once dried water has no effect upon it. India-ink rubbed up with this liquid forms a most valuable *label-ink* for the laboratory, as it is not affected by acid vapors. Sal-ammoniac is also a sol-

vent for shell-lac, and the solution has been suggested as a substitute for the alcoholic solution.

**Bleached Shell-lac.**—By passing chlorine in excess through the dark-colored alkaline solution the lac-resin is precipitated in a colorless state. When this precipitate is washed and dried, it forms with alcohol an excellent pale-yellow varnish, especially with the addition of a little turpentine and mastic. By exposure in thin shreds to the sun's rays or in a finely-divided state to chlorine-water, or by reducing it to a fine powder, suspending in water, and passing hydrochloric acid vapor into the menstruum, the dark-colored varieties are bleached. When this is done, however, the resin loses many of those qualities that so admirably recommend it for some kinds of varnishes, but it answers well for making sealing-wax.

**Uses of Shell-lac.**—In India lac is fashioned into rings, beads, and other trinkets. It is the material of which the best modern sealing-wax is made. Turpentine is added to promote fusibility and prevent brittleness. Earthy matters are added to increase weight and to prevent too rapid fusion. For red and other light-colored sealing-wax very pale or even bleached shell-lac is used, while for black and dark colors the darker-colored shell-lac is equally suitable. The following are common proportions, the first being the best, Venice turpentine being used in it:

	1.	2.	3.	4.
Shell-lac .....	500	300	340	330
Turpentine .....	125	400	370	330
Chalk or magnesite .....	...	140	110	...
Gypsum or zinc white .....	...	95	...	...
Sulphate of baryta .....	...	...	60	160
Vermilion .....	375	65	120	165
Oil of turpentine .....	...	...	...	15
	1000	1000	1000	1000

The materials are melted together in an iron pan, with constant stirring. The cool but still soft mass is rolled on a slab of marble and shaped into sticks, or the fluid mass is poured into brass moulds. The various colors are imparted by cobalt blue, chrome yellow, bone-black, etc. Perfumed sealing-wax contains gum benzoin, storax, or balsam of Peru. Inferior sealing-wax is colored red with oxide of iron instead of vermilion, or it is even made of common rosin with gypsum or chalk. New Zealand resin, from the *Xanthorrhoea hastilis*, is frequently used in place of shell-lac. Medieval sealing-wax was a mixture of bees-wax with turpentine and coloring-matter.

Shell-lac is used for the preparation of varnishes and for japanning, the ordinary shell-lac varnish being a simple alcoholic solution. It is used for stiffening hat bodies and many other purposes. Its solution in sal-ammoniac and water has been suggested as capable of numerous applications. It is made by placing 3 parts white shell-lac, 1 part sal-ammoniac, and 6 to 8 parts water in a close vessel for twelve hours, then boiling with constant stirring till the shell-lac is dissolved. The solution may be used as a stiffener, water-proofer, or vehicle for pigments and dyes, as paint or varnish.

**Lac-dye** and **lac-lake** are the secondary or by-products of the purification of stick-lac. The coarsely-sifted stick-lac is macerated with hot water, to which a little soda is sometimes added. The red liquid thus obtained is strained through canvas and evaporated over a charcoal fire or in the sun. The residue is made into little cakes, which are known as *lac-dye*, and, as they appear in commerce, contain about 50 per cent. of coloring-matter, 25 of resin, 25 of earthy impurities. **Lac-lake** is obtained by precipitating with alum the decoction from stick-lac, prepared with weak caustic soda. The precipitate is pressed, moulded into cakes, and dried. It contains coloring-matter 50, resin 40, alumina 9, impurities 1. Messrs. Brooke, Simpson & Spiller of Manchester, England, have introduced into commerce a lac-dye superior to that imported from India. They treat stick-lac with weak ammonia, and precipitate the solution with chloride of tin. The coloring-matter of lac-dye is analogous to that of cochineal, carminic acid, but its absolute identity has not been established. The shades produced by it are less bright, but more permanent. Lac-dye and lake are chiefly employed for dyeing woollen fabrics scarlet; 2 or 3 parts produce the same effect as 1 of cochineal. The solvent for the dye is either sulphuric or hydrochloric acid; the mordant is chloride of tin and tartar. The following processes for preparing the dye for use are given in *Watts's Dictionary of Chemistry*: (1) A mixture of 4 parts of lac with strong sulphuric acid is allowed to stand for 24 hours in summer and 48 in winter, then diluted and stirred with 3½ parts of water, and again left to clarify. The clear liquid is poured into an iron pot, and mixed with the wash-water of the previous residue; the solution is mixed with a quantity of lime sufficient to neutralize four-fifths of the sulphuric acid, and the precip-



itate of gypsum is removed: the liquid is then ready for use. This is the mode of preparation chiefly adopted in England. (2) 32 parts of lac-dye are triturated with 10 to 12 parts of sulphuric acid of specific gravity 1.85, or hydrochloric acid of specific gravity 1.13, each diluted with three times its weight of water. The mixture is left to itself for 48 hours in winter or 24 hours in summer, and then mixed with the requisite quantity of river-water. (3) 32 parts of lac-dye are triturated with 12 parts of hydrochloric acid of specific gravity 1.148, diluted with an equal weight of water; the mixture is left for 24 hours, and frequently stirred, and then diluted with water. To dye with the color thus prepared, each pound is mixed with three-quarters of a pint of so-called lac-spirit, a solution of stannous chloride prepared by dissolving 1 pound of tin in 20 pounds of fuming hydrochloric acid, the mixture being left to itself for 6 hours before use. C. F. CHANDLER.

**Lac** [Hindustanee], the sum of 100,000 rupees, worth about \$50,000. The term is used in East Indian commerce. One hundred lacs make one *crore* of rupees.

**La Caille, de** (NICOLAS LOUIS), b. Mar. 15, 1713, at Rumigny, in Champagne; studied mathematics and astronomy; made himself known by his participation in the survey of the French coast between Nantes and Bayonne, and in the measurement of the arc of the meridian, and was appointed professor in astronomy at the Collège de Mazarin at Paris in 1741. In 1750 went to the Cape of Good Hope, and in 127 nights determined 9800 stars hitherto undetermined; and in connection with Lalande in Berlin he established the distance of the moon, Mars, and Venus. He evinced the same energy in his literary activity, which comprises, besides his *Astronomie Fondamentale* (1758), *Tabule Solaris* (1758), *Observations sur 515 étoiles du zodiaque* (1763), several elementary handbooks, and a number of essays which have been of great influence on navigation. D. at Paris Mar. 21, 1762.

**Lacandon'es**, an Indian tribe of Central America, inhabiting an extensive unexplored region of Northern Guatemala, near the frontier of Belize, on a river of the same name tributary to the Usumasinta. They formerly extended into Chiapas and Tabasco, but are now found only in the region of the Chicho Mountains. They, like the neighboring Itzaes of Lake Peten, belong to the Maya stock, and do not differ in point of actual civilization from the other fractions of their race in Yucatan. They for more than three centuries kept up a warfare with the Spaniards, but have generally been pacific of late years, and, though allowing no whites to visit their settlements, sometimes traffic a little on the frontiers, giving tobacco and sarsaparilla in exchange for trinkets and firearms. They are nominally subject to Guatemala, but are in fact entirely independent, never having received laws from or paid tribute to the whites. They still practise their ancient religious rites, and have towns of some extent, though the magnificent description of their cities told to Mr. John L. Stephens by the cura of Quiché is but a romance. (See Stephens's *Travels in Central America*, and Morelet's do. (trans. by Mrs. Squier, New York, 1870).)

**Lacadvies** (Sans. *lakke*, "a hundred thousand," and *dive*, "island"), a numerous group of small islands in the Indian Ocean (Arabian Sea), consisting of twenty clusters, 100 miles from the Malabar coast. Area, 744 square miles. Pop. 7000. They are of coral formation, the largest being only 7 miles in length, and most of them are mere barren rocks. From the dangers of the surrounding reefs the Lacadvies are little frequented by navigators. The natives are called Moplays, are Mohammedans of Arabian descent, and live in stone huts. The only commerce is in cocoa-fibre and betel-nuts. The islands pay tribute to Cananore in the presidency of Madras. They were discovered by Vasco da Gama in 1499.

**Lace** (Old Fr. *laciis*, *laees*, from Latin *lacina*, the guard-hem of a robe; in Early English *lace* meant simply a fastening or to fasten, in common with the Ang. Sax. *laccian*, to "catch, to hold," probably allied to the Greek *laeos* and Latin *ligare*; Sanskrit, *lagati*), an ornamental open work of thread, twisted, plaited, or woven into patterns. Itself comparatively modern, lace is derived from two most ancient kinds of work, netting and embroidery, the former of which was used by the Egyptians to ornament the borders of some festival garments; indeed, the network of blue beads found on mummies may, as it was made with the needle, be regarded as a sort of lace. The Greeks and Romans bordered their robes with embroidery, called, when of superior quality, *opus Phrygiacum*, from the skill with which it was executed by Phrygian workers. Among early Christians it was customary for women to wear veils during public worship, and writers of the second century complained that too often those coverings ministered rather to vanity than to modesty, being frequently of netting inter-

woven with gold or silver, through which the face was visible. Anglo-Saxon embroidery, known as *opus Anglicaum*, was esteemed even in Rome; the cope and mantle of St. Cuthbert, found in his coffin, and still preserved at Durham, are good specimens of this work.

Lace may be divided into two principal classes—point and pillow lace, the former being of much the greater antiquity. We cannot decide when point was first made, so very gradually was it evolved from netting and embroidery, with which it is often confounded in old records. The Italians probably derived it from Byzantium, since its earliest development may be traced to Venice, Genoa, and other towns engaged in commerce with the Greek empire. The oldest point is of two kinds—*laciis*, or *point compté* ("counted stitch"), and cut work (*point coupé*). *Laciis* usually consisted of netted squares, made in the ordinary way on a mesh, then joined with the needle, and darned or embroidered in a pattern, like the modern "guipure d'art;" or designs cut out of linen were laid on the netting and secured to it by embroidery. The open ground, again, was sometimes formed by drawing threads in a piece of linen and fastening them with the needle where they crossed each other. For cut-work, threads were stretched netwise across a piece of linen, called *quintin* from the place of its manufacture, and a pattern was made by sewing round with buttonhole stitch those parts of the linen intended to remain, and cutting the rest away. By degrees, skilful workers arrived at making the thick part entirely with the needle, using variations of two stitches (Figs. 1 and 2),

FIG. 1.

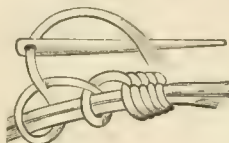


FIG. 2.



similar to those in modern point. The name "cut-work," though inappropriate, was long retained, and as late as 1640 we find it applied to Italian lace by John Taylor, the Water Poet, in his *Pragme of the Needle*. Embroidery, *laciis*, and cut-work were often combined in one piece, squares of darned netting alternating with squares of cut and embroidered linen; and this work, which was used chiefly for large articles, such as coverlets and altar-cloths, was sometimes white or unbleached, sometimes varied with gold, silver, or colored threads. The earliest pattern-books extant date from the sixteenth century, and are extremely rare, most of them having been worn out in the using. The best known is that of Vinciolo, a Venetian (about 1612), who gave new designs, besides republishing many from older books. Among those we may notice *Le Livre nouveau des Patrons de Lingerie* (Berlin, 1525); *Knitting and Lace Patterns*, Hans Sibmacher (1597, reprinted at Vienna 1866), having a curious frontispiece representing a workroom where an aged female is directing several young pupils; *La Pratique de l'Aiguille industrielle*, M. Mignerak (1605). The designs in these and contemporary works on the same subject are either geometrical or attempts at depicting sacred, historical, or allegorical scenes. Sibmacher gives St. George and the Dragon to be worked in *laciis*; Mignerak shows how the seasons, the elements, the death of Lucretia, etc. may be more or less adequately represented with the needle. In the South Kensington Museum, London, a large piece of *laciis* in many compartments contains in each a Bible picture wrought on a netted ground. As pattern-books were expensive and easily damaged, it was usual for ladies, in the times when needle-industry ranked as a cardinal female virtue, to preserve designs and stitches by working lace-samplers or "sam-cloths," which are still kept as heirlooms in many families.

In the sixteenth century lace became a very general ornament of both male and female dress, and we find it frequently mentioned in royal edicts and accounts: "8 pieces of yelow (yellow) lace were bought for Henry VIII. at a cost of 5s. 4d." A sumptuary law of Queen Mary forbade the wearing of "white woorkes, alias cut-woorkes, made beyonde the seas." Stubbes, in his denunciation of "ruffes," declares them to be "clogged with gold, silver, or silk lace of stately price, wrought all over with needle-work, speckled and sparkled here and there with the sonne, the moone, the starres, and many other antiquities straunge to beholde." For those much reviled yet long triumphant articles of dress, pillow-lace, being lighter than point, was a favorite edging. This work, usually supposed to have been invented by Barbara L'Ormeau, wife of a master miner of St. Annaberg, in Saxony, is by Joseph Seguin pronounced of Italian origin. "From Italy," says he, "a knowledge of the art passed into France, whence it was acquired by



the lace-makers of Flanders." Be that as it may, Belgium is now the special home of this beautiful fabric. The lace-pillow is a round or oval board forming the base of a hard cushion; the worker places it upon her knees, lays on it a strip of parchment pricked with holes which indicate a lace-pattern, and sticks a pin through each hole so that its point enters the pillow. The thread for making the lace is wound on bobbins, small pieces of wood, bone, or ivory about the circumference of an ordinary lead-pencil, having round their upper ends a groove or neck to receive the thread; by the twisting and crossing of these the lace is formed. The ground or "mesh" is made by plaiting (Fig. 3) or

FIG. 3.

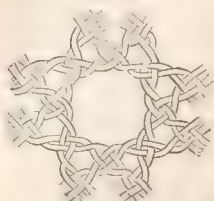
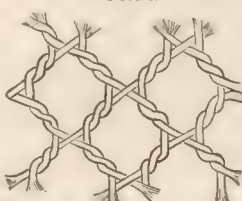


FIG. 4.



twisting the threads (Fig. 4); the pattern, technically called "gimp," by weaving or "clothing" (Fig. 5. These figures, as also 1 and 2, represent the stitches considerably magnified). A large number of bobbins is needed, as many as 1200 being sometimes employed on one cushion. Those not immediately in use hang over the front of the cushion, each by its own thread, which is so looped as not to become unwound. The leading lines of the pattern are sometimes marked by pins with colored heads, and the "gimp" threads are wound upon colored bobbins. Early pillow-lace, like contemporary point, was of stiff design, and may be compared to the more formal of modern crochet edgings. But towards the close of the sixteenth century lace of all kinds changed from the geometrical to the flowing style, as may be seen by comparison of Holbein's pictures with those of Vandyke. And every year it was more generally and profusely worn. At Queen Elizabeth's death 3000 lace-trimmed habits were found in her wardrobe. Charles I. wore hunting-dresses adorned with rich point. In France, and all countries where French fashion-laws were obeyed, lace during the seventeenth and eighteenth centuries was used lavishly for nearly all articles of dress. The falling collars and cravats which succeeded ruffs were either made of lace or deeply bordered with it. Ladies wore lace head-dresses, lace flounces, ruffles of lace at the elbow, aprons frilled with or composed entirely of lace. Gentlemen had lace cuffs or ruffles (called *pleureuses*, "weepers") which fell over the hand, and thus, it was said, facilitated cheating at cards; they wore lace-trimmed garters, deep frills of lace at the knee, lace roses in shoes, even quillings of lace to fill up the wide boot-tops that were fashionable about 1662. Infants' robes, caps, and cradle-furniture were made of rich lace, and it was used for curtains, for coverlets, even for bathing-wrappers. Drayton's pretty conceit for a head-dress which the shepherd Lalus promises to his mistress must have been inspired by the sight of some beautiful lace of flowery pattern:

"For thy head Ile have a Tyer  
Of Netting made of Strawbery wyer,  
And in each knot that doth compose  
A mesh, shall stick a half-blowne Rose  
Red, damask, white, in order set;  
About the sides shall run a fret  
Of primroses, the Tyer throughout  
With Thirt and Pansyes fringed about."  
(*The Muses' Entertainment*, Nymphall ii.)

Great sums were spent upon lace, and as it was nearly all brought from Italy, Venice and Genoa were enriched with the fortunes of French nobles. For this reason its importation was, between 1620 and 1660, forbidden by many edicts, which, however, had little effect except to inspire numerous satires: of these, *La Révolte des Passements* ("The Rebellion of the Laces") is specially valuable, since it names every kind of lace known at the time. Soon after the edict of 1660 the minister Colbert, resolved that France should have a lace manufacture of its own, sent to Italy for workers, and established them near Alençon, where they instructed a number of French girls in the art of making point. Alençon lace, which, though derived from that of Venice, differed considerably from it, was by Louis XIV. called *point de France*, and being patronized by that monarch, soon became indispensable to all his courtiers. In 1665 a company was organized with the monopoly of its sale for ten years, during which time the shareholders received over and over again the amount of their original

investments. The manufacture of "point de France," though affected, like every kind of French industry, by the Revocation of the Edict of Nantes, flourished until the Revolution, when nearly all demand for lace ceased, and many Alençon workers, having ministered to aristocratic luxury, shared the fate of their high-born patrons. It was revived by Napoleon I., and there exist here and there fragments of a suite of bed-furniture powdered with the imperial bees, which was made for him at immense cost. Venice point is no longer worked, except by skilful reproducers of old lace. The raised kind was especially beautiful, and had the appearance of carving or bas-relief, the outlines of the patterns being worked over thick rolls of cotton. The flowers were filled in with delicate lace-stitches (technically called *modes*) and connected by *brides*, or bars, of exquisite lightness varied by little stars and picots, or pearl loops. A similar lace was made in Spanish convents and devoted to church purposes, such as altar-furniture, vestments, and the dresses of images. In the island of Cephalonia much Italian point of geometrical design has been found in tombs and sold under the name of "Greek lace." Point d'Alençon, the most costly and complicated of needle-laces, is made in small segments and by twelve different workers, each of whom has her special province. The pattern is printed off on pieces of green parchment about ten inches long, each segment numbered in its order; the pattern is then pricked upon the parchment, which is stitched to a piece of coarse linen folded double. The outline of the pattern is traced out by two threads fixed by small stitches passed with another needle and thread through the parchment and its linen lining. The ground is next worked in fine *réseau* ("net") backward and forward at right angles to the border; the flowers are worked in, and the various "modes" or "fillings" are introduced. The threads which unite lace, parchment, and linen are next cut by passing a razor between the folds of the linen, and the many segments are joined by an invisible stitch called "assemblage." Point d'Alençon is the only lace in which horsehair is introduced along the edge to give firmness to the "cordonnet." The horsehair has the disadvantage of being apt to shrink in washing, and thus impair the beauty of the point. Until the Revolution there was made at Argentan a point resembling that of Alençon, but with heavier flowers and a "bride" ground of large hexagonal meshes worked over with button-hole stitch. The art of making this lace, which was very strong and effective, is entirely lost. Pillow-lace is either worked in one piece on the cushion, in which case it cannot be of any great width, or is made in separate flowers, afterwards connected by "brides" or applied on net. Of the latter kind are Brussels, Honiton, and guipure de Bruges. The best Brussels lace is made of wonderfully fine thread, the flax for which is grown in Brabant and steeped at Courtrai, the Lys water being very clear. This thread is spun in cellars, since contact with dry air causes it to break; a ray of light is thrown on it, but the spinner is guided chiefly by touch, and stops her wheel when she feels the slightest unevenness. The number of expert spinners being small, and their work tedious and unhealthy, real Brussels thread is very expensive, costing from 20,000 to 50,000 francs per pound. Machine-made thread is therefore generally used, but it has never attained the fineness of that spun by hand. The most costly Brussels lace has a fine needle-made ground, called *point à l'aiguille*, rarely used except for royal trousseaux; the pillow-made ground, though much less expensive and durable, is also of great value, and is commonly replaced by fine machine net made at Brussels for the purpose. The flowers are sometimes worked with the needle, but more frequently on the pillow; a fine "cordonnet" marks the outlines of the pattern, which is formed with a variety of beautiful "modes." A piece of Brussels lace passes through seven different hands, each worker having her own department, and knowing nothing of the intended effect, which is decided by the head of the establishment. Lace-making is taught in schools, of which there are over 900 through Belgium, many being attached to convents. Brussels flowers coming soiled from the lace-makers' hands are too often prepared for sale by means of white lead; this process, besides being injurious to health, renders the lace liable to turn black on exposure to heat or sea-air, in which case it can never be cleaned. Honiton, the most valuable English lace, is made along the Devonshire sea-coast. The flowers, now generally copied from nature, are of fine woven or cloth-stitch, a thicker thread marking the outlines. They are either "applied" on net or connected by "brides," which, like the pattern, are worked on the pillow; needle-stitches are occasionally introduced. Guipure de Bruges, sometimes called "duchesse" lace, resembles Honiton, its sprigs being united by "brides."

Of the many laces made in one piece on the pillow, Valenciennes is the most esteemed. Before the French Rev-



olution it was worked chiefly at Valenciennes, and was called, on account of its durability, "everlasting." It was made in cellars, the damp air of which favored the use of extremely fine thread, and was ruinous to the sight, many women becoming blind before thirty. At present it is manufactured only at Bailleur in France and in several Belgian towns, Ypres furnishing the widest kinds, which cost sometimes as much as £80 per metre. It is a very even lace, one-sized thread forming both ground and pattern, and as it bears washing remarkably well, is a suitable trimming for white garments. Mrs. Palliser pronounces Mechlin (*dentelle de Malines*) "the prettiest of laces." Somewhat resembling Valenciennes, it is also used for trimming white articles, but its ground is lighter, and the flowers are outlined by a flat shiny thread which looks like embroidery. Pillow-lace less expensive than Valenciennes is made at Lille and Arras, and large quantities are manufactured in Normandy, Lorraine, and Auvergne. According to M. Audry, the number of French lace-makers in 1851 was 240,000. Coarse pillow-edgings, used chiefly by peasant-women for their costume head-dresses, are manufactured in Holland, Sweden, Denmark, and some parts of Germany; more delicate kinds are also made in those countries, but not in very great quantities. In England the counties of Bedfordshire, Buckinghamshire, and Northamptonshire were formerly celebrated for edgings resembling those of Lille, and called "baby lace" from being used chiefly for infants' caps, but various causes having lessened the demand for this fine lace, the workers now generally make Maltese or Cluny guipure. The term *guipure*, now used for any rich lace, was anciently applied only to a kind made of *cartisane* (thin strips of parchment or vellum), round which gold, silver, or silk thread was twisted. It was worked either with a needle or on a pillow, the pattern being outlined with "cartisane" and filled in with stitches, and was very perishable, as the vellum was affected by damp. Thread guipures, resembling the modern Cluny, Maltese, and Russian, were made in Italy and Flanders. Some specimens of Russian lace, now in the South Kensington Museum, are remarkable for bold and correct design.

Blonde lace, both black and white, is either worked entirely on the pillow, like Chantilly, or has pillow flowers applied on silk net. Black Chantilly lace is now made chiefly at Bayeux. Grammont, in Belgium, produces black lace, and large quantities are manufactured in Spain, particularly at Almagro, where 12,000 workers are employed. White blonde mantillas are worn by Spanish ladies at bull-fights. Irish lace comprises crochet guipure, very fine tatting, Carrickmacross, a kind of cut-work, and embroidery upon machine net, called "Limerick lace." The last-named variety is suitable for large articles, such as veils and flouncers. Worsteds, mohair, and "yak" lace, used of late years for dress-trimming, are made chiefly at Le Puy. Greek and Italian peasants work aloe-fibres into a lace which, though pretty, has the disadvantage of not washing: sometimes, however, it is dyed black, and thus rendered more useful. A natural lace is furnished by the *Lagetta linearis*, a lofty West Indian tree with white flowers and large smooth leaves; its inner bark may, after maceration in water, be separated into fine layers resembling net. Gold and silver laces, employed for uniforms and court dress, are made either of very fine wire, or silk covered with a fine flat thread of gold, silver, or silver gilt. Machinery is now generally used in the manufacture, which is carried on in London, Belgium, Italy, and France.

The first machine net, made at Nottingham about 1760 upon the ordinary stocking-frame, was a looped fabric, woven with a single thread, and resembling an open knitting both in appearance and liability to ravel. Improvements in its manufacture were introduced by Hammond, Robert Frost, Flint, and others, but the object of inventors—namely, an imitation of the firm three and six-sided meshes of pillow-work—was not attained until 1809, when Heathcote, after long watching a woman at her pillow, and carefully unravelling some pieces of pillow lace, found out how to make twist bobbinet. (See NETS.) Lace patterns are worked in bobbinet either in a frame by hand, like Limerick lace, or by an adaptation of the Jacquard apparatus to the net-machine. When the machine-worked pattern consists of separate sprigs, stars, or dots, the thick pattern thread (called "gimp") is carried from one to the other, and afterwards cut away by children. Net which has been torn in the working is confided to lace-menders, who exactly replace the damaged meshes. In Nottingham, the chief seat of the English machine-lace trade, in 1864 there were 250 lace manufacturers, employing machinists and engineers, lace-dressers, starch-makers, designers, and draughtsmen, besides 135,000 female operatives. The materials used cost about £1,715,000; the wages and profits came to £3,415,000, and the net returns to about £5,130,000.

English machine-net was formerly smuggled into France, but the French now excel in the finer kinds, and show special taste in their patterns. Their principal lace-making towns are Calais, Cambrai, Lyons, St. Omer, Lille, St. Quentin, and Caen. Embroidery on machine-net is done in Paris. Every kind of pillow-lace is imitated by machinery, and so accurately as to deceive a superficial or ignorant observer. But in this, as in all work, that done by hand, even though faulty, has a character which no machine can supply; and the very evenness and flatness of "imitation" lace make it of little value from an artistic point of view.

J. Séguin's new work, already cited, contains fifty beautiful photographs of old and modern hand-made lace. *History of Lace*, F. Bury Palliser (London, 1865, 8vo); *Designs for Lace-making*, Mrs. Hailstone (1870, fol.); V. Touche, *The Handbook of Point Lace* (1871); *Guipure d'Art*, Madame Goubaud (1870). JAMIE TUCKER.

**Lace-Bark Tree**, the *Lagetta linearis*, a large tree of the order Thymelacææ, growing in the West Indies. Its white inner bark, after maceration in fresh water, is stretched out into a material curiously resembling coarse lace.

**Lacedæmon**. See LACONIA and SPARTA.

**Lacedœgna** [Lat. *Aquilonia*], town of Southern Italy, in the province of Avellino. This town is beautifully situated, and is of much historical interest. Like so many other places in Italy, its neighborhood abounds in Roman antiquities. The cathedral was originally a temple of Castor and Pollux. Pop. in 1874, 6132.

**Lacépède, de** (BERNARD GERMAIN ÉTIENNE DE LA VILLE SÈRELLON), COUNT, b. at Agen Dec. 26, 1756; early showed great fondness for music and for physics and natural science; went to Paris in 1776 under the patronage of Buffon and the musician Gluck; became sub-demonstrator in the Royal Cabinet 1785; member of the Institute and professor of herpetology at the Museum of Natural History 1796; president of the senate 1801; was grand chancellor of the Legion of Honor 1803-14; re-entered the chamber of peers in 1819; d. at Épinay Oct. 6, 1825. His earlier works on science and music are unimportant; his best works are *Histoire naturelle des quadrupèdes ovipares et des serpents* (1788), *Histoire naturelle des reptiles* (1789), *Histoire naturelle des poissons* (1798-1803), *Histoire naturelle des oiseaux* (1804).

**La'ceyville**, post-v. of Braintrim tp., Wyoming co., Pa., on the E. branch of the Susquehanna River and on the Lehigh Valley R. R., 23 miles N. W. of Tunkhannock.

**Lachaise** (FRANÇOIS D'AX), b. Aug. 25, 1624, at the Château of Aix, France. He was grand-nephew of the celebrated Father Cotton, confessor of Louis XIII. and of Henry IV. after the latter's abjuration. Lachaise had therefore rapidly risen to be "provincial"—that is, a high functionary of the Jesuitical order. In 1675 he became confessor of Louis XIV., tolerated the many mistresses of this king, was concerned in the Revocation of the Edict of Nantes, in the persecution of Protestantism, and of Fénelon and other liberal prelates of the Gallican Church. Louis XIV. caused to be built for Father Lachaise a splendid mansion in one of the eastern suburbs of Paris. In 1804 the grounds were chosen as a fit place for the largest cemetery of Paris, which is known as the "Cimetière du Père Lachaise." D. Jan. 20, 1709. He wrote in Latin a book on philosophy, *Peripateticæ quadruplicis philosophiæ placita rationalis, naturalis, supernaturalis et moralis*, being an abstract of a course of lectures, and some academical essays. FÉLIX AUCAIGNE.

**Lachambeaudie** (PIERRE), b. at Sarlat, department of Dordogne, in 1806, would have not been much known if he had not been mixed up, though in a quite secondary degree, with revolutionary movements in France, and if his fables had not reflected some of the socialistic ideas current in 1830 and 1848. Lachambeaudie only received a primary instruction; he joined the St. Simonians, and, thanks to their chief, M. Enfantin, he was able to publish his *Popular Fables* in 1839. Though very liberal in their teachings, their morality was so appropriate and so moral that they received the annual prize of the French Academy. In 1848, during the Revolution, and at the time of the *coup d'état* of Dec., 1851, Lachambeaudie associated with Esquiros, Blanqui, and other ultra radicals. In June, 1848, after the insurrection of June, he was released through the efforts of Béranger; and in 1851 he was prevented from being transported to Cayenne, thanks to the duke of Persigny, who had been twenty years ago his friend and co-writer for a poetical review then published (1829) in the department of Loire. Lachambeaudie was, for the French generation under Louis Philippe, the republic of 1848, and the empire, what Béranger had been for Frenchmen under the Restoration.

FÉLIX AUCAIGNE.



**Lach'es** [Old Fr. *lacherie*, from Fr. *lache*, "negligence;" Lat. *laxus*, "loose," "lax"], a term employed in law to denote negligence, remissness, or unreasonable delay in enforcing or attempting to enforce a legal or equitable right or claim. It is most commonly used with reference to claims arising in a court of equity which are not affected by an express statute of limitations. See LIMITATIONS, STATUTE OF.) It is a rule of equity not to encourage stale demands or give relief to parties who sleep upon their rights. A claim must be asserted with reasonable diligence, in order that the interests of other parties may not be unduly prejudiced by the difficulty of procuring the necessary evidence after a long interval has elapsed. In the case of legal titles and legal demands, however, courts of equity usually act in obedience to the statute of limitations, in conformity with the practice of courts of law. In some States, also, there are special statutes of limitations applying to equitable causes of action. But where this is not the case, and a demand is strictly of an equitable character, the statute of limitations applying to legal actions is not an absolute bar in equity as at law, though it is frequently followed in analogous cases. But where the analogies of the law do not apply, a court of equity is governed by its own inherent doctrine of discountenancing stale demands. What shall be deemed an unreasonable delay is not determined by any precise and definite rule, but must depend upon the circumstances of each particular case. A long delay which would ordinarily be deemed laches may be excused when a party is in ignorance of his rights, without any fault or remissness on his part; when a transaction is involved in obscurity, so that information in regard to it cannot be obtained; when he was under duress or undue influence which prevented him from asserting his rights; or where he labors under a legal disability, as insanity, coverture, infancy, and the like. Poverty or pecuniary embarrassment, however, is not a sufficient excuse for delay. (See Kerr on *Fraud and Mistake*, pp. 302-312, Am. ed.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Lach'esis** [Gr., the name of one of the Fates], the *Craspedophthalmus Lachesis* or *Lachesis matus*, one of the most dreaded of the venomous serpents of tropical America, called bushmaster, curucucu, and couanacouchi. It has been known to exceed twenty feet in length, is partly arboreal in its habits, and often attacks man with the greatest fury. Its poison is very deadly, and when greatly diluted constitutes a favorite remedy with homœopaths.

**Lachine'** [Fr. for "China," so named by the early explorers, who hoped to reach China by passing up the St. Lawrence], a v. of Jacques Cartier co., Quebec, Canada, on Montreal Island. A ship-canal 8½ miles long extends from Lachine to Montreal harbor, and surmounts the Lachine Rapids. It is connected by rail with Montreal, 9 miles distant, and by steam-ferry with Caughnawaga across the river. It is a thriving place. Pop. 1696.

**Lach'ish**, a city in Southern Palestine, among the mountains separating the territory of Judah from the *Shephelah*, or plain of the Philistines. It was an almost impregnable hill-fortress, as its name probably signified, but was taken and partially destroyed by Joshua and fortified by Rehoboam. It resisted for a long time the assaults of the Assyrian army under Sennacherib, and the biblical accounts afford no indication that it was taken; but among the cuneiform inscriptions discovered by Layard at Kouyunjik several were carved on large slabs representing the siege and capture of *Lakhisha*, giving a ground-plan of the fortress, and a picture of a procession of Jewish captives from the same place appearing before Sennacherib. This interesting discovery has given rise to much discussion. Lachish was afterwards taken by Nebuchadnezzar at the downfall of the kingdom of Judah. Its ruins have been identified by Raumer, Van de Velde, and Thomson with the modern village *Um-Lakis*, on a round knoll covered with heaps of stones, on the left of the road between Gaza and Hebron. Other geographers, however, question the correctness of this identification.

**Lach'ian**, a river of East Australia, rises in New South Wales, joins the Murrumbidgee in 31° 20' S. lat. and 144° 10' E. lon., and after 400 miles enters the Murray.

**Lach'mann** (KARL, D. D., LL.D., b. at Brunswick, Germany, Mar. 4, 1793; studied at the universities of Leipzig and Göttingen; founded at the latter a philological society in union with Bunsen and Schulze; entered the army as a volunteer in 1813, and served in the Waterloo campaign; became professor extraordinary at Königsberg in 1818 and at Berlin in 1825; ordinary professor in 1828, and member of the Academy of Sciences in 1830, remaining at Berlin until his death, Mar. 13, 1851. His life was chiefly devoted to the preparation of critical editions of the classics, of the New Testament, and of the masterpieces of early German literature. He published an essay *On the*

*Primitive Form of the Poem of the Nibelungen* (1816), translations of Shakspeare's *Somnata* and *Macbeth* (1820), critical editions of the *Nibelungenlied* (1826), *Walter von der Vogelweide* (1827), *Catullus*, *Tibullus*, and *Propertius* (1829), *Wolfram von Eschenbach* (1833), *Ulrich von Liechtenstein* (1841), *Cainus* (1841), *Bahrius und Arrianus* (1845), *Studies on the Iliad* (1847), *Lucretius* (1850), and edited Lessing's complete works (13 vols., 1838-40), besides numerous studies upon classical and early German philology and literature. His great work, however, was his edition of the Greek text of the New Testament (1831), the first which had any pretensions to be called critical, and which is not yet entirely superseded by the labors of Tischendorf. His readings were taken from a limited number of the earliest codices, from the citations of Origen, Irenæus, Cyprian, and the earliest Fathers, from the fragments of the Latin versions previous to the Vulgate text, which was reprinted at the foot of the page. (See his *Biography*, by Herz, Berlin, 1851.)

**Lach'rymæ Chris'ti** [Lat., "Christ's tears"], a sweet but very spirited wine of the group called muscated, has a fine bouquet, is produced chiefly upon Monte Somma, near Naples, in Italy. It is white (sometimes red), and of medium alcoholic strength. Large quantities of wine from the Levant and Southern Italy are sold as *Lachrymæ Christi*.

**Lach'rymal Gland**, or **Tear Gland**, the organ in man and other animals which produces tears. In man it is of the shape and size of an almond, and is found above the outer angle of the eye. Its secretion is discharged by some seven ducts into the space between the eyeball and the lid. At the inner angle of the eye may be seen two small apertures through which the supply of lachrymal secretion is taken up by the lachrymal canals, passed into the lachrymal sac, and thence, through the nasal duct, into the nose.

**Lach'rymatory** [Lat. *lachryma*, a "tear"], a popular name for the supposed "tear-bottles" of the ancients, small glass or earthen vessels found in ancient Greek and Roman tombs. That they ever really contained the tears of mourning friends is probably fabulous.

**Lack**, tp. of Juniata co., Pa. Pop. 1290.

**Lackawanna**, or **Lackawannock**, a small river in Pennsylvania, rises in Susquehanna co., near the N. E. corner of the State, flows S. W. through Luzerne co., and enters the Susquehanna River at Pittston. Its lower course for 30 miles passes through the largest and most abundant anthracite coal-basin in America, to which it gives name, though it is sometimes called the Wyoming basin. The chief emporium of this basin is Scranton, formerly called Lackawanna. A large portion of the anthracite coal used in New York City and in the New England States is furnished by this coal-field, which has an area of 198 square miles, and a thickness of from 5 to 14 feet at a depth varying from 100 to 400 feet beneath the surface. The annual production, including the Wyoming Valley as a part of the same field, is over 10,000,000 tons, and furnishes constant freight to several railways, with very numerous branch lines. Next to Scranton, Wilkesbarre, Pittston, and Carbondale are the chief seats of the mining industry.

**Lackawanna**, post-v. and tp. of Luzerne co., Pa., 3 miles S. W. of Hyde Park. Pop. 5133.

**Lackawannock**, former tp. of Mercer co., Pa., now called West Lackawannock. Pop. 1079.

**Lackawax'en**, post-v. and tp. of Pike co., Pa., on the Erie R. R., at the junction of the Honesdale branch, and at the confluence of the Lackawanna River with the Delaware, here crossed by railroad and canal, the latter being carried over by a suspension aqueduct. Pop. 1757.

**Laclede'** (formerly KINDERHOOK), county of S. W. Central Missouri. Area, about 690 square miles. It is a rough, broken region, with fertile valleys and deposits of iron and lead. It is traversed by the Atlantic and Pacific R. R. Tobacco, cattle, and grain are leading products. Cap. Lebanon. Pop. 9380.

**Laclede**, post-v. and tp. of Fayette co., Ill., on the Illinois Central R. R., 34 miles N. E. of Centralia. Pop. of v. 159; of tp. 1242.

**Laclede**, post-v. of Linn co., Mo., at the junction of the Hannibal and St. Joseph and the Burlington and Southwestern R. Rs., 97 miles E. of St. Joseph, has 2 churches, 3 hotels, 1 flouring-mill, a fine brick school-house, 1 weekly newspaper, and 20 stores, is surrounded by a rich farming country, and ships large quantities of grain. Coal is abundant in the vicinity. Pop. about 1000.

W. J. PORTER, FOR ED. "LACLEDE REPUBLICAN."

**Laclede** (PIERRE LIGESTE), the founder of St. Louis, Mo., a native of France, was in 1762 a resident of New Orleans, when he established the Louisiana Fur Company under a charter from the director-general of the colony,



giving it the exclusive right of trading with the Indians on the Missouri. The pioneers under his direction made the first settlement on the site of St. Louis Feb. 15, 1764, erecting a large house and four stores, and named the place in honor of Louis XV., then king of France.

**Lacmus.** See LIMUS.

**La'con**, post-v. and tp., cap. of Marshall co., Ill., on the Illinois River and a branch of the Chicago and St. Louis R. R., 130 miles S. W. of Chicago, has 7 churches, 1 bank, 1 weekly newspaper, a court-house and jail, a saw-mill, 3 flouring-mills, a distillery, and several hotels, stores, and shops. Large quantities of grain are shipped from this place. Pop. of v. 2165; of tp. 2440.

SPENCER ELLSWORTH, Ed. "HOME JOURNAL."

**Lacóna**, post-v. of Sandy Creek tp., Oswego co., N. Y., near Lake Ontario, is the N. terminus of the Syracuse Northern R. R., and is on the Rome Watertown and Ogdensburg R. R.

**Lacônia**, or **Lacedæmon**, the southernmost division of the ancient Peloponnesus, was bounded W. by Messenia, N. by Arcadia and Argolis, and E. and S. by the Argolian Gulf, the Myrtoan Sea, the Laconian and Messenian Gulfs. To the S. it ended in the two promontories of Tænarus and Malea, the present Cape Matapan and Cape Malio. To the Laconian Gulf flowed the Eurotas, on whose banks was the capital of Laconia, SPARTA (which see).

**Laconia**, post-v. and tp., cap. of Belknap co., N. H. (partly in Gilford tp.), 28 miles N. of Concord and 102 N. of Boston, upon the Winnipiseogee River, between the lake of that name and Grand Bay, and on the Boston Concord and Montreal R. R., is a flourishing manufacturing village, having 7 hosiery-mills, 1 flannel-mill, an extensive car manufactory, 1 weekly newspaper, 6 churches, 2 hotels, 3 banks, numerous stores, and various minor industries. The views of lake and mountains are picturesque. Pop. of tp. 2309.

O. A. J. VAUGHAN, Ed. "DEMOCRAT."

**Lacordaire'** (JEAN BAPTISTE HENRI), b. May 12, 1802, at Recey-sur-Ource, in the department of Côte d'Or; studied law at Dijon, and went in 1821 to Paris, where a brilliant career seemed to open for him as an advocate. But suddenly he entered the seminary of St. Sulpice; was ordained a priest in 1827; became preacher at the Collège de Henri IV. in 1830; and founded the journal *L'Avenir* in connection with Lamennais and Montalembert. His standpoint was a most singular combination of ultramontaniam in religion and radicalism in politics, and the tone of his sermons and articles was extremely violent. Summoned before the civil court, he was acquitted, but when the pope in 1832 denounced his ideas, he immediately retracted and submitted. In 1835 he began his celebrated *conférences* in Notre Dame, which drew immense audiences, and in 1842 he entered the order of the Dominicans. In 1848 he was a member of the Constituent Assembly, though without exercising any influence, and after 1853—in which year he was ordered to leave Paris on account of one of his ultramontane-radical sermons—he lived in retirement at Sorèze, where he d. Nov. 22, 1861. Besides his *Conférences de Notre Dame de Paris* (4 vols., 1844-51), he wrote *Vie de St. Dominique* (1849; new ed. 1858), *Lettres à un Jeune Homme* (1858), *Discours sur le Droit et le Devoir de la Propriété* (1858), etc.—His brother, JEAN THÉODORE, b. at Recey-sur-Ource Feb. 1, 1801; studied law at Dijon; afterwards devoted himself to natural science; made four voyages to South America between 1825 and 1832, exploring Brazil, the Argentine Republic, and Chili; travelled in Senegal; became editor of the *Temps* (1832), in 1835 professor of zoology, and in 1838 of comparative anatomy in the University of Liège, Belgium; wrote several valuable works on natural history and entomology, and d. at Liège Aug. 31, 1870.

**Lacquer** [from *Lac* (which see), a varnish, transparent or colored, for covering wood, papier-maché, leather, or metal. It is of many kinds. In most of them lac is an important ingredient. Anatto and dragon's blood give red tints, and gamboge, aloes, etc., yellow. Lacquers, well made and skilfully applied, will take a high polish and withstand hot and cold water, and even alcohol. The Japanese and Chinese excel in the art.

**Lac qui Parle**, county of Minnesota, bounded W. by Dakota and N. E. by Minnesota River. It is traversed by Lac qui Parle and numerous other streams, and is adapted to grain-culture. Cap. Lac qui Parle. Pop. 145; it has greatly increased since the census.

**Lac qui Parle**, post-v. and tp., cap. of Lac qui Parle co., Minn., on the N. side of the Itapah or Lac qui Parle River, about 2 miles above its confluence with the Minnesota. The first house was built in 1870; it now (1875) has a newspaper and all the usual accompaniments of a growing town. It is on the line of the projected Hastings and

VOL. II.—101

Dakota R. R., midway between the St. Paul and Pacific R. R. on the N., and the Winona and St. Peter on the S. It has a large school, 1 hotel, and 1 weekly newspaper. Pop. of tp. 307.

C. J. COGHLAN, Ed. "PRESS."

**La Crescent'**, post-v. and tp. of Houston co., Minn., on the Mississippi River, opposite La Crosse, Wis. It is the E. terminus of the Southern Minnesota R. R. Pop. of v. 380; of tp. 961.

**Lacretelle'** (PIERRE LOUIS), b. at Metz in 1751; practised law, first at Nancy, and then, from 1778, at Paris, where he lived in intimate connection with Malesherbes and Laharpe. Under the Revolution took part, though with great moderation and cautiousness, in all the principal political movements, but after 1804 lived in retirement. Under the Restoration belonged to the opposition, and his *Mémoires de France* and *Mémoires Français*, published in connection with Ségur and Benjamin Constant, were successively suppressed. D. Sept. 5, 1824. Besides a number of juridical and political works, he wrote *Portraits et Tableaux, Études sur la Révolution Française*, and *Mes Saïetés à Malesherbes*, which are of great interest to the student of the history of that period.

**Lacretelle, de** (JEAN CHARLES DOMINIQUE), b. at Metz, France, Sept. 3, 1766; studied at the College of Nancy; was admitted to the bar at the age of eighteen; wrote at Nancy a tragedy and several academic essays; went to Paris in 1787; assisted his brother Pierre in writing for the *Encyclopédie Méthodique*; became an editor of the *Journal des Débats*, for which he reported the sessions of the National Assembly; became in 1790 secretary to the duc de Rochefoucauld-Liancourt, with whom he was associated in the project of favoring the king's escape; made himself popular as an advocate of the constitution at the Club des Feuillants; wrote the most extensively circulated account of the execution of Louis XVI.; was associated with André Chénier in editing the *Journal de Paris*; exerted himself in speeches and with the pen to save the Girondins from the popular wrath; was accused of being a royalist, arrested after a long residence at Epinay, and kept in prison two years (1797-99); became professor of history in Paris 1809, imperial censor 1810, was admitted to the Academy in 1811, and ennobled by Louis XVIII. in 1822. He remained professor of history for thirty-six years, and wrote eight valuable histories, covering all the period from the outbreak of the Revolution to 1846, and several earlier periods. D. at Mâcon Mar. 26, 1855.

**La Croix**, tp. of Emmet co., Mich., on Lake Michigan. Pop. 663.

**Lacroix'** (PAUL), b. at Paris, France, Feb. 27, 1806; was educated at the Collège Bourbon, and has written, under the pseudonym of "Le bibliophile Jacob," a vast number of romances and works of curious learning about the books, the history, manners, and customs of the Middle Ages; distinguished himself by his efforts to improve the Bibliothèque du Roi; was appointed in 1855 conservateur of the Arsenal Library, and has edited since 1854 the *Revue Universelle des Arts*. His best works are probably the *Arts au moyen âge et à l'époque de la Renaissance* (1868), *Manière, usages et costumes au moyen âge*, etc., with 141 plates (1871), and *La vie militaire et la vie religieuse au moyen âge* (1872), which have all been translated into English.—His wife, AROLINE BIFFE, has written some popular novels; and his brother, JULES, b. in Paris May 7, 1809, has had success as a writer of dramas and as a translator, imitator, and critic of Shakspeare. His *Œdipe Rex*, a translation from Sophocles, was successfully produced on the stage in 1858, and received in 1862 from the French Academy a grand prix of 10,000 francs.

**Lacroix** (SILVESTRE FRANÇOIS), b. at Paris in 1765; became professor of mathematics at the marine school of Rochefort in 1782, held subsequently the same position at the normal school, the École Polytechnique, Sorbonne, and Collège de France, and d. at Paris May 25, 1843. His noble character, instructive lectures, and very useful handbooks, besides *Traité du Calcul différentiel et intégral*, made him quite a popular man, and on the re-establishment of the Academy under Napoleon he was one of the very few of the original members living.

**La Crosse**, the "national sport" of Canada, a field-game of Indian origin. The players have a *crosse*—a hickory rod some six feet long, bent in the shape of a bishop's pastoral crook; across the crooked part leather thongs are stretched in a network. There is a rubber ball some three inches in diameter. The object of each of the two parties in the game is to send the ball over the goal of the other party. The ball is not thrown, but carried on the *crosse*. It may, if necessary, be thrown from one player to another, but is not to be touched by the hand.

**La Crosse**, county in the W. of Wisconsin, bounded



on the W. by the Mississippi River. Area, 450 square miles. It is diversified, generally fertile, and is traversed by the Milwaukee and St. Paul R. R. (La Crosse division). Cattle, grain, and wool are leading products. Cap. La Crosse. Pop. 20,297.

**La Crosse**, post-v. of Izard co., Ark., 30 miles N. W. of Batesville, has one weekly newspaper.

**La Crosse**, city and cap. of La Crosse co., Wis., 190 miles W. of Milwaukee, is finely located on the E. bank of the Mississippi, at the mouth of the Black River from the N. and the La Crosse River from the E., the former tributary having an annual lumber product of 250,000,000 feet, and the latter draining one of the finest farming valleys of the State. Opposite in Minnesota is the Root River Valley, a large and rich agricultural section, which is pierced for 200 miles by the Southern Minnesota R. R., of which La Crosse is the eastern terminus. The main commercial support of La Crosse is derived from the Black River lumber and wholesale trade with Southern Minnesota. The Chicago Milwaukee and St. Paul and the Chicago Dubuque and Minnesota R. Rs. connect with the East, North, and South. La Crosse has 15 church buildings (worth \$300,000), 3 banks, 2 daily, 5 weekly (1 German and 1 Norwegian), and 3 monthly newspapers, 3 school-buildings worth \$15,000 each, and 4 others of wood, a library association with 2500 volumes, a fine court-house (cost \$40,000), where the U. S. courts for the western district of Wisconsin meet twice a year, an opera-house, a custom-house with the largest registry of tonnage between St. Louis and St. Paul, 9 steam saw-mills, 2 steam flouring-mills, an extensive machine-shop (cost \$60,000) and several smaller ones, 3 agricultural implement factories, the largest yard above St. Louis for building steamboats, 5 large breweries, and 20 wholesale firms. The assessed valuation is \$3,000,000. Pop. in 1870, 7785; by State census of 1875, 11,012.

E. B. USHER, Ed. "LIBERAL DEMOCRAT."

**Lac Sulphuris** (*milk of sulphur*), finely divided sulphur, precipitated by acids from solutions of alkaline and alkaline-earth persulphides. (See SULPHUR.)

**Lactantius** (FIRMICUS), one of the Christian Fathers, b. about the middle of the third century, either at Firmum, Italy, or in Africa; studied rhetoric at Sicca in Proconsular Africa; became a distinguished orator, and one of the most learned men of his time. At the invitation of the emperor Diocletian he settled at Nicomedia as professor of Latin eloquence (301), became a Christian, and having been a witness of the persecutions of the times, wrote his works in defence of the new religion. He was called by the emperor Constantine to Treves as tutor to his son Crispus, and is supposed to have d. there about 325. Lactantius was called the "Christian Cicero"; he wrote an important work, *Divinae Institutionum libri VII.*, and smaller treatises, *De Ira Dei* and *De Opificio Dei, vel Formatione Hominis*. The famous work on the death of persecutors (*De Mortibus Persecutorum*), attributed in the only existing manuscript to a Lucius Caelius or Cæcilus Lactantius, is now generally thought to belong to a later date, perhaps to another Lactantius, as the best authorities never give those names to Firmianus. The first edition of Lactantius was printed at the monastery of Subiaco in 1465, being one of the first specimens of the typographical art. The best editions are those of Le Brun and Lenglet du Fresnoy (2 vols., 4to, Paris, 1748), and by Fritzsche (Leipzig, 1842-44, 2 parts). Two other editions were printed at Rome in 1468 and 1470.

**Lac'teals** [Lat. *lac*, *lactis*, "milk"], the lymphatic vessels of the small intestine, a part of the general absorbent or lymphatic system, pervading all parts of the body, distinguished as lacteals, since they imbibe from the glandular mucous surface of the small intestine, following the ingestion of fatty food, a milky, white, opaque fluid, "the chyle." The chyle is fat digested by the pancreatic and biliary fluids, reduced to an emulsion, molecular particles of fatty matter suspended in an albuminoid liquid. The lacteals take up the chyle, traverse the mesentery, and terminate, by two or three small trunks, in the thoracic duct. Here the chyle mingles with the more watery, opalescent lymph, and with it passes up to enter the left subclavian vein, and becomes a nutritive element of the blood. (See LYMPHATICS.)

E. DARWIN HUDSON, JR.

**Lactic Acid** [Ger. *Milchsäure*; Fr. *acide lactique*], *acide nanceique* of Braconnot; the acid which is formed in milk when it turns sour, and which exists therefore in buttermilk. It is  $C_3H_5O_3$ , and is formed from lactose or milk-sugar, as follows:

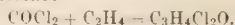


The souring of milk is not therefore a process of oxidation, but, like the vinous fermentation of sucrose or glucose, a molecular breaking up into simpler molecular structures;

lactic acid, like alcohol in the other case, being an intermediate product of decay or dissolution. Sucrose undergoes the lactic fermentation like lactose, under the influence or impulse of the same special ferments.

The names of Scheele, Braconnot, Berzelius, Liebig, and other great chemists are associated in the early history of the discovery of lactic acid and the extended controversies that grew out of it. Braconnot found it in sour beer, sour meal, sour beet-juice, fermented rice, and many other places, and, supposing it new, called it *nanceic acid*, after his birth-place, Nancy. Berzelius appears first to have announced that it occurs as a normal constituent of *flesh*, deducing important physiological conclusions. Liebig denied its occurrence in flesh, but afterwards found therein *sarcolactic acid*, an isomere or metamere of lactic acid, which Strecker found to be convertible into ordinary lactic acid by heat. Mitscherlich first prepared *pure* lactic acid by decomposing lactate of zinc with sulphuretted hydrogen. A colorless syrupy liquid; deliquescent; does not freeze at  $12^\circ$  below zero F.; density = 1.215. It appears strangely like glycerine,  $C_3H_8O_3$ , in its properties, though intensely sour, while the latter is intensely sweet.

Lactic acid has been produced by many artificial chemical transformations; probably the most interesting being that of Lippmann, who formed it by synthesis, by combining olefant gas and oxychloride of carbon, which gives *paralactic chloride*:



This, with alkalis, gives salts of paralactic or Liebig's *sarcolactic acid*, which, then, by heat, as aforesaid, will give us the ordinary lactic acid of buttermilk.

Several methods of manufacture are given. One is to mix 6 pounds of cane-sugar with one half ounce of tartaric acid (to convert it into glucose), and after forty-eight hours to add 3 pounds of prepared chalk and 4 ounces of rotten curd, which latter ferments the glucose to lactic acid. Stir the mass daily in a warm place ( $90^\circ$  F.). In a week or so it becomes a paste of lactate of lime, which is dissolved by boiling in water with some hydrate of lime. The lactate must be evaporated, pressed, washed with cold water, and pressed repeatedly for purification, then decomposed by sulphuric acid. A crude lactic acid thus cheaply prepared might probably be used as a condiment or ingredient of food, confectionery, etc. To get it pure, it is further converted into zinc lactate, which is then decomposed by sulphuretted hydrogen. Lactic acid has a great solvent power over *phosphate of lime*, and to this some attribute its known medicinal virtues.

The lactic fermentation of sugars is referred by Pasteur and others to the action of the common yeast-fungus *Penicillium glaucum*, as the alcoholic fermentation to that of *Torula*. It is said that filtering common brewer's yeast through paper will separate it into two portions; that which passes through containing the smaller *Penicillium* cells, and therefore inciting lactic fermentation, while the larger cells of *Torula* will remain on the filter, which will therefore cause a saccharine liquid to enter into vinous fermentation. (See FERMENTATION.)

**Lactates**.—Some of the salts of lactic acid are used in medicine.

HENRY WURTZ.

**Lactin and Lactose**. See MILK-SUGAR.

**Lactom'eter** [Lat. *lac*, "milk," and Gr. *μέτρον*, "measure"], a graduated cylinder for roughly estimating the amount of cream in milk. The term is often applied to the *galactometer*, which is a hydrometer for showing the specific gravity of milk. (See MILK.)

**Lactuca'rium** [Lat. *lactuca*, "lettuce"], a drug consisting of the dried milky juice from the mature stem of different species of *Lactuca* or lettuce. It is in reddish-brown lumps, masses, or cakes, of an opium-like smell and bitter taste. It was introduced into medicine in 1799 as having the property of allaying pain and procuring sleep, like opium, but its powers are exceedingly feeble, and it cannot be relied upon.

EDWARD CURTIS.

**Lacustrine Villages, or Lake Dwellings**. See PALEOLITHS AND PRE-HISTORIC MAN.

**La'cy** (LUTS), b. in San Roque, Spain, in 1772; distinguished himself in the war of independence against Napoleon, in which he was one of the earliest leaders, with the rank of lieutenant-general. On the establishment of absolutism by Ferdinand VII., Lacy was at the head of a conspiracy for the restoration of the constitution, which was to have broken out Apr. 5, 1817, in Catalonia, but the plot having become known, he was seized, tried by court-martial, and condemned to death, the sentence being secretly pronounced and executed at the castle of Bellver, Majorca, some time in the same month.

**La Cygne**, post-village of Linn co., Kan., on the Missouri River Fort Scott and Gulf R. R., 63 miles S. of Kan-



sas City, has a fine public school, 3 churches, 2 banks, 2 hotels, 1 weekly newspaper, and superior water-power, making it a desirable location for manufactures. There are 4 lodges, 1 grange society, a public library, and a number of grocery, hardware, and drug stores. Town-site was laid out in 1870. Pop. about 1400.

ALBERT GORE, ED. "JOURNAL."

**Ladakh', or Middle Thibet**, an independent territory in Central Asia, extending from 32° to 36° N. lat., and from 76° to 79° E. lon., between Great Thibet in E. and Little Thibet in W., and separated N. from Tookistan by the Karakorum, S. from Cashmere by the Himalaya. Area, estimated at 30,000 square miles. Pop. 150,000. It is a wild mountainous region along the upper course of the Indus, mostly of a sterile soil and with a severe climate. But it is well cultivated, and its inhabitants, who are Mongolians, professing a kind of Lamaism and governed by a theocratical despotism, raise large crops of wheat, barley, and buckwheat, besides rearing immense herds of sheep, which supply most of the wool used in Cashmere. The mountains contain iron, copper, and lead, and a very important transit-trade between China and Hindostan is carried on by mules and sheep. Cap. LEE (which see).

**Ladanum.** See LABDANUM.

**Ladd (WILLIAM)**, b. at Exeter, N. H., May 10, 1778; graduated at Harvard College in 1797; was for some years a captain in the merchant marine, and was one of the principal founders of the American Peace Society, of which he was for many years the president. He edited in behalf of that society the *Friend of Peace*, and afterwards the *Harbinger of Peace*, and published many occasional writings upon the same topic, of which the most important was *An Essay on a Congress of Nations* (1840). D. at Portsmouth Apr. 9, 1841.

**Ladi'ga**, post-v. and tp. of Calhoun co., Ala., on the Selma Rome and Dalton R. R., 35 miles S. W. of Rome, Ga. Pop. 1663.

**Lading, Bill of.** See BILL OF LADING, by PROF. T. W. DWIGHT, LL.D.

**Ladislas, or Lancelot**, king of Naples, surnamed THE LIBERAL and THE VICTORIOUS, b. about 1375; succeeded his father, Charles III., under the regency of his mother Margaret, in 1386; was driven from Naples in July, 1387, by his competitor, Louis II. of Anjou, whom Pope Clement VII. (of Avignon) had invested with the crown; was reinstated by Otto of Brunswick the same year; repulsed two invasions made by Pope Urban VI. in 1388; was crowned at Gaeta May 29, 1390, by a legate of the new pope, Boniface IX.; maintained a war for several years in the heart of his kingdom against his rival, Louis II., who was in possession of the capital; recovered that city July 9, 1399; was a candidate for the throne of Hungary, and actually crowned Aug. 5, 1403, but soon withdrew his claims; attempted to seize Rome in Aug., 1405; was excommunicated and deprived of his kingdom by the pope June 18, 1406; entered Rome in 1408, retiring in a few months; after a long series of alternations of fortune again took by surprise and plundered that city June 8, 1413, and d. at Naples Aug. 16, 1414. He was perhaps the earliest modern Italian ruler who conceived the project of the unity of Italy; was also a claimant of the throne of Provence and a candidate for the imperial crown of Germany.

**Ladislas I.** (LOKTEK), king of Poland, b. in 1260; succeeded to the kingdom of Poland in 1296; was deposed in 1300, in which year he attended the jubilee at Rome; was restored in 1304; carried on a long war with the Teutonic Knights; assumed the title of king of Poland in 1320 by permission of Pope John XXII.; defeated the Teutonic Knights at Płowce Sept. 27, 1321, and d. at Cracow Mar. 10, 1333.

**Ladislas II.**, king of Poland. See JAGELLON.

**Ladislas III.**, king of Poland. See LADISLAS V., king of Hungary.

**Ladislas IV.**, king of Poland, b. at Cracow June 9, 1595; succeeded his father, Sigismund III., Nov. 13, 1632; compelled the Russians to raise the siege of Smolensk (1632); defeated the Turks in Moldavia (1634), and the Tartars of the Crimea; made a truce for twenty-six years with Sweden (1635); began a war with the Cossacks, 1637; married a daughter of the German emperor Ferdinand (1637), and d. in Lithuania May 19, 1648. He was an able and energetic prince, sprung in the female line from the Jagellons, and had such a reputation for valor that in his early youth a party among the Russians wished to make him their czar.

**Ladislas, or Ladislaus**, the name of seven kings of Hungary: LADISLAS I., DIE SAINT, called also LANCELOT, b. about 1011; succeeded his brother, Geysa I., in 1075;

was victorious over the Wallachians, Bohemians, Russians, Cumans, and Poles; conquered Croatia and Dalmatia, 1087, for the crown of Hungary; promulgated a new code of laws at the diet of Zabol (1092); stimulated commerce; aided Boleslas II. in obtaining the throne of Poland; projected the delivery of the Holy Land from the Moslems; erected many churches and monasteries, and favored the clergy in their efforts to civilize the Hungarians. D. July 29, 1095. He was canonized by Pope Celestine III. in 1122. LADISLAS II., b. about 1131; crowned July 15, 1161, and d. Jan. 14, 1162.—LADISLAS III., b. about 1185; was elected in 1204 to succeed his father, Emerich, but d. May 7, 1205.—LADISLAS IV., surnamed THE CUMAN, b. about 1250; succeeded his father, Stephen IV., in 1272; made war upon and at first defeated the Cumans (1282), but the latter, reinforced by vast hordes of Nogai Tartars or Mongols from the plains N. E. of the Black Sea (the empire of Kiptchak), overran and ravaged all Hungary (1285). He then made terms with the Cumans, adopted some of their customs, repudiated his wife, and married one of their princesses, whence his surname, but was finally assassinated by them July 19, 1290.—LADISLAS V. (III. of Poland), b. Oct. 31, 1424; succeeded his father, Ladislas II. (Jagellon), as king of Poland in 1434; was elected king of Hungary in 1440 by the influence of the famous John Huniades, vaivode of Transylvania, by whose aid he defeated the invading Turks in two great battles (1442-43); made a ten years' truce with the sultan Amurath II. at Szegedin in June, 1444, acquiring thereby the sovereignty of Wallachia, but at the instigation of Cardinal Julian obtained a papal dispensation from his oath, and invaded Bulgaria, where he was defeated and killed in battle, with a great part of the Polish nobility, at Varna, Nov. 10, 1444.—LADISLAS VI., THE POSTHUMOUS, son of Albert of Austria, emperor of Germany and king of Bohemia and Hungary, b. Feb. 22, 1440, several months after his father's death, when Ladislas V. had already been placed upon the throne; was elected king in 1445; assumed the government in 1451; was crowned king of Bohemia Oct. 28, 1453, and d. at Prague Nov. 23, 1457. He was cowardly and cruel, and persecuted the followers of John Huss.—LADISLAS VII., eldest son of Casimir IV. of Poland, b. about 1456; was designated as his successor by George Podiebrad, king of Bohemia, July 19, 1469; crowned at Prague Aug. 16, 1471; entered Hungary with an army on the death of Mathias Corvinus in 1490; was proclaimed king and crowned Sept. 21; fought against the Turks, and repulsed the army of Bajazet in 1501; made peace at Buda Aug. 20, 1503; permitted the proclamation of a crusade against the Turks in 1514, and d. at Buda Mar. 13, 1516. PORTER C. BLISS.

**Ladmirault', de** (RENÉ PAUL), distinguished himself in the war with Germany (1870-71); commanded the 4th corps in the battles of Courcelles, Aug. 14, Vionville, Aug. 16, and Gravelotte, Aug. 18, 1870; on the capitulation of Metz became a prisoner of war, but on his return after the conclusion of peace received, in recognition of his brilliant services, the command of the territorial division of Paris, and was appointed governor of the capital. When in 1873 the arrangement of territorial divisions was abolished, Ladmirault retained his position of military governor of Paris.

AUGUST NIEMANN.

**La'doga**, the largest lake of Europe, comprising an area of 6804 square miles, situated in Russia, between the governments of Viborg, Petersburg, and Olonetz. It receives the water from the lakes of Onega, Saima, and Ilmen, and sends it through the Neva to the Baltic. On account of shallows, sandbanks, and sunken rocks navigation is very dangerous on this lake, and canals have been constructed connecting the Neva with those rivers which flow into the lake, and thereby establishing a water-communication through the Volga between the Baltic and the Caspian Sea.

**Ladoga**, post-v. of Montgomery co., Ind., on the Louisville New Albany and Chicago R. R., 11 miles S. E. of Crawfordsville, is a thriving mercantile and manufacturing town.

**Lado'nia**, post-v. of Fannin co., Tex., 13 miles S. E. of Bonham, on N. fork of the Sulphur River. It has 1 weekly newspaper. Pop. 516.

**Ladore'**, post-v. and tp. of Neosho co., Kan., on the Missouri Kansas and Texas R. R. Pop. 839.

**Ladrones', or Marianne Islands**, a group of twenty islands in the Pacific Ocean, belonging to Spain, and situated between 13° and 21° N. lat., and between 144° and 146° E. lon. They are of volcanic origin, have a warm but not unhealthful climate, and comprise an area of 1254 square miles of fertile land, but only two of them, Guggan and Rota, are inhabited. They were first discovered by Magellans in 1521, and called Las Islas de los



Ladrones (the Thieves' Islands) on account of a strong propensity to theft observed in the natives. In 1667 the Spaniards established a regular settlement on Guguan, and called the islands Marianne Islands, after Queen Maria Anna. At the time of this settlement the islands had about 100,000 inhabitants, who received the settlers well, and made great progress until the Spaniards began to attack their independence, when a war broke out which ended nearly with the extermination of the natives. The present number of inhabitants is not more than 6000, and of these many have been transferred by the Spaniards from Luzon. Principal town, San Ignacio de Agaña, situated on Guguan.

**Lady** [Ang.-Sax. *hlafidige*, probably originally meaning "bread keeper"; a woman of good social standing; a term correlative with *gentleman*. In Great Britain the wife of a nobleman is legally styled "lady," and the title is by courtesy given to daughters of nobles and the wives of knights and baronets. The Virgin Mary is often designated "Our Lady."

**Lady-bird** [Ger. *Marienkäfer*, "Mary-bug"], a common name for coleopterous insects of the family Coccinellidae, of which there are more than 1000 species and many genera. They are extremely useful to farmers, destroying vast numbers of aphides or plant-lice; but are the objects of many popular superstitions, and are by many viewed with a vague and unreasonable dread. They are usually of an elongated hemispherical shape, frequently having bright colors, and are often spotted. The species are quite difficult to distinguish.

**Lady Day**, the 25th of March, the feast of the Annunciation of the Blessed Virgin Mary. In England it is one of the quarter days upon which rent is usually payable.

**Lady's Slipper.** See *CYPRIPEDIUM*.

**Lælaps** [Gr. *λαλασ*, a "storm"], a genus of fossil saurians found in the cretaceous strata of various parts of the U. S. The creature was carnivorous, some twenty-five feet in length, and doubtless walked upon its immense hind legs like a bird, for its fore legs were very small. It must have obtained its prey by leaping. *L. aquilunguis* is the largest known species.

**Læu'na**, tp. of Logan co., Ill., traversed by the Gilman Clinton and Springfield R. R. Pop. 691.

**Lænnec'** (RENÉ THÉODORE HYACINTHE), b. at Quimper, Brittany, Feb. 17, 1781; studied from 1800 medicine in Paris; obtained the degree of M. D. in 1804; became principal physician at the Necker Hospital in 1816, and professor of medicine at the Collège de France in 1822. In 1824 retired, on account of his health, to his native town, where he d. Aug. 13, 1826. Was the inventor of the STETHOSCOPE (which see). Besides articles in different medical journals, he wrote *Traité de l'auscultation médiate et des maladies des pommans et du cœur* (1819).

**Læstrygones**, the name of a race of giants mentioned by Homer (*Odyssey*, x. 80-132). Homer, however, does not know anything about their abode, as little as about that of the Cyclops and other fabulous nations, but later traditions assigned Leontini in Sicily or Formiae in Naples as the homestead of the Læstrygones.

**Læet**, de (JAN), b. at Antwerp; was in 1633 a director of the Dutch East India Co., and was an intimate friend of Saumaise (Salmasius). Published nearly twenty learned geographical works in Latin, several of which formed part of the miniature series of *Republicas* issued by the Elzevirs of Leyden. Maintained a sharp literary controversy with Grotius about the origin of the American Indian tribes (1643-44). His most important works were *Norus Orbis* (folio, Leyden, 1633) and *Historia Naturalis Brasiliæ* (1648). D. about 1649.

**Lætare Sunday, Mid-Lent, or Dominica de Rosa**, the fourth Sunday in Lent, the day on which the pope blesses the GOLDEN ROSE (which see). *Lætare*, "re-joice," is the first word of the introit in the missal for this day (Isa. lxvi. 10). On this day only is the organ played during Lent.

**La Fargeville**, post-v. of Orleans tp., Jefferson co., N. Y., on the Chaumont River. It has an academy.

**La Farina** (GIUSEPPE), b. at Messina in 1815; d. in 1863. At the age of eleven he composed a hymn to Italy which excited great admiration. In 1837, after an ineffectual attempt to detach Sicily from the dominion of the Bourbons by heading a popular insurrection, he fled to Tuscany. The following year he was amnestied and returned to Sicily, but after about three years he was once more forced to retire to Tuscany. Here for several years he occupied himself with literary pursuits and in efforts to promote Italian independence. The revolution of 1848 took him back to Sicily; he was elected deputy to the Sicilian

Parliament, then appointed commissioner to the courts of Turin, Florence, and Rome, and in August of the same year he became minister of war and of the marine. In the spring of 1849 he took command of the University Legion against the Bourbons, and when the liberal cause was lost he escaped to Paris, where he continued in relations with Daniel Mann and other patriots till 1853. After a few months' stay at Tours he established himself at Turin in 1854. Here he made great efforts to strengthen the political party in favor of a united constitutional monarchy under the house of Savoy. He co-operated with Cavour in the war of 1859, and with Garibaldi in organizing the numerous volunteers. In 1860 he was elected deputy to the Italian Parliament from six districts. Among the many historical works of La Farina, *La Storia d'Italia* may be specially recommended for the warmth and patriotic eloquence with which it is written. Two volumes entitled *L'Epistolario di Giuseppe La Farina* were published at Milan in 1869.

**Lafave'**, tp. of Scott co., Ark. Pop. 175.

**La Fayette'**, county of S. W. Arkansas. Area, 1060 square miles. The soil is generally level and very fertile, but requires drainage. It is partly prairie and partly hardwood timber, and is traversed by the navigable Red River and by the Cairo and Fulton R. R. Cotton and corn are leading products. Cap. Lewisville. Pop. 9139.

**Lafayette**, county of Florida, bounded on the E. by the navigable Suwanee River, and on the S. W. by the Gulf of Mexico, is extensively covered with forests, and is quite level. Corn is the principal product. Area, 925 square miles. Cap. New Troy. Pop. 1783.

**La Fayette**, parish of S. Louisiana. Area, 230 square miles. It is level, very fertile, and is traversed by the navigable Vermilion Bayou. Cattle, corn, rice, and cotton are leading products. Cap. Vermilionville. Pop. 10,388.

**La Fayette**, county of N. Mississippi. Area, 607 square miles. It is generally level and highly productive. Live-stock, maize, and cotton are leading products. It is traversed by the Tallahatchie and Yockney rivers and the Mississippi Central R. R. Cap. Oxford. Pop. 18,802.

**La Fayette**, county of W. Missouri, bounded on the N. by the Missouri River. Area, 585 square miles. It is generally level and highly fertile, partly timber and partly prairie. Coal, limestone, and sandstone are found. Cattle, grain, tobacco, and wool are staple products. Flour and lumber are leading manufactures. It is traversed by the Lexington branch of the Missouri Pacific R. R. Cap. Lexington. Pop. 22,623.

**La Fayette**, county of S. W. Wisconsin. Area, 630 square miles. It is bounded on the S. by Illinois. The surface is diversified, the soil fertile. Cattle, grain, and wool are staple products. Wagons and carriages are leading articles of manufacture. Lead and zinc are found. The county is traversed by the Mineral Point R. R. and the Pecatonica River, which affords good water-power. Cap. Darlington. Pop. 22,639.

**La Fayette**, post-v. and tp., cap. of Chambers co., Ala., 80 miles N. E. of Montgomery, on the East Alabama and Cincinnati R. R., has 4 churches, 3 hotels, 1 weekly newspaper, a male high school, and a female college. In 1874 it handled 5000 bales of cotton. Pop. of v. 1382; of tp. 1694. W. C. BLEDSOE, Ed. "CLIPPER."

**Lafayette**, tp. of Crawford co., Ark. Pop. 902.

**Lafayette**, tp. of Ouachita co., Ark. Pop. 1131.

**Lafayette**, tp. of Scott co., Ark. Pop. 400.

**Lafayette**, post-v., cap. of Walker co., Ga., 16 miles S. W. of Tunnel Hill, a station on the Western and Atlantic R. R. It is in a beautiful mountain-region. Pop. 251.

**Lafayette**, tp. of Coles co., Ill. Pop. 1265.

**Lafayette**, tp. of Ogle co., Ill. Pop. 467.

**Lafayette**, post-v. of Goshen tp., Stark co., Ill., on the Peoria and Rock Island R. R. Pop. 284.

**Lafayette**, tp. of Allen co., Ind. Pop. 1471.

**Lafayette**, tp. of Floyd co., Ind. Pop. 1576.

**Lafayette**, tp. of Madison co., Ind. Pop. 1452.

**Lafayette**, tp. of Owen co., Ind. Pop. 1071.

**Lafayette**, city, cap. of Tippecanoe co., Ind., on the Wabash River and Wabash and Erie Canal, at the intersection of the Louisville New Albany and Chicago and the Toledo Wabash and Western R. Rs., and terminus of the Indianapolis Cincinnati and Lafayette, the Cincinnati Lafayette and Chicago, and W. division of the Lafayette Muncie and Bloomington R. Rs. The E. division of the latter road is graded and ready for equipment. Lafayette originally derived its chief importance from being the head of navigation on the Wabash River, and then received an

impetus which has sustained its growth since the abandonment of the upper Wabash as a channel of commerce. Lafayette has 25 churches, 1 (Sunday) weekly, and 3 daily newspapers, 9 public-school buildings, besides several denominational academies, street railroad, gasworks, paid fire department with fire-alarm telegraph, an elegant opera-house, State agricultural college (Purdue University), and a large number of manufactories of different kinds. There are 5 national, 4 private, and 2 savings banks, with an aggregate capital of nearly \$2,000,000. The wholesale trade is heavy, especially in groceries and boots and shoes, while the retail traffic finds abundant supplies in the rich agricultural region of which Lafayette is the centre. The scenery in the vicinity is very beautiful. Pop. 13,506.

S. VATER, PUB. "DAILY JOURNAL."

**Lafayette**, tp. of Allamakee co., Ia. Pop. 1120.

**Lafayette**, tp. of Bremer co., Ia. Pop. 867.

**Lafayette**, tp. of Keokuk co., Ia. Pop. 959.

**La Fayette**, tp. of Story co., Ia. Pop. 401.

**Lafayette**, a v. of Centre tp., Doniphan co., Kan., on the Missouri River. Pop. 54.

**Lafayette**, post-v. of Christian co., Ky., 22 miles S. W. of Hopkinsville, the county-seat. Pop. 215.

**Lafayette**, a v. of Metcalfe co., Ky. Pop. 53.

**Lafayette**, post-v. and tp. of Gratiot co., Mich., 10 miles E. of Ithaca, the county-seat. Pop. 288.

**Lafayette**, tp. of Nicollet co., Minn. Pop. 594.

**Lafayette**, tp. of Clinton co., Mo. Pop. 2007.

**Lafayette**, tp. of Nemaha co., Neb. Pop. 618.

**Lafayette**, post-v. and tp. of Sussex co., N. J., on the Sussex R. R. Pop. 884.

**Lafayette**, post-v. and tp. of Onondaga co., N. Y., on the Syracuse and Binghamton R. R. The township is hilly and fertile, and is in part occupied by the Onondaga Indian Reservation. Pop. of v. 135; of tp. 2233.

**Lafayette**, a v. of Jackson tp., Allen co., O. (Herring P. O.), on the Pittsburg Fort Wayne and Chicago R. R. Pop. 337.

**Lafayette**, tp. of Coshooton co., O., traversed by the Pittsburg and Cincinnati R. R. Pop. 920.

**Lafayette**, post-v. of Deer Creek tp., Madison co., O., 4 miles N. E. of London, the county-seat, and on the National Road. Pop. 113.

**Lafayette**, a v. (Whittlesey P. O.) and tp. of Medina co., O. Pop. 1109.

**Lafayette**, post-v. and cap. of Yamhill co., Or., 32 miles S. W. of Portland, on the Yamhill River and near the Oregon Central R. R., has a church, a hotel, a weekly newspaper, an academy, a flouring-mill, 2 drug-stores, and a number of mercantile and manufacturing establishments. It is situated in a fine agricultural district. Pop. about 655.

DORRIS & HEMBRER, EDS. "COURIER."

**Lafayette**, v. and tp. of McKean co., Pa., on a branch of the Buffalo Bradford and Pittsburg R. R. Pop. 591.

**Lafayette**, a v. (Rossville P. O.) of Fayette co., Tenn., on the Memphis and Ohio R. R.

**Lafayette**, post-v., cap. of Macon co., Tenn., 22 miles N. of Carthage. Pop. 161.

**Lafayette**, tp. of Pleasants co., W. Va. Pop. 397.

**Lafayette**, post-v. and tp. of Chippewa co., Wis., 6 miles N. E. of Eau Claire. Pop. 970.

**Lafayette**, a v. (Sparta P. O.) and tp. of Monroe co., Wis., on the La Crosse division of the Milwaukee and St. Paul R. R. Pop. 192.

**La Fayette**, tp. of Walworth co., Wis. Pop. 1032.

**La Fayette**, de (MARIE PAUL JEAN ROCH YVES GILBERT MOTIER), MARQUIS, b. at the château Chavagnac, Auvergne, Sept. 6, 1757, of an ancient family. His father was killed at Minden, and on his mother's death in 1770 he fell heir to large estates; married in 1774 a granddaughter of the duc de Noailles; entered the guards, and while a captain of dragoons in 1776 determined to join the American Revolutionists; fitted out a yacht at his own expense, and landed Apr. 24, 1777, near Georgetown, S. C.; served as major-general 1777-83 without pay, furnishing also clothing and camp equipment at his own expense to the needy patriots; was wounded at Brandywine, and fought with great honor at Monmouth; was in France 1779-80, where he induced the king to send Rochambeau to America; conducted the campaign in Virginia, which ended so brilliantly in the siege and capture of Yorktown; and then returned to France; visited the U. S. again in 1784; exerted himself to procure the abolition of slavery in the French colonies, and freed and educated his own slaves at Cayenne; was in the Assembly of Notables, Paris, 1787;

demanded the convocation of the States General, to which he was a deputy, 1789; became vice-president of the National Assembly, commandant of Paris, and chief commander of the national guards, which he organized, 1789; founded the clubs of Feuillants 1790; protected the king and queen from the mob of Oct. 5 and 6; commanded successfully the army of Flanders 1792; denounced the Jacobins, from whom he escaped to Flanders, but was imprisoned for five years by the Austrians at Olmütz; was liberated by Napoleon, and returned to France in 1799, but would never become a partisan of Napoleon; lived principally upon his estate of La Grange; was in the French House of Representatives 1815; in the Chamber of Deputies 1818; visited the U. S. in 1824-25, and received a grant of \$200,000 and a township of land; was chosen to the Chamber of Deputies 1827; took part in 1830, and commanded the national guard, but not in person. La Fayette d. at Paris May 20, 1834. It would be hard to overestimate the services done by La Fayette to the cause of American liberty. In France he was an ardent and consistent democrat, but he was ready to sacrifice his own preferences for the advantage of the public. Even his enemies admitted his perfect honesty, his courage, and his ability.—His son, GEORGES WASHINGTON LA FAYETTE (1779-1849), and his grandsons, OSCAR (b. 1816) and EDMOND (b. 1818), have figured in French politics as republicans.

**Lafayette College** at Easton, Pa., at the junction of the Delaware, Lehigh, and Bushkill rivers, and of many canals and railroads—a site known from the earliest times as a centre of Indian occupation, and of missionary-work by David Brainerd and others—was chartered in 1826. Rev. George Junkin, D. D., was the first president. It has been from the first distinguished for cheap living and thorough study, especially for students preparing for the ministry, and at first undertook to find manual labor for students who wished it. Since 1855 it has also been known for its course of Anglo-Saxon and English in connection with comparative philology under Prof. F. A. March, LL.D., in which it has been a pioneer, and trained many teachers and professors in other American colleges, and has now a European reputation. It is also known to the scientific world as in some sense the head-quarters of meteorology in America, for here, since 1833, the observations of the government officers and the collections of the Smithsonian Institution, supplemented by the world-wide correspondence of Prof. J. H. Coffin, LL.D., have been reduced and prepared for publication under the direction of that eminent meteorologist. Under the presidency of Rev. W. C. Cattell, D. D., and since 1865 it has still further become a centre of scientific and technical instruction for the coal and iron regions of Pennsylvania and New Jersey, in the midst of which it is situated. It has received nearly \$1,000,000 of new endowment, of which about one-half has been given by Mr. A. Pardee of Hazleton, Pa., and \$300,000 has been expended in the buildings and apparatus for scientific and technical teaching and investigation. The flora of Pennsylvania, in charge of Prof. T. C. Porter, D. D., is the most complete in existence. The Anglo-Saxon and Early English department of the library is probably the best in the country. The college now offers five schools or courses of study of four years each, leading to degrees; two of general culture—the classical and the scientific; and three technical—mining engineering, civil engineering, and chemistry. In the classical school there are two parallel courses—one the common college course in heathen authors; the other in the Latin and Greek of Christian authors, the latter established in 1872, and sustained by the munificence of B. Douglass, Esq., of New York City. Special courses of two terms each are given on iron, road engineering, and chemistry; and any person prepared to do so may devote his whole time to any branch of learning or science taught in the college, either in an under-graduate or post-graduate course. A law school has been organized, and will open in October of this year (1876). There are 28 resident professors and tutors, 11 non-resident lecturers, and 319 students, nearly equally divided between the old and new courses. TRAVIS GREEN.

**Lafitau** (JOSEPH FRANÇOIS), b. at Bordeaux in 1670; became a Jesuit priest; came to Canada as a missionary in 1712; was stationed at the Iroquois mission at Sault St. Louis, and studied closely the Indian character. Discovered also the ginseng-plant. Returning to France in 1717, wrote his two esteemed works—*Mœurs des Sauvages américains* (1724) and *Histoire des découvertes des Français dans le Nouveau Monde* (1733). D. at Bordeaux July 3, 1746.

**Lafitte** (JACQUES), b. at Bayonne, France, Oct. 24, 1767, was the son of a poor carpenter; went in 1787 to Paris; became in 1788 a bookkeeper in the banking house of Perregaux; was soon admitted to the firm by reason of his financial ability; became a regent of the Bank of France 1809, and in 1814 its governor; was in the Cham-



ber of Deputies 1816-17; acquired great reputation by his patriotic management of the public finances; became banker to Napoleon and Louis XVIII.; was widely beloved for his generosity, honesty, and constant devotion to the cause of good government, his own preferences being democratic; supported the revolution of 1830; was minister of finance 1830-31, soon after which he suffered great pecuniary losses. D. in Paris May 26, 1844.

**Lafitte** \* (JEAN), b. in France about 1780. He has been made the subject of Ingraham's romance, *The Pirate of the Gulf*. According to (what appears most authoritative) writers in *De Bow's Review*, vols. xii. and xix., the former of whom refers to the late John R. Grymes, who he says was once Lafitte's counsel, he came from Bordeaux or Marseilles, and was, "within the recollection of old citizens now living," a blacksmith, "who kept his forge at the corner of Bourbon and St. Philip streets." This is, in a subsequent volume (xxiii.), referred to as an "idle story" by a writer who styles him one of three brothers whose privateering operations led him to Galveston Island, and then to Barataria, "keeping as agents in New Orleans his two brothers," etc.

The cession to the U. S. of Louisiana was followed by events—especially the war between France and Spain—which made the Gulf of Mexico "the arena of the most extensive and profitable privateering" depredations upon the rich commerce of Spain. At the period of the taking of Guadeloupe by the British (1806), most of the privateers commissioned by the government of that island, and which were then on a cruise, not being able to return to any of the West India islands, made for Barataria, there to dispose of their prizes, which could not be admitted into any of the ports of the U. S., we being at that time in peace with Great Britain. Most of the commissions granted to privateers by the French government at Guadeloupe having expired some time after the declaration of the independence of Colombia, many of the privateers repaired to her port of Carthagena for the purpose of obtaining from the new government commissions for cruising against Spanish vessels. Having duly obtained their commissions, they in a manner blockaded for a long time all the ports belonging to the royalists, and made numerous captures, which they carried into Barataria. (See BARATARIA BAY.) It is asserted by Latour, from whom we have quoted (*Hist. of the War in E. Florida and Louisiana*), that public auction-sales were made of the cargoes of their prizes. "From all parts of Lower Louisiana people resorted to Barataria, without being at all solicitous to conceal the object of their journey. In the streets of New Orleans it was usual for traders to give and receive orders for purchasing goods at Barataria with as little secrecy as similar orders are given for Philadelphia or New York." While Latour denies that these men were really pirates, he admits that they audaciously infringed our laws, and committed a great offence in smuggling into the territory goods captured from nations with which we were at peace.

Preparatory to the expedition against New Orleans, Lt.-Col. Nicholls, commander of the British forces in the Floridas, made overtures by letter, dated Pensacola, Aug. 31, 1814, to Lafitte, "with his brave followers, to enter into the service of Great Britain;" he is offered the rank of captain, and lands are to be given to "all in proportion to respective ranks." The letter was delivered by Capt. Lookyer, R. N., commanding an armed brig which Sept. 2d visited Barataria for that purpose, and who personally offered him, according to Latour, besides the rank of captain, the sum of \$30,000. These offers he communicated to the governor of Louisiana by letter couched in language which gives evidence of a cultivated mind and of elevated sentiments. "I offer (writes he) to you to restore to this State several citizens, who perhaps in your eyes have lost that sacred title. I offer you them, however, such as you could wish to find them, ready to exert their utmost efforts in defence of the country. This point of Louisiana which I occupy is of great importance in the present crisis. I tender my services to defend it; and the only reward I ask is that a stop be put to the conscription against me and my adherents by an act of oblivion for all that has been done hitherto. I am the stray sheep wishing to return to the sheepfold. If you were thoroughly acquainted with the nature of my offences, I should appear to you much less guilty, and still worthy to discharge the duties of a good citizen. I have never sailed under any flag but that of the republic of Carthagena, and my vessels are perfectly regular in that respect." No answer appears to have been given, and, indeed, an expedition already in preparation under

Commodore Patterson to break up the association at Barataria (where, however, Lafitte and his men were not found) was carried out. Subsequently (about the middle of December), when the invasion of New Orleans was imminently pending, the governor of Louisiana issued a proclamation inviting, and Gen. Jackson accepted, the services of Lafitte and his men, a portion of whom formed a corps under Cpts. Dominique and Beluche, and were employed on the lines, where with distinguished skill they served two twenty-four pounders in batteries Nos. 2 and 3. Others enlisted in one or the other of the companies of mariners, under Cpts. Songis, Lagaud, and Colson, and served at Forts Petite Coquille (now Fort Pike) and St. Philip, and Bayou St. John.

On the 6th of Feb., 1815, Pres. Madison issued a proclamation stating that "it had been long ascertained that many foreigners, flying from the dangers of their own home, and that some citizens forgetful of their duty, had co-operated in forming an establishment on the island of Barataria, near the mouth of the river Mississippi, for the purpose of a clandestine and lawless trade. . . . But it has since been represented that the offenders have manifested a sincere penitence; that they have abandoned the prosecution of the worst cause for the support of the best, and, particularly, that they have exhibited in the defence of New Orleans unqualifying traits of courage and fidelity;" and granting full pardon for acts therein defined, provided that certificate in writing be produced from the governor of Louisiana stating that the person "has aided in the defence of New Orleans." The subsequent career of Lafitte is involved in uncertainty.

J. G. BARNARD.

**La Flèche**, town of France, in the department of Sarthe, on the left bank of the Loire, has manufactures of paper and leather, and a brisk trade in grain, wine, wax, cattle, and fowls. The palace, which was built by Henri IV., and which for some time belonged to the Jesuits, who here had a celebrated school, is now used for a school of artillery. It contains a picture-gallery and a library of 20,000 vols. Pop. 9,292.

**Lafin** (ADDISON H.), b. in Lee, Mass., Oct. 24, 1823; graduated at Williams College in 1843; removed to Herkimer co., N. Y.; elected in 1857 to the New York senate; in 1864 to Congress as a Republican; re-elected in 1866 and 1868, and appointed in 1871 naval officer of the port of New York, which office he held till Feb. 1, 1877. D. Sept. 24, 1878.

**La Fontaine', de** (JEAN), b. at Château Thierry in 1621; d. 1695. Was protected at first by the duchess of Biquillon, then by the prince of Condé, Fouquet, Henrietta of England; but was too frank, too open-spoken, ever to succeed in securing the favors of Louis XIV. Had for friends Molière, Racine, Boileau, and was member of the French Academy. Wrote at first his *Contes*, a set of short, lively, but rather licentious novels; but his great and classical work, known throughout the world, is his *Fables*, some of them taken from Æsop and Phædrus, which have been translated into every language, and of which many have been committed to memory by children in every school. La Fontaine, like Molière, had a larger and better heart than most of the French writers of the Louis XIV. period; he held fast by his protector, Fouquet, even after the ruin inflicted, through a personal jealousy, on handsome and kingly-looking Fouquet by the *roi soleil* (Sun King), as Louis XIV. liked to be called.

FÉLIX AUCAGNE.

**Lafontaine** (SIR LOUIS HIPPOLYTE), BART., b. at Boucherville, Lower Canada, in Oct., 1807; became a prominent advocate and politician; accused in 1837 of sympathy with the insurgents, a reward was offered for him, and he escaped to Europe, but was recalled, and became premier of Canada for some time, resigning his office in 1851. In 1853 he became chief-justice of the queen's bench, a baronet in 1854, and d. in Montreal Feb. 26, 1864.

**La Fourche**, parish of S. E. Louisiana, bounded S. and S. E. by the Gulf of Mexico and Barataria Bay. The surface is flat, and abounds in lakes and bayous, often navigable. Along the Bayou La Fourche are some of the best lands in the Attakapas region. Rice, sugar, molasses, and corn are leading products. Area, 1025 square miles. Cap. Thibodeaux. Pop. 14,719.

**La Fourche**, a bayou in S. E. Louisiana, an outlet of the Mississippi, which begins at Donaldsonville on the right bank, and flows S. E. through the parish of La Fourche interior to the Gulf of Mexico, with a total length of 150 miles. It is navigable by steamboats for about 100 miles from its mouth, and is one of the principal channels of communication between the Gulf and the interior.

† Fortifying Barataria (Grand Terre Island) or the passes of Barataria Bay formed no part of the services rendered by these men. When the writer, twenty-one years after the battle of New Orleans, visited Grand Terre Island, scarcely a trace of Lafitte's occupation remained.

\* The name is thus most commonly spelt, and is so in Latour's *History*; but in the appendix to that work the signature to the several letters there published is printed *J. Lafitte*; and it is so spelt in the heading to the letter of Lt.-Col. Nicholls; hence this was probably his own and the correct spelling.



**Lafuente** (MODESTO), b. at Revanal de los Caballeros, near Cervera, Spain, May 1, 1806; studied philosophy and theology at Leon and at the University of Santiago Compostella; became in 1820 professor of rhetoric, and afterwards of philosophy, at Astorga; began in 1844 to publish under the pseudonym of "Fray Gerundio" a series of satirical essays, and in 1850 issued the first volume of an elaborate *History of Spain*, completed in 1862 in 26 vols.

**Lager Beer.** See BEER, by PROF. C. F. CHANDLER.

**La'go Maggio're**, the longest of the lakes of Northern Italy, situated between Piedmont, Lombardy, and the Swiss canton of Ticino, and traversed, or rather formed, by the river Ticino, which carries its waters to the Po, is 40 miles long and 2 miles broad, and remarkable for the beauty of its scenery, wild, rugged granite mountains alternating with vineclad hills.

**Lagomy'idæ** [from *Lagomys*, λαγώς, "hare," and *μῦς*, "mouse," and *-idæ*], a family of mammals of the order Glires or ROSENTIA (which see), and sub-order Duplicitentati, externally resembling a guinea-pig (*Cavia aperea*) and to some extent a rabbit, having a squat body, with the hinder limbs not very greatly exceeding the fore ones, the back arched, and the buttocks projecting backward; the head is deep, but the profile scarcely arched backward; the eyes small, the snout hare-like, the ears short, and the tail almost wanting. The skull is depressed, the rostral portion moderately produced and narrow, and the interorbital area narrow and without well-defined supraorbital processes; the orbits are oval and rather small; the nasal processes of the supramaxillary bones have each a single large aperture, and are not perforated in a sieve-like manner; the lower jaw has the ascending rami nearly vertical and the condyles correspondingly advanced, and the angular processes extend very little forward. The teeth have the four upper and two lower incisors ( $\frac{2}{3} \times 2$ ) characteristic of the Duplicitentati, and five molars in each jaw (M.  $\frac{3}{1}$ ; P. M.  $\frac{3}{2} \times 2$ ; the upper are (as in the Leporidae) mostly (M. 2; P. M. 1) provided with vertical grooves on the outer as well as inner surface, and three transverse ridges of enamel, but on the last "a small extra loop" is developed; the molars of the lower jaw have each the groove on the outer surface, as well as inner, very strong. The clavicles are wanting. This family includes a few species combined in one genus (*Lagomys*, Cuv.), which was formerly associated with the hares and rabbits in the same family; but the numerous differences between the two groups have caused modern mammalogists to separate them. The Lagomyidæ are of smaller size than most Leporidae, the largest not exceeding the guinea-pig in size: they inhabit cold mountain-regions, and species are found in Northern Asia and Eastern Europe, as well as the Himalaya Mountains and the Rocky Mountains, the latter being the *Lagomys princeps* of Richardson, or the "little chief hare." THEODORE GILL.

**Lagoon** [Lat. *lacuna*, a "hollow;" Sp. *laguna*], a shallow lake, usually communicating with the sea or with some river. The name is also given to the water enclosed in the atolls or circular coral islands.

**La'gos**, a British colony on the coast of Dahomey, W. Africa, extending from the river Yerewa to Ode. Pop. about 60,000, of whom less than 100 are whites. The principal settlement is on the island of Lagos in the Bight of Benin, at the mouth of the Ikorodu Lagoon, from which it derives its name. The territory under British protection extends only 10 or 12 miles inland. The trading-posts are Badagry, Palma, and Leckie, the exports being palm oil, cotton, indigo, and groundnuts. The town of Lagos has a population of 36,000, is the seat of Catholic and Wesleyan missions. Was once famous for the slave-trade, but was conquered in 1851, and ceded to Great Britain in 1861.

**Lagos**, town of Portugal in the province of Algarve, on the western side of a large bay. The harbor, however, is not fit for large vessels. Pop. 8340.

**Lagos**, city, capital of a canton of the same name in the state of Jalisco, Mexico, near the frontier of the state of Guanajuato, noted for its fine churches and factories, and for the abundant deposits of iron ore in the vicinity. It is a central point in Mexico, and as such has been designated as the place of junction of the three principal railroads to be built by government aid, and which will connect Lagos respectively with the city of Mexico, with the Rio Grande, and with the Pacific. Pop. about 25,000; of canton, 90,000.

**Lagosto'minæ** [from *Lagostomus*, λαγώς, "hare," and *στόμα*, "mouth," and *-inæ*], a sub family of the family Chinchillidæ, whose only known species is distinguished by a rat-like form, but with a bushy tail, a broad muffle, upper lip with a vertical groove like a hare's (and hence the name), moderate ears, and imperfect feet—i. e. the anterior with four toes, and the posterior with three, the former having comparatively short and pointed nails, and the

latter long, compressed, and acutely-pointed ones; the molar teeth have mostly only two narrow lamellæ, but in the hindmost upper ones are three. But one species is known—the viscacha or *Lagostomus trichodactylus* or *merriami*; it is a characteristic animal of the Pampas of South America, where it burrows in a clayey or sandy soil; it has the singular habit of bringing to the mouth of its burrow every hard object which takes its fancy, such as bones and stones. THEODORE GILL.

**Lago'tis**, or **Lagidium**, a genus of the chinchilla family of mammals, with two species, *L. Cuvieri* and *L. pallipes*, is the mountain viscacha, inhabiting the western slope of the Andes in Chili, Peru, and Ecuador, and must not be confounded with the viscacha of the plains (*Lagostomus*). It is about the size of a hare, and burrows in the rocks. The fur is long and soft, and falls out as soon as the animal is dead.

**La Grande**, post-tp., cap. of Union co., Or., on the S. side of Grande Ronde Valley, 80 miles S. E. of Walla Walla, and on the line of the projected Portland Dalles and Salt Lake R. R., has Federal and State land offices, is supported by its proximity to the mines of Eastern Oregon and Idaho, and is celebrated for the even temperature and healthfulness of its climate. There is a weekly newspaper. Pop. 610. E. S. McCOMAS, *Register State Land*.

**La Grande**, county of N. E. Indiana, bounded N. by Michigan. Area, 384 square miles. Its surface generally consists of level and productive oak-openings. Cattle, grain, wool, and lumber are leading products. It is traversed by the Grand Rapids and Indiana R. R. Cap. La Grange. Pop. 14,148.

**La Grange**, a v. of Colbert co., near the N. W. corner of Alabama, seat of La Grange College, a thriving Presbyterian institution founded in 1830.

**La Grange**, tp. of Lafayette co., Ark. Pop. 2784.

**La Grange**, post-v. of Richland tp., Phillips co., Ark., 15 miles N. W. of Helena. Pop. 62.

**La Grange**, post-v. and tp., cap. of Troup co., Ga., 71 miles S. W. of Atlanta, on the Atlanta and West Point R. R., has 5 churches, 2 banks, 2 hotels, 2 female colleges, 1 male high school, 1 steam grist-mill, 1 furniture manufactory, 34 stores, some of the finest flower-gardens in the South, and 1 weekly newspaper, the oldest in the State, which won the \$50 gold medal at the Georgia State fair in 1873. Pop. 2043. J. T. WATERMAN, Ed. "LA GRANGE REPOSITORY."

**La Grange**, tp. of Bond co., Ill. Pop. 1060.

**La Grange**, post-v., cap. of La Grange co., Ind., in the centre of the county, on the Grand Rapids and Indiana R. R., 45 miles N. W. of Fort Wayne, has 4 churches, 2 banks, 1 weekly newspaper, 2 school-houses, 1 large hotel, and the usual number of stores and shops. Pop. 1038.

JOHN H. RADEK, Ed. "STANDARD."

**La Grange**, tp. of Harrison co., Ia. Pop. 308.

**La Grange**, post-v., cap. of Oldham co., Ky., on the Louisville and Cincinnati R. R., near the junction of the Lexington and Louisville R. R. Pop. 612.

**La Grange**, post-tp. of Penobscot co., Me., on the Bangor and Piscataquis R. R. It has good water-power and manufactures of lumber, etc., and is the site of a remarkable ridge, the result of glacial action. Pop. 622.

**La Grange**, post-v. and tp. of Cass co., Mich., 4 miles N. W. of Cassopolis. Pop. 1884.

**La Grange**, city of Lewis co., Mo., on the Mississippi River and Mississippi Valley and Western R. R., 175 miles above St. Louis, 11 above Quincy, Ill., and 30 below Keokuk, Ia., has 11 churches, 2 hotels, 1 national bank, 1 savings bank, 1 weekly newspaper, a chartered college, tobacco manufactories, several large flouring and planing mills, a mammoth rolling-mill for turning out railroad iron, and considerable river trade. Incorporated as a city in 1863. Pop. 1576. R. M. WALLACE, Ed. "DEMOCRAT."

**La Grange**, tp. of Dutchess co., N. Y. It is traversed by the Dutchess and Columbia R. R., and contains several villages. Pop. 1774.

**La Grange**, post v. of Lenoir co., N. C., on the Atlantic and North Carolina R. R., 14 miles from Goldsborough, has 2 churches, 2 carriage shops, 1 secret societies, 1 female high school, 1 weekly newspaper, and ships annually 3600 bales of cotton. Pop. about 300.

B. W. NASH, Ed. "BAPTIST REVIEW."

**La Grange**, a v. of Wells tp., Jefferson co., O., on the Ohio River and on the Cleveland and Pittsburg R. R. (Phillipsburg P. O.). Pop. 228.

**La Grange**, post-v. and tp. of Lorain co., O., on the Cleveland Columbus and Cincinnati R. R., 24 miles S. W. of Cleveland. Pop. 1609.



**La Grange**, post-v. of Bell co., Tenn., on the Memphis and Charleston R. R. Pop. 760.

**La Grange**, post-v., cap. of Fayette co., Tex., on the E. bank of Colorado River, 20 miles from Columbus, 20 miles S. of the Central R. R., and 11 miles N. of the "Sunset Route," has 4 churches, 4 schools, 2 weekly newspapers, a public hall, and 20 or more business-houses. Pop. 1165.  
J. J. GOSSLER, ED. "NEW ERA."

**La Grange**, post-v. and tp. of Walworth co., Wis., 8 miles E. of White Water, a station on the Milwaukee and Mississippi R. R. Pop. 1039.

**Lagrange** (JOSEPH LOUIS), b. at Turin Jan. 25, 1736; d. at Paris Apr. 10, 1813. He was, by the rivalry of Laplace only, says Prof. Nichol, prevented from "being held, by common consent, the most illustrious geometer of modern times." Though born in Italy, as his name indicates, he was of French extraction. At the age of nineteen he was made a professor of geometry in the Royal School of Artillery. In 1766 he was invited to Berlin by Frederick II. (who as the "greatest king" expressed the desire to have the "greatest mathematician" of Europe at his court) to succeed Euler as mathematical director of the Academy, of which he was made president. Here he wrote his *Mécanique Analytique*. After the death of Frederick (1786) he received invitations from the sovereign of his native Sardinia, as well as those of Naples and Tuscany, but ultimately accepted one in 1787 to take his residence at Paris (receiving a pension from the Academy, of which he had been elected in 1772 a foreign associate), where the rest of his life was passed.

The method of the Variation of Parameters, expounded to a certain point by Euler, but perfected by Lagrange, is one of his important contributions to analytical mechanics. The ellipse which a planet would describe around the sun were there no other attraction undergoes fluctuations of form by attractions of other heavenly bodies. The essence of the method in question is that, holding fast to the idea of the simple curve—the ellipse—though it be never realized, the actual motion of the body is conceived to be on an elliptic curve, the *parameters* (or elliptic elements) of which are ever varying through the disturbing action of foreign attractions. To subject this motion, which under the name of "revolving orbits" had its origin with Newton, to analytical calculation, and to determine the influence of each planet in disturbing the elliptic motion of others, was the problem the solution of which is in great degree due to Lagrange. As a natural sequence to this problem arising out of this perpetual change in the planetary orbits comes the greater problem of the *stability and permanence of the solar system*, the establishment of which is Lagrange's greatest achievement. The orbits being thus in constant fluctuation, it is of the highest interest to know whether the resulting changes be necessarily limited in amount, or whether they will progressively increase until the *stability of the solar system* shall be destroyed.

Lagrange demonstrated (though Laplace had preceded him with a partial demonstration) that the fluctuation of the orbital elements is limited to small amounts, and is periodic, extending, however, through long periods of time. Thus, e. g., the eccentricity of the earth's orbit, now diminishing, will continue to do so for 24,000 years, and then begin to increase. At the same time the apses and nodes are in motion. The grand cycle of the earth's perihelion, which coincided with the vernal equinox 4089 years B. C. (about the date chronologists assigned to the biblical account of the Creation), will be completed in 110,000 years.

"Some of the (orbital) ellipses," says Prof. Forbes (6th Dissertation, *Encyc. Brit.*), "will elongate, whilst others tend to become circles; their planes will vary in inclination, but ultimately be stayed within the limit which human sagacity had predicted myriads of years before. 'These,' says a French analyst, 'are the pendulums of eternity, which beat ages whilst ours beat seconds.' And amidst all these variations, subject to law and to impassable limits, the Major Axes of the orbits preserve a steadfast uniformity, or are subject only to transient fluctuations; and thus permanence arises in the midst of change, and the perfection of the system is demonstrated by the very nature of the disturbances which seemed at one time inevitably to limit its duration." "These results may be considered as among the most astonishing with which science brings us acquainted. The range of insight which man has acquired into the past and future history of the universe throughout periods compared to which the whole existence of his species is but a span, enhances our admiration of the reasoning power which can attain to knowledge so high and excellent."

Laplace had asserted the invariability of the major axes of the planetary orbits, which involves the *fact* of stability. But Lagrange, says Prof. Nichol, "from a higher flight, showed the *necessity* of that stability;" and that it results

from the *dispositions* of the elements in nearly the same plane—the almost circular form of the orbits, and the uniform direction of the motions therein. The importance of such assurance is enhanced when one is reminded that Newton believed that our system contained the seeds of dissolution.

After the mention of these two *opera magna* of Lagrange, his minor works, though there is scarce a topic in physical astronomy or in mechanics or pure mathematics which he has not touched and shed light upon, must be passed by without notice. (A very complete enumeration and analysis of his writings is attached to his biography in the 8th ed. of the *Encyc. Brit.*) Happy in the affectionate attachment of the young wife he at the age of fifty-six had married (his first wife dying soon after marriage, twenty years before), living in intimate relations with Laplace, Euler, D'Alembert, and other renowned contemporaries, escaping the misfortunes to which the French Revolution subjected nearly all his contemporaries, and retaining throughout his scientific appointments, Lagrange's residence in Paris was tranquil, and he died universally respected and regretted. "Take him as a whole," says Prof. Nichol, "abstract science has in modern times possessed no other servant so great."  
J. G. BARNARD.

**La Granja**, or **San Ildefonso**, town of Spain, in the province of Segovia, with a magnificent palace built in 1724 by Philip V., and situated about 4000 feet above the sea. Here Maria Christina was surprised (Aug. 13, 1836) by a number of conspirators and compelled to restore the constitution of 1812. Pop. 3850.

**La Greux**, tp. of Arkansas co., Ark. Pop. 355.

**La Gro**, post-v. and tp. of Wabash co., Ind., is on the Toledo Wabash and Western R. R., Wabash and Erie Canal, and Wabash River. Pop. of v. 519; of tp. 4066.

**La Guayra**, town of Venezuela, South America, the harbor of Caracas, on a narrow strip of land between the sea and the wall of the inland plateau, which rises at once to a height of about 3000 feet. It is one of the hottest places on earth, very unhealthy, and often visited by earthquakes. Its harbor is an entirely open roadstead, where the water is always agitated, and where loading and unloading are very difficult. It is nevertheless the principal port of Venezuela, and the importation of manufactured goods and the exportation of coffee, cacao, cotton, sugar, indigo, and hides are extensive. Pop. about 8000.

**La Guéronnière**, de (LOUIS ÉTIENNE ARTHUR DUBREUIL HELION), VISCOUNT, b. in Poitou, France, in 1816. In 1850 he became chief editor of the *Pays*, and attracted great attention by his *Portraits politiques* of Louis Napoleon and the count of Chambord. After the *coup d'état* of Dec., 1851, he became a decided supporter of Napoleon, was elected a deputy, became a member of the *Conseil d'Etat* (1853), and took charge in the ministry of the interior of the delicate relations of the government to the press and to literature, in which capacity his conciliating manners enabled him to discharge his functions with advantage. In 1861 he was made senator, and became one of the most popular orators, especially on the questions relating to Italy and to home government. In 1868 he was made ambassador to Belgium. As a writer, M. de La Guéronnière became the most trusted organ of the Napoleonic policy, and his pamphlets (*brochures*) were often the first indication of coming events.

**La Harpe**, post-v. and tp. of Hancock co., Ill., on the Toledo Peoria and Warsaw R. R., at the junction of the Burlington branch. It has 1 weekly newspaper. Pop. 1741.

**La Harpe**, de (FRÉDÉRIC CÉSAR), b. at Rolle in the canton of Vaud, Switzerland, in 1754; studied law at the University of Tübingen; became tutor to a young Russian nobleman, with whom he travelled through Italy and France, and was recommended by Baron Grimm to Catharine II., who appointed him tutor to her two grandsons, Alexander and Constantine. His enthusiasm for the French Revolution made his stay in Russia somewhat difficult, and in 1793 he left the country, but received a pension for life, and resided partly in Geneva, partly in or near Paris, until 1814. On his visit to Paris the emperor Alexander received his former tutor with great esteem, made him a Russian general, and exercised through him considerable influence on the political reorganization of Switzerland. In 1817 returned to Lausanne. D. Mar. 30, 1838.

**La Harpe**, de (JEAN FRANÇOIS), b. at Paris Nov. 20, 1739; made his debut as a poet in 1759 with a volume of *Hermès*, wrote *Warwick* (1763), *Timoleon* (1764), and two other tragedies; was in 1768 literary critic on the *Mercur de France*; gained several prizes from the Academy; obtained applause by a drama, *Melanie, ou la Religieuse* (1776); was elected member of the Academy, and in 1786 appointed professor of literature at the newly-established



**Lyceé.** Here large audiences gathered year after year to hear his lectures on literature, from which originated his best work, *Cours de la littérature ancienne et moderne* (16 vols., 1799-1805). Embraced the Revolution with great enthusiasm, and lectured with the red cap on his head. Was nevertheless arrested and kept in prison for some time, and this incident wrought a singular change in him; the philosopher of the school of Voltaire became a fervent Catholic. As a poet, La Harpe is entirely forgotten, but his *Cours de la littérature* is still an interesting and instructive book, in spite of the superficiality and harshness with which some parts are treated. D. Feb. 11, 1803.

**Lahas'ka**, post-v. of Buckingham tp., Bucks co., Pa., 6 miles N. E. of Doylestown.

**Lahijan'**, town of Persia, in the province of Ghilan, near the Caspian Sea. It has some silk manufactures. Pop. 7000.

**La Hontan**, of **ARMAND LOUIS DE DELONDARCEL**, BARON, b. near Mont de Marsan, Gaseony, France, about 1667; came to Canada, probably as a private soldier, in 1683, in one of the companies of marines sent by Gov. de la Barre against the Iroquois, and was afterward in Denonville's expedition against the Senecas, being stationed successively at Chambly and at Forts Frontenac, Niagara, and St. Joseph's. In 1668 he was sent to Michilimackinac and Sault Ste. Marie, was at Green Bay in 1669, and pretended to have explored the head-waters of a branch of the Mississippi. Returning to Quebec, he sailed for France in 1690, came back the following year, and was sent by Count Frontenac with despatches to the French government announcing the failure of Sir William Phipps' expedition against Quebec. The vessel put in to Placentia, Newfoundland, and La Hontan rendered such good service in defending that port from an attack by the English that he received a command as lieutenant in Newfoundland and Acadia. In 1693 he became involved in difficulties with the governor, made his escape to Portugal in a merchant vessel, and thence passed to Spain, Denmark, and England. Having been dismissed from the French service, and being unsuccessful in his endeavors for reinstatement, he published at the Hague in 1703 his adventures in America under the title *Nouveaux Voyages de M. le baron de Lahontan dans l'Amérique Septentrionale* (2 vols.), and added a third volume, *Dialogue de M. le baron de Lahontan et d'un sauvage dans l'Amérique, avec les voyages du même en Portugal* (Amsterdam, 1704). These volumes were widely circulated, but are entirely untrustworthy for details of fact, the geography and ethnography of the upper Mississippi being completely fictitious, though long relied upon by compilers. D. in Hanover in 1715.

**Lahore'**, the principal city of the Punjab, British India, situated on the western bank of the Ravee, in lat. 31° 36' N. and lon. 74° 18' E. The city itself is surrounded with a high brick wall, and consists mostly of narrow, dirty, and overcrowded streets between high houses, which present only bare walls toward the streets. But it has many magnificent Mohammedan mosques and Hindoo temples, and its extensive bazaars are well stocked. Outside the wall are other fortifications, stretching 7 miles in circuit, enclosing the most beautiful and luxuriant gardens and promenades, interspersed with large monuments and ruins of the former splendor of the city, when it was the residence of the Mogul emperors and had 1,000,000 inhabitants. Since 1849 it has been a British possession, and it is said to be rising again. Its present pop. is estimated at about 100,000.

**Lahr**, town of Germany, in the grand duchy of Baden, on the Shutter. It has some manufactures of snicloth, vinegar, tobacco, and paper. Pop. 7103.

**Lah'sa**, or **El-Ah'sa**, which latter word in the Arabic language means a tract of land where the water sinks through the surface, but is retained by a lower layer), the name of an independent dominion, situated on the eastern shore of Arabia, 90 miles S. W. of Katif, in lat. 25° 25' N., lon. 49° 45' E., and comprising an extensive valley, fertile and well watered, and a large capital, flourishing and well built. Wheat, millet, and all kinds of fruits and vegetables are cultivated, and horses and sheep are extensively reared, but dates and camels are the two principal items of the wealth of the country. The population of the district numbers about 50,000; of the town, about 10,000. The former name of the tribe and its abode was Hodjaz. A small tribute is annually paid to the Turkish sultan.

**Lai'bach**, or **Laybach**, town of Austria, cap. of duchy of Carniola, beautifully situated on a plain on a river of the same name, on the road from Vienna to Trieste, is an old town, with some manufactures, a considerable trade, many good educational institutions, and several interesting buildings; as, for instance, the cathedral of St. Nicholas, the Gothic town-house, the castle and the palace of Count Auersberg. Pop. 23,032.

**Laid'lie** (ARCHIBALD), D. D., b. at Kelso, Scotland, Dec. 4, 1727; graduated at the University of Edinburgh; was ordained in 1759, and was for four years pastor of the Scotch church at Flushing, Holland, where he acquired a knowledge of the Dutch language and the theology of the Reformed (Dutch) Church, with which he was thenceforth connected. As a consequence of a sharp controversy in New York as to the language to be used in preaching to the churches founded by the Dutch colonists, Dr. Laidlie was called to the pastorate of the Collegiate church, and on Apr. 15, 1764, preached at the Middle Dutch church the first English sermon addressed by a regular pastor to an American Dutch congregation. His ministry was marked with great popularity and success. Early in the war of the Revolution he retired from New York to Red Hook, N. J., where he d. in 1778.

**Laing** (ALEXANDER GORDON), b. in Edinburgh, Scotland, Dec. 27, 1794, entered the British army; served some years in the West Indies, and was in 1820 aide-de-camp to the governor of Sierra Leone. Was employed in negotiations with African chieftains for the suppression of the slave-trade, and explored the upper course of the Niger. Returning to England, was promoted to the rank of major, and in 1826 undertook an overland journey from the Mediterranean to the Gulf of Guinea. Setting out from Tripoli in July with a caravan of native traders, reached Timbuctoo in August, but was soon after murdered near that city. Had published an account of his earlier explorations, *Travels through the Timbuctoo, Kano, and Sokoto Countries to the Sources of the Rokelle and Niger* (London, 1825).

**Laing** (MALCOLM), b. on the island of Mainland, Orkneys, in 1762; studied at the University of Edinburgh, and was called to the bar in 1785, but devoted himself chiefly to literature. Wrote a continuation of Henry's *History of Great Britain* (1785), and a *History of Scotland from the Union of the Crowns to the Union of the Kingdoms* (1800), with dissertations on the Gowry conspiracy and on the Ossian poems, adding in the second edition an essay arguing the guilt of Mary Queen of Scots in the murder of Darnley. Was elected a member of Parliament in 1807, and d. in the Orkneys in Nov., 1818.

**Laing** (SAMUEL), of Rapdale, Orkney, brother of Malcolm, was author of several of the most instructive works of travel published in the present century. Among them are books on *Norway* (1834), *Sweden* (1838), *Notes of a Traveller in France, Prussia, and Switzerland* (1811), *Social and Political State of the European People in 1848 and 1849* (1850), and *Observations on the Social and Political State of Denmark* (1852).

**Laing** (SAMUEL), b. at Edinburgh, Scotland, in 1810, son of Samuel Laing the traveller; graduated at Cambridge (1832), and at Lincoln's Inn; was admitted to the bar in 1840; became private secretary of Mr. Labouchere, president of the board of trade, and afterward a member of the railway commission, and had much to do with the relations of the government to the railways, then being rapidly extended. To his efforts the public were indebted for the convenience of "parliamentary trains" at a minimum rate of payment of one penny per mile. In 1848 he became chairman of the Brighton Railway Company, in 1852 chairman of the Crystal Palace Company; entered Parliament in 1852 for his native district; was financial secretary to the treasury in 1859, and went to India in 1860 as minister of finance. Returning in 1865, he again entered Parliament, and resumed in 1867 the chairmanship of the Brighton Railway Company.

**Laings'burg**, post-v. of Shiawassee co., Mich., on the Jackson Lansing and Saginaw R. R. It has manufactures of castings and lumber.

**Laird** (JOHN), b. at Greenock, Scotland, in 1805, was the first builder of iron steamships in 1829, and was for many years head of the great firm of John Laird & Sons, iron shipbuilders and engineers at Birkenhead, near Liverpool. As builder of the Confederate privateer *Alabama* his name has become a part of the history of the American civil war. Mr. Laird filled many posts of responsibility in connection with commerce and public works, and was a member of Parliament from 1861 until his death at Birkenhead, Oct. 29, 1874.

**Lair's Station**, post-v. of Harrison co., Ky., on the Kentucky Central R. R.

**La'ity** [remotely from the Gr. *laos*, the "people"], a term chiefly used to distinguish the unshorn people from the clergy. The term is also sometimes employed by persons in the professions of medicine and law to distinguish non-professional from professional persons. So also members of certain voluntary associations speak of the uninitiated as the laity. Convents have lay brothers and lay sisters and lay elders, lay preachers.



**Lajard'** (JEAN BAPTISTE FÉLIX), b. at Lyons, France, Mar. 30, 1783; accompanied as secretary a mission to Persia in 1807; became interested in the study of Oriental religions and Oriental influences upon ancient Greece, and made a fine collection of cuneiform cylinders, which were obtained by the Imperial Library. By the aid of the labors of Bopp and Schlegel in the young science of comparative philology, as well as by his own researches, Lajard was enabled to broach a theory of the common origin of the races now called Aryan, which has since been confirmed in most points. He filled diplomatic posts in Greece, Russia, and Denmark until the fall of Napoleon I.; was afterward employed in the financial department; was elected in 1830 a member of the Academy of Inscriptions, and wrote most of vols. xviii. and xix. of the vast work edited by that body, *Histoire Littéraire de la France*, his contributions being upon the early rabbins, scholastics, and juriconsults. Of his numerous and learned miscellaneous writings, the most important is the *Recherches sur le Culte public et les Mystères de Mithra en Orient et en Occident* (Paris, 1847-48). D. at Tours in Sept., 1838.

**Lakanal'** (JOSEPH), b. at Serres, France, July 14, 1762; studied theology; became professor of rhetoric at Bourges, and of philosophy at Moulins; was elected to the National Convention; distinguished himself by his solicitude for the interests of the sciences and of literature; was the principal founder of the Museum of Natural History, of the Academy of Sciences, and other institutions of higher education; entered the Council of Five Hundred (1795); was professor at the Lycée Charlemagne under the consulate and empire; was a refugee in 1815, as having voted for the death of Louis XVI.; settled in the U. S.; was favored by Jefferson; received from Congress a grant of 500 acres of cotton land in Alabama, and became a planter; was chosen president of the University of Louisiana; returned to France after the revolution of 1830; was re-elected to the Academy of Sciences in 1834, and d. at Paris Feb. 14, 1845.

**Lake** [Lat. *lacus*], a body of water nearly or quite surrounded by land. Lakes derive their forms and character from the nature of their basins and the region in which they are found. Mountain-lakes, being valleys filled by running streams, are long and narrow, rarely of great size, but often of great depth. Lake George and Lake Champlain in the Appalachian Mountains, the lakes of Constance, Zurich, Lucerne, and Geneva on the N. side, Lago Maggiore and Lago di Como on the S. side of the Alps, all renowned for the beauty and loveliness of their shores or the grandeur of the surrounding scenery, are fair examples. Their length exceeds their width twenty or thirty times. The depth of Lago Maggiore, which is hardly 3 miles wide, reaches, according to the Italian engineers, 2613 feet below its surface, or more than double the depth of Lake Superior, and 1926 feet below the level of the ocean. Sometimes their forms are very irregular, for the water of a mountain-lake often covers several contiguous valleys, as in the Lago di Como, with its two long branches, and the lakes of Lucerne and Lugano, which owe their strange and crooked form to the fact that each fills four distinct valleys, crossing each other almost at right angles.

Lakes in plains and plateaus, being simple depressions in a uniform surface, are generally of larger size, and wider compared to their length, but relatively of no great depth. The largest lakes of the globe, the so-called Caspian and Aral seas in Asia, the equatorial lakes of Central Africa, the great North American lakes, and Lake Titicaca in South America, all belong to this class. Their vast expanse and the tameness of their shores deprive them of the picturesque beauties which adorn the mountain-lakes.

Most lakes receive and send forth large rivers, of which they seem to be an expansion. In their basins the wild alpine torrents spend their force, and their muddy waters flow out purified and transparent. The lakes are thus the regulators of the mountain-streams, preventing destructive freshets; they perform the same office in the low plains.

**Salt Lakes.**—Numerous lakes, however, in the interior of the continents, though receiving affluents, have no outlet, some of their water losing itself in the sandy ground, but the greater portion passing into the atmosphere by evaporation. These are usually filled with salt water. All the surface of the continents being an old sea-bottom, the presence of salt is very natural. Fresh-water rivers and lakes can only be found after the surface has been thoroughly washed and the salt carried away by streams having access to the ocean. The Caspian and the Aral seas, at the bottom of the vast depression which lies between Europe and Asia, are the most extensive salt lakes. The Caspian Sea, though receiving the Volga, the largest river of Europe, and many others of considerable size, evaporates so much water that its surface has been found by the Russian academicians to be 83 feet below the level of the Mediter-

anean, and varying with the seasons. Many lakes in the neighborhood ooze away during the summer, leaving a pure, white crystalline crust of salt. One of them, the Elton Lake, between the Volga and Ural rivers, furnishes thus an annual crop of over 100,000 tons of salt.

More remarkable than all is the Dead Sea, which lies in the deepest part of a long valley, sunk from 4000 to 5000 feet below the surrounding country, its surface being 1286 feet, and its bottom over 2500 feet, lower than the level of the Mediterranean. Its feeder, the river Jordan, alone among the streams of the earth, accomplishes nearly its whole career below the level of the sea. When expanding into the Lake of Tiberias, the beautiful sheet of water whose shores witnessed so many of Christ's miracles, it is nearly 620 feet below the surface of the Mediterranean. By another long step of over 640 feet downward its fresh waters mingle with the bitter floods of the Dead Sea. In this last reservoir the salt has accumulated so as to transform the water into a heavy brine, which may be the remnant of an ancient sea of much larger extent, gradually reduced by evaporation to its present size. The other continents have also their salt lakes, and North America can boast of the Great Salt Lake of Utah as one of the finest specimens of its kind.

**Geographical Distribution of Lakes.**—Lakes are not uniformly spread over the continents. They are most numerous in the northern regions of Asia, Europe, and North America, but more thinly scattered farther S. and in the southern continents. Asia is pre-eminently the land of the salt lakes. Both in its north-western steppes from the Caspian to Lake Balkash, and in its vast central highlands, they occur in countless numbers. The Altai and Daourian mountains, however, contain the largest alpine lakes, among which the kingly Baikal, nearly 500 miles long, holds the first place.

In Europe the most characteristic and celebrated are the mountain-lakes which adorn the Alps of Switzerland and Scandinavia, and the more modest chains of the British Isles. But the greater number and the largest are found on the slight swells and in lowlands which surround the Baltic Sea in Northern Germany, Western Russia, Finland, and Sweden. The lakes of Ladoga and Onega in Russia, and those of Wener and Wetter in Sweden, are the most extensive among the European lakes.

In Africa the great plateau-lakes are typical of the continent. The majestic Ukerewe, or Victoria Nyanza, and the Albert Nyanza at the sources of the White, the Tzana at the head of the Blue Nile, Lakes Bangweolo and Tanganyika, probable head-waters of the Congo, Lake Nyassi in the Zambese basin, are all crowning the tablelands of Central Africa.

But North America is peculiarly rich in this respect. No continent presents a more remarkable chain of large lakes than that which stretches from N. W. to S. E. in the Arctic plains, along the line of contact of the oldest geological formations, to the Appalachian Mountains, comprising the Great Bear and Great Slave lakes, Athabasca, Lake Winnipeg, and the five great lakes from Superior to Ontario, forming together the largest extent of fresh water on the face of the earth. This abundance of lakes in the northern part of the continent renders their almost complete absence in the basin of the Mississippi the more remarkable.

ARNOLD GYOR.

**Lake.** This term is applied to pigments prepared by combining animal or vegetable dyes with metallic oxides, usually alumina or oxide of tin. Almost all coloring-matters may be made to produce lakes, but in practice a few only are found available for this purpose. Lakes are used as pigments for painting, for wall-paper, and in calico-printing.

**Red Lakes.**—(1) Carmine lake, called also Florentine, Vienna, Munich, and Paris lake. This has a beautiful red color, and is the finest of all lakes. It is made by adding an alkali to a decoction of cochineal mixed with alum. Inferior cochineal, and the residues and mother-liquors from the preparation of carmine, are employed for carmine lake. This lake was manufactured at Florence from kermes before cochineal was known in Europe. A finer lake may be made by adding freshly precipitated alumina to the mother-liquor from carmine. (2) Madder lake (Ger. *Krappecarmine*) is extensively prepared. It has a more or less deep rose-color, with a bluish tint. The following is Persoz's process for preparing it: Madder is washed with cold water wherein some sulphate of soda is previously dissolved, and boiled for about twenty minutes, with ten times its weight of a 10 per cent. solution of alum free from iron. The liquid is filtered and cooled to 40° or 35°. The red-colored solution is then treated either (a) by saturating cautiously with carbonate of soda equal to from one-tenth to one-eighth the weight of the alum used, so as to cause the formation of a basic alum, which remains in solution, and which is pre-



precipitated on boiling, as an insoluble basic sulphate of alumina, holding all the coloring matter in combination. Or (b) by adding a solution of acetate of lead, containing 78 parts of the salt for every 100 of alum used, filtering from the precipitated sulphate of lead, and boiling to precipitate a colored basic acetate of alumina. This is much finer than that precipitated by carbonate of soda. Flowers of madder, garancine, or other preparations of madder may be used in place of the root. The coloring-matter of madder may be extracted by an alkaline solution, and precipitated by alum. (3) Brazil-wood lake, known also as Vienna ball-lake, Florentine, Berlin, new lake, etc. The wood is boiled with water, and the solution should be left some time to permit certain impurities to settle. The addition of a little glue or skimmed milk is advantageous. A solution of alum and tin crystals is added, and precipitation effected by caustic potash, taking care not to add an excess, or by carbonate of soda. A slight excess of potash gives the lake a violet tint.

**Violet and Purple Lakes.**—(1) Logwood gives a violet lake on the addition of an alum solution to its decoction, and precipitation cold by carbonate of potash. (2) Alkanet yields a purple lake when the finely-cut roots are boiled with potash, and the solution is precipitated by alum.

**Yellow Lakes.**—(1) Persian or French berries furnish a yellow lake called *Dutch pink*. Potash or soda is added to the decoction, and then a solution of alum is poured in as long as a precipitate occurs. The color is brightened by treating the moist precipitate with a tin solution. (2) Fustic lake: the decoction of the wood is treated with a little glue or skimmed milk to remove tannic acid, then made alkaline, and precipitated with alum. (3) Quercitron lake is made in the same manner. (4) Weld lake is made in the same manner. (5) Annatto lake: the aqueous solution of annatto is mixed with carbonate of soda, heated to boiling, and precipitated by an excess of alum.

**Orange Lakes.**—(1) Annatto: by boiling annatto with carbonate of soda, and precipitating by alum or salt of tin, an orange lake is obtained. The color is still deeper if the annatto is first boiled with water and the solution rejected. (2) Turmeric boiled with potash and precipitated with alum gives an orange lake.

**Blue Lakes** are seldom prepared. (1) Logwood solution mixed with sulphate of copper, and precipitated cold with potash, gives a blue lake. (2) Sulphindigotic acid mixed with alum, and precipitated with carbonate of potash, gives a peculiar blue lake.

**Green Lakes** are usually prepared by mixing blue and yellow lakes, or blue pigments, such as Prussian blue, ultramarine, indigo, etc., with yellow lakes. (1) Coffee lake: a very good green lake is made by exhausting 1 pound of bruised coffee-berries with 1 gallon of water, adding 2½ to 3 pounds of sulphate of copper, and precipitating with caustic potash, avoiding an excess. By moistening the precipitate with vinegar and exposing it to the air, its color is heightened. (2) Weld yields a green lake by similar treatment; and by adding alum to the sulphate of copper, and precipitating by cold carbonate of potash, various tints can be obtained.

**Other Colors.**—Lakes of other colors can be prepared in a similar manner, but true lakes are rarely made except those of cochineal, madder, and Brazil-wood. Lakes of great variety of shades may also be obtained by the substitution of bismuth or antimony solutions for those of alum and tin.

**Adulteration of Lakes.**—Starch, gypsum, China clay, barytes, etc. are extensively used to adulterate lakes, increasing the yield at the sacrifice of brilliancy. To secure thorough mixture with the lake, they are often added to the solutions before precipitation.

**Aniline Lakes**, so called, are not true lakes. They are made of all colors. They are easily prepared by dissolving 1 gramme (15 grains) of the aniline color in ½ kilo. (½ pint) of 95 per cent. alcohol, adding 10 grammes (½ ounce) gum copal, and when all is dissolved mixing in dry starch to a uniform mass, which when dry is reduced to powder. Aurine produces a variety of beautiful precipitates if mixed with metallic or earthy solutions, and thrown down by the cautious addition of an alkali. These are merely hydrated oxides or sub-salts, with which the aurine is mechanically incorporated; on washing with distilled water they lose their color. C. F. CHANDLER.

**Lake**, county of California, consisting of the valley of Clear Lake, which is some 80 miles N. of San Francisco. It is enclosed by the Bear Mountains on the E. and Mayacannas Mountains on the W., both of which are arms of the Coast Range. Area, 820 square miles. It contains much excellent farming land. Cattle, wool, and dairy products are the agricultural staples. Sulphur and borax abound, the latter especially in Borax Lake. Cap. Lakeport. Pop. 2969.

**Lake**, county of Colorado, extending W. from the Rocky Mountains to the E. border of Utah. Area, 1600 square miles. In the E. part the Arkansas River rises, and also the Gunnison, one of the head-streams of the Colorado of the West. It abounds in timber. There are many lofty mountains in the county. Gulch-mining for gold is a leading pursuit. Cap. Dayton. Pop. 522.

**Lake**, unorganized county of S. E. Dakota. Area, 576 square miles.

**Lake**, county of N. E. Illinois, having Wisconsin on the N. and Lake Michigan on the E. Area, 390 square miles. It is level and fertile, the soil being a clayey loam. Cattle, grain, and wool are largely produced. The county is traversed by two divisions of the Chicago and Northwestern R. R. Cap. Waukegan. Pop. 21,014.

**Lake**, county of N. W. Indiana, having Lake Michigan on the N., Illinois on the W., and Kankakee River on the S. The extreme N. is sandy and the S. part marshy, but the rest is very fertile. Cattle, grain, and wool are staple products. The county is traversed by several railroads, mostly centring at Chicago. Area, 480 square miles. Cap. Crown Point. Pop. 12,339.

**Lake**, county of Michigan. Area, 576 square miles. It is very level, and generally has a good soil, but is mostly covered with forests. Pop. 548.

**Lake**, county of N. E. Minnesota, bounded N. by Canada and S. E. by Lake Superior. Area, 3000 square miles. The lake shore is abrupt, and characterized by numerous short, rapid streams. The interior is a succession of pine-covered ridges, diversified by numerous lakes and flat, boggy tracts covered with small larch trees. Cap. Beaver Bay. Pop. 135.

**Lake**, county of N. E. Ohio, bounded N. W. by Lake Erie. Area, 220 square miles. It is undulating, and has a productive clay soil. Iron ore is found. Live-stock, grain, wool, and fruit are leading products. Carriages, brick, and lumber are important manufactures. The county is traversed by the Lake Shore and the Painesville and Youngstown R. Rs. Cap. Painesville. Pop. 15,935.

**Lake**, county of N. W. Tennessee, bounded W. by the Mississippi River, N. by Kentucky, and E. by Reelfoot Lake and River. Area, 150 square miles. It is level, well wooded, and fertile, but partly subject to overflow. Indian corn is the staple product. Cap. Tiptonville. Pop. 2428.

**Lake**, tp. of Cook co., Ill., contiguous to Chicago, on the S. of that city. Pop. 3360.

**Lake**, tp. of Allen co., Ind. Pop. 1309.

**Lake**, tp. of Newton co., Ind., lying N. of Beaver Lake. Pop. 378.

**Lake**, tp. of Cerro Gordo co., Ia. Pop. 1164.

**Lake**, tp. of Monona co., Ia. Pop. 178.

**Lake**, tp. of Muscatine co., Ia. Pop. 843.

**Lake**, tp. of Dorchester co., Md. Pop. 1409.

**Lake**, tp. of Berrien co., Mich., on Lake Michigan. Pop. 1002.

**Lake**, tp. of Huron co., Mich. Pop. 325.

**Lake**, tp. of Lake co., Mich. Pop. 28.

**Lake**, post-v. of Scott co., Miss., on the Vicksburg and Meridian R. R.

**Lake**, tp. of Buchanan co., Mo. Pop. 297.

**Lake**, tp. of Humboldt co., Nev. Pop. 117.

**Lake**, tp. of Ashland co., O. Pop. 701.

**Lake**, tp. of Logan co., O. It contains the city of Bellefontaine. Pop. 3755.

**Lake**, post-v. and tp. (the former also called Uniontown), Stark co., O., 12 miles S. E. of Akron. Pop. 2113.

**Lake**, tp. of Wood co., O. Pop. 1120.

**Lake**, post-tp. of Luzerne co., Pa. Pop. 597.

**Lake**, tp. of Mercer co., Pa. Pop. 524.

**Lake**, tp. of Williamsburg co., S. C. Pop. 873.

**Lake**, tp. of Milwaukee co., Wis., on Lake Michigan, just S. of Milwaukee. Pop. 2974.

**Lake** (GERARD), VISCOUNT, b. in England July 27, 1744; entered the army in 1758; served in the closing campaigns of the Seven Years' war, in the American war (1781), and in Holland under the duke of York in 1793-94; rose to the rank of general; was commander-in-chief in Ireland during the insurrection of 1797-98; defeated the rebels and recovered Wexford June 21, defeated the French troops under Humbert at Killybeg Sept. 8, was made commander-in-chief in India in 1800; conducted the Mahratta war (1803) with brilliant success, taking Delhi (Sept. 12), Agra (Oct. 17), and winning the decisive victory of Laswaree (Nov. 1), which brought the Mogul emperor into vassalage



to England, for which he was made (Sept. 1, 1804) Baron Lake of Delhi and Laswaree. He defeated Holkar near Bhurtpoor Apr. 2, 1805; returning to England in 1807 was made viscount (Oct. 31), and appointed governor of Plymouth, where he d. Feb. 20, 1808. The title became extinct by the death of the third viscount, June 24, 1848.

**Lake Belt**, tp. of Martin co., Minn. Pop. 296.

**Lake Butler**, post-v., cap. of Bradford co., Fla. It is 11 miles S. from Olustee, a station on the Jacksonville Pensacola and Mobile R. R.

**Lake Charles**, post-v., cap. of Calcasieu parish, La., situated on Lake Charles and Calcasieu River, 50 miles N. of the Gulf of Mexico, 30 miles E. of Sabine River, and 200 miles W. of New Orleans, on the (unfinished) New Orleans and Texas R. R. It has 11 steam saw-mills, 1 weekly newspaper, 4 churches, 7 orange groves, 11 stores, 80 lumber-schooners making voyages from Calcasieu River to Galveston, Tex., chiefly for the transportation of lumber, which constitutes the leading industry. Pop. about 500.

J. W. BRYAN, ED. "WEEKLY ECHO."

**Lake City**, post-v., cap. of Columbia co., Fla., 60 miles W. of Jacksonville and 105 E. of Tallahassee, on the Jacksonville Pensacola and Mobile R. R., has 5 churches, 3 schools, 3 weekly newspapers, and the usual number of stores and hotels. It is surrounded by bright silvery lakes abounding in the most delicious fish. Pop. 964.

E. G. JOHNSON, ED. "HERALD."

**Lake City**, post-v. of Calhoun tp., cap. of Calhoun co., Ia., on Lake Creek, 27 miles S. W. of Fort Dodge, has 2 churches, 2 hotels, 1 weekly newspaper, a fine brick school-house, with the usual proportion of stores and shops. Situated in the midst of a rich farming country. Pop. 103.

EARL BILLINGS, PUB. "PIONEER."

**Lake City**, post-v. of Missaukee co., Mich., on the E. shore of Wintergreen Lake, was laid out in 1873 in the midst of a lumbering and farming region; has a weekly newspaper, stores, and saw-mills.

S. W. DAVIS, ED. "MISSAUKEE REPORTER."

**Lake City**, post-v. and tp. of Wabasha co., Minn., on the Lake Pepin and Chicago and the Milwaukee and St. Paul R. Rs., 93 miles below St. Paul, contains 4 large steam-elevators, several saw and flouring mills, a large foundry and machine-shop, a plough and 2 wagon manufacturing, several churches, Masonic and other lodges, 2 banks, 2 weekly newspapers, a public library and 10 or 12 stores. The town is handsomely laid out, is the market of a thickly settled and productive wheat-region, and the scenery on Lake Pepin is admitted to be the most beautiful on the upper Mississippi, and for grandeur to vie with any other region in America, resembling that of Lake Geneva. Pop. 2698.

E. C. SPAULDING, ED. "LEADER."

**Lake Crys'tal**, post-v. of Judson tp., Blue Earth co., Minn., on the St. Paul and Sioux City R. R.

**Lake Dwellings**. See PALEFITS and PRE-HISTORIC MAN.

**Lake Forest**, post-v. of Shields tp., Lake co., Ill., on Lake Michigan and on the Milwaukee division of the Chicago and North-western R. R., 8 miles S. of Waukegan, and 28 miles from Chicago, is laid out in curvilinear form. It is the seat of Lake Forest College, and has a female seminary.

**Lake Fork**, tp. of Logan co., Ill. Pop. 398.

**Lake George**, the P. O. name of CALDWELL (which see), the cap. of Warren co., N. Y.

**Lake Haus'kah**, tp. of Brown co., Minn. Pop. 215.

**Lake Hen'ry**, tp. of Stearns co., Minn. Pop. 159.

**Lake Johan'na**, post-tp., Pope co., Minn. Pop. 219.

**Lake'land**, post-v. and tp., Washington co., Minn., on St. Croix Lake, almost opposite Hudson, Wis. Pop. 395.

**Lake Land'ing**, post-v. and tp. of Hyde co., N. C., on Mattamuskeet Lake and Canal. Pop. 2235.

**Lake Lil'ian**, post-tp. of Kandiyohi co., Minn. Pop. 238.

**Lake Marme**, tp. of Monongalia co., Minn. Pop. 196.

**Lake Ma'ry**, tp. of Douglas co., Minn. Pop. 244.

**Lake Mills**, post-v. of Winnebago co., Ia. It has 1 weekly newspaper.

**Lake Mills**, post-v. and tp. of Jefferson co., Wis., 9 miles N. W. of Jefferson, the capital of the county. Pop. of v. 590; of tp. 1509.

**Lake of the Woods**, a large lake on the boundary between Pembina co., Minn., and the Dominion of Canada. A small detached portion of Minnesota lies on its N. W. side. Its principal affluent is the Rainy Lake River, and its waters flow N., through the Winnipeg River into Lake

Winnipeg. It contains many small wooded islands, a part of which are in Minnesota and a part in Canada. It is but 977 feet above the sea-level, being 598 feet lower than Lake Itasca. Wild rice (*Zizania aquatica*) grows along its shores abundantly.

**Lake Pleasant**, tp. of Hamilton co., N. Y., in the Adirondack region. It contains Sageville, the county-seat, and the beautiful Lake Pleasant. It is a place of summer resort, and has manufactures of lumber. Pop. 318.

**Lake Poets**, a name given by the *Edinburgh Review* to a number of English poets, of whom Coleridge, Wordsworth, and Southey were the most important, who at the beginning of the present century lived in the lake region of Westmoreland and Cumberland, England. They had little in common except the desire to break away from the conventionalities of the literature of that day.

**Lakeport**, post-v., cap. of Lake co., Cal., 28 miles N. E. of Cloverdale, the terminus of the San Francisco and North Pacific R. R., on the shore of Clear Lake, has 1 bank, 1 weekly newspaper, 2 churches, 2 hotels, 1 flour-mill, 7 stores, numerous mineral springs, and 2 steamers plying on the lake. Principal business, farming. Pop. 248.

J. B. BACCUS, JR., ED. "LAKE CO. BEE."

**Lakeport**, post-v. of Sullivan tp., Madison co., N. Y., on the S. shore of Oneida Lake. Pop. 134.

**Lake Prairie**, tp. of Marion co., Ia. It includes Pella and several other villages. Pop. 4958.

**Lake Prairie**, tp. of Nicollet co., Minn. Pop. 828.

**Lake Providence**, post-v., cap. of Carroll parish, La., on the W. bank of the Mississippi, 60 miles above Vicksburg, has 5 churches, 2 machine-shops, and 1 weekly newspaper. It is located in the heart of a fine cotton-growing section, and ships annually 7000 to 8000 bales. Pop. 320.

B. H. LANIER, ED. "LAKE REPUBLICAN."

**Lake Survey**. The U. S. shore-line of the great lakes and their connecting rivers, if measured in steps of twenty-five miles, is about 3000 miles, but if the indentations of the shore and the outlines of the islands are included, the developed shore-line is about 4700 miles in length. Where a lake is narrow and along rivers it is necessary for navigation that both shores be surveyed. This increases the actual shore-line to be covered by the survey between St. Regis and Duluth to about 6000 miles—a dimension which gives some idea of the magnitude of the work. The necessity of accurate soundings and accurate charts for the commerce of these lakes is evident on remembering that in the frequent storms and fogs on these lakes, vessels are never many hours from shore, and that during the summer, commerce, as shown by entries and clearances, is equal to that of all the rest of the U. S.

The first appropriation of \$15,000 was made in 1841; none was made in 1847, and previous to 1862 the largest annual appropriation was \$75,000. Since that time it has varied between \$50,000 and \$175,000. At first, the survey was confined mainly to special localities, but, progressing, the work was made continuous, and one lake after another was taken up and its American shore completed. The first chart was published in 1852. It was not till 1852 that work on a larger scale was begun, a copy of the Bache-Wardec-mann base apparatus being then obtained, making greater precision in the triangulation practicable.

The work has been under the secretary of war, at first under the direction of the chief of topographical engineers, and since the junction of the two corps under the direction of the chief of engineers, U. S. army. The following officers have been in immediate charge of the work: Capt. W. G. Williams, T. E., 1841-45; Lt.-Col. J. Kearney, T. E., 1845-51; Capt. J. N. Macomb, T. E., 1851-56; Lt.-Col. J. Kearney, T. E., 1856-57; Capt. G. Meade, T. E., 1857-61; Col. J. D. Graham, T. E., 1861-64; Col. and Brevet Brig.-Gen. W. F. Reynolds, engineers, 1864-70; Major and Brevet Brig.-Gen. C. B. Comstock, 1870. They have been aided from time to time by such other officers of their corps as could be spared for the work, and by civil assistants, until a body of men has grown up thoroughly competent for such duty.

The normal plan for the survey of a lake is the following: (1) The establishment of a primary triangulation, the average probable error of whose angles shall not exceed 1/10ths of a second, the probable error of its bases not exceeding 3/10000th part of their lengths. (2) The determination from the primary triangulation of secondary points along the shore-line to be surveyed, not more than ten or fifteen miles apart, these distances being much less when a secondary or tertiary triangulation can be carried along shore. (3) A detailed topographical and hydrographical survey along the shore based on these points, extending inland about three-fourths of a mile, and lakeward for half a mile, or to the four-fathom curve. (4) A belt of off-shore hy-

drography done with a steamer, and extending from the four-fathom curve to eight or ten miles from land. (5) Lines of steamer-soundings across the lake. (6) Precise determinations of latitude, longitude, and azimuth at several primary stations. (7) Reduction of field-work and construction of the maps.

In some cases, on account of special difficulty or cost, the primary triangulation has not been carried along the lake shore. Thus, on the American shore of Lake Huron points were determined by a combination of astronomical work and triangulation. On the E. and a part of the W. shore of Lake Michigan the positions of points needed for the maps were obtained by carrying lines of azimuths and latitudes southward from known points, the longitudes being computed from their azimuths and latitudes. The field-work for Lakes Superior, Huron, Michigan, St. Clair, and about one-half of Ontario, for the rivers St. Mary, St. Clair, Detroit, St. Lawrence, is now (July 1, 1875) completed. Lake Erie remains to be done. Forty-two charts, on scales varying from 1:25,000 to 1:100,000, have been published, and about 6000 are issued annually. The pressure for the general charts (scale 1:100,000) has been so great that few of the shore-charts on a larger scale have yet been published.

The primary triangulation is completed from Duluth to Chicago, a distance, measured along its axis, of 700 miles, and depends on four bases, of which one is yet to be measured. When the triangulation at Chicago is connected with that of Lakes Erie and Ontario, the length of the chain will be increased to 1300 miles, with three more bases, of which one is measured. Incidentally, this triangulation will give an arc of the meridian running N. from Chicago for 450 miles, an arc of a parallel running W. from the E. end of Lake Ontario for 600 miles, and an oblique arc from the same point to Duluth, 800 miles long. These, in connection with those of the Coast Survey, will, in combination with the long European and Indian arcs, finally give a more precise determination of the form and dimensions of the earth, which, so far as this continent is concerned, now depends on the Peruvian arc, a short one, and therefore of little value.

As connected with the lake survey, determinations of the magnetic elements are made at various points, the heights of the lakes above the sea are being determined, and their fluctuations are observed. The existence of solar and lunar tides in Lakes Michigan and Superior has been established, and their values determined. Aid has been rendered to the State surveys of Michigan and Wisconsin, and the positions of many hundreds of points near the lakes have been precisely determined, which will serve as starting-points for State surveys in all the future. C. B. COMSTOCK.

**Lake'ton**, tp. of Muskegon co., Mich., on Lakes Muskegon and Michigan. Pop. 1039.

**Lake'town**, tp. of Allegan co., Mich., on Lake Michigan. Pop. 669.

**Laketown**, post-v. and tp. of Carver co., Minn. Pop. 1039.

**Lake Val'ley**, post-tp., El Dorado co., Cal. Pop. 246.

**Lake Valley**, tp. of Douglas co., Nev. Pop. 11.

**Lake View**, post-tp. of Cook co., Ill., on Lake Michigan, is contiguous to Chicago on the N. It contains many fine suburban residences, and a marine hospital, and is the site of several beautiful cemeteries. Pop. 1841.

**Lake Vil'lage**, post-v., cap. of Chicot co., Ark., on Old River Lake, part of a former channel of the Mississippi River.

**Lake Village**, post v. of Belknap co., N. H., at the outlet of Lake Winnepiscogee in Gifford and Laconia tps., on the Boston Concord and Montreal R. R., 27 miles N. of Concord. It has 4 churches, 1 hotel, 1 weekly newspaper, railroad repair-shops, several hosiery-mills, foundry and machine-shops. Pop. in village limits, about 2300.

M. A. HAYNES, PUB. "LAKE VILLAGE TIMES."

**Lakeville**, post-v. of Salisbury tp., Litchfield co., Conn., 5 miles E. of Millerton, N. Y. It is a romantic place of summer resort, is the seat of the Connecticut institution for feeble-minded children, and has a public library.

**Lakeville**, post-v. and tp. of Plymouth co., Mass., 35 miles S. of Boston. It is traversed by the Old Colony and Newport and the Taunton and New Bedford R. Rs., contains several beautiful lakes, large forests and valuable granite ledges, and has 2 churches and a public library. Pop. 1159.

**Lakeville**, tp. of Dakota co., Minn. Pop. 780.

**Lakeville**, post-v. of Livonia tp., Livingston co., N. Y., at the foot of Conesus Lake. It has 3 churches. Pop. 130.

**Lakeville Plantation**, tp. of Penobscot co., Me. Pop. 108.

**Lak-Nagy**, town of Hungary, on the Maros, has 1002 inhabitants, mostly engaged in agriculture and the rearing of cattle and poultry.

**Laksh'mi**, a goddess of the Hindu Pantheon. Throughout the whole range of Oriental mythology no creation is to be met with more pleasing than that of Lakshmi, at once the Ceres and the Venus of India, the bride of the Preserver Vishnu, who sprang in the full perfection of maidenly beauty from the foam of the sea, as Homer and Hesiod sing of Aphrodite. According to the *Vishnu Purana*, "The goddess Sri, seated on a full-blown lotus, and holding a water-lily in her hand, radiant with beauty, rose from the waves. The great sages, enraptured, hymned her with votive song. *Vincauran* and the celestial choirs sang before her, whilst *Ghritachi* and the heavenly nymphs danced. The Ganges and other holy rivers followed her, attending on her ablutions. The elephant of the skies, taking up pure waters in vases of gold, poured them over the goddess, the queen of the universal world," etc. Lakshmi, it has been observed, is also represented as the counterpart of Vishnu, the beneficent protector and preserver. Vishnu is meaning, Lakshmi is speech. She is intellect, he is understanding. He is righteousness, she is devotion. He is Creator, she is creation. He is the male energy, she is the female, and *Sakti* of Vishnu. (See SAKTI.) Her complexion of skin is delicate saffron. Her attendant, like that of Minerva, is the owl. This is a curious circumstance, but difficult of satisfactory explanation. The simple fact appears to be that Lakshmi has always been such a popular deity in Hindustan that gradually her true character was lost sight of, and the attributes and attendant emblems of other divinities were ascribed to her. Thus, some Hindus have confounded her with Saraswati, the true goddess of learning of the East, who, as such might, like Minerva, be fitly attended upon by the owl. However, in the early times of the epic period of Sanskrit literature Lakshmi was simply known as the queen of loveliness and good-luck, also called *Padma*, *Sri*, *Kamala*, *Varahi*, etc. (See Sir William Jones's *Hymn to Lakshmi*, wherein she is addressed as "the world's great mother.") Hindus, when they perform solemn obsequies in honor of deceased ancestors, almost invariably invoke the consort of the Preserver. As the goddess of fertility she is widely worshipped by agricultural laborers. Balfour states: "The Mahratta cultivators are attentive to her worship, and when the *rabhi* crops are well above the ground they proceed to their fields, where they place five stones round a tree, on which they set pots of vermilion and some wheaten flour, which they worship as the *Pauch-Paudu*." In all of the ordinary worship paid to Lakshmi throughout India it is sufficient to state that the ceremony principally consists of offerings of flowers and grain. The goddess is a very favorite subject of Hindu art. In painting and sculpture she is represented as a very young girl, with the full breasts of a mature matron, thus typifying budding beauty conjoined with full fertility. She is frequently represented as reclining at the feet of Vishnu. A huge lotus supports them as they ride upon the silver foam of the churned ocean of milk. R. C. CALDWELL.

**Lalande', de** (JOSEPH JEROME LE FRANÇAIS), b. at Bourg-en-Bresse, department of Ain, July 11, 1732; educated at Lyons by the Jesuits; at Paris studied mathematics and astronomy, and in 1751 was sent to Berlin to make observations complementary to those made by La Caille at the Cape of Good Hope concerning the distance between the earth and the moon. In 1762 was appointed professor of astronomy at the Collège de France, and director of the observatory of Paris. He conducted the *Connaissance de Temps* from 1760 to 1775, and from 1794 till his death. His lectures were exceedingly attractive, not only to the student, but to educated people in general, and his success in diffusing astronomical knowledge and interest was very remarkable. His most prominent writings are *Traité d'Astronomie* (2 vols. 1761), *Abrégé de Navigation* (1763), *Astronomie des Dames* (1785). D. Apr. 1, 1807.

**Lalemant'** (CHARLES), b. in France Nov. 17, 1687; became a Jesuit in 1697; went to Canada in 1622 as superior of the missions; opened the first school in Quebec in 1634; attended Champlain on his deathbed; returned to France in 1638; became rector of colleges of his order at Rouen, La Flèche, and Paris, and vice-provincial. D. at Paris Nov. 18, 1674. He wrote several letters on the missions of Canada, reprinted at Albany in 1870.—His brother JEANNE (1593-1673) was superior of the Canadian missions 1644-50, and again for several years from 1659, and wrote 6 volumes of the *Jesuit Relations*. His nephew CHARLES, b. 1610, a missionary to the Hurons, was put to death by torture by the Iroquois Mar. 17, 1649.

**Lali'ta-Patan'**, town of Nepal, Northern Hindostan. It has many elegant buildings. Pop. 24,000.



**Lallemand'** (Gen. CHARLES FRANÇOIS ANTOINE), BARON, b. at Metz June 23, 1774; entered the army in 1792; distinguished himself in the campaigns in Egypt, Portugal, Prussia, Spain, and Russia; was brigadier and baron in 1811, and was made lieutenant-general and member of the chamber of peers on Napoleon's return from Elba. He accompanied the emperor in the Waterloo campaign, and was sent as commissioner to Capt. Maitland to treat for his surrender to the English navy. He was sent a prisoner to Malta, and on his release went to Turkey, Persia, and Egypt in an unsuccessful search for employment, after which he made his way to the U. S., where he proposed to found a colony of French imperialist refugees. A first attempt had already been made in Alabama, but as it proved a failure, he, with his brother, Baron Henri Lallemand, located a *Chaparral d'Asile* on the Trinity River in Texas, then belonging to Mexico, where in 1817 he assembled 150 colonists. Driven from Texas by the Spanish authorities in Mexico, Lallemand and his companions fell back upon the project of a colony in Alabama, and, aided by a bountiful subscription opened in Paris, lands were again obtained and the so-called *state or canton* of Marengo was founded on the banks of the Tombigbee River. A city was laid out, and named *Eagleville*; the streets were denominated from the victories in which the refugees had participated under Napoleon. Lallemand, however, took no personal part in the Marengo colony. After devising many wild projects, he settled in Louisiana in 1819, and opened a correspondence with Napoleon, whom he proposed to carry away from St. Helena. The ex-emperor, dying in 1821, bequeathed 100,000 francs to Lallemand, but the French government opposed obstacles to his receiving it on account of his having been tried and condemned to death in France during his absence. In 1823 he fought in the Spanish war; went afterwards to Brussels; entered France without molestation; returned to the U. S., and established a successful school in New York. After the revolution of 1830, Lallemand was restored to his military and political honors (1832), took his seat in the chamber of peers, and was for two years military commander in Corsica. D. in Paris Mar. 9, 1839.

**Lally-Tollendal'** (THOMAS ARTHUR), COUNT, b. at Romans, in France, in Jan., 1702, of Irish descent, his father having come to France with James II.; received a military education; fought with distinction at Kehl in 1733, at Fontenoy in 1745, at Falkirk in 1746, and received in 1757 the command of an expedition against the French possessions in the East Indies. He was very successful at first; conquered the Coromandel coast and laid siege to Madras, but being left unsupported by the other French commanders, he was compelled to surrender at Pondicherry in 1761, and was brought to England as a prisoner. Having heard that his personal enemies accused him of various crimes, he went to Paris on parole and demanded a trial. But by infamous intrigues he was thrown into the Bastille, and after nineteen months' imprisonment placed before a court, which, after a kind of mock trial, condemned him to death as a traitor and defaulter. He was executed May 9, 1766. By the indefatigable exertions of his son, Trophime Gérard, supported by Voltaire, a revision of the proceedings was ordered in 1778, which ended with the complete reversion of the sentence.

**La'ma, or Llama**, the *Anchomia glama*, a quadruped of the family Camelidae, an artiodactyl ungulate mammal of the Andes of South America. It is believed to be specifically identical with the GUANACO (which see). The lama is domesticated, and employed as a beast of burden, though to a much smaller extent than in the age of the old Peruvian incas. In fact, it is believed to be the only domestic animal known upon the American continent before the advent of Europeans. The old Peruvians employed immense numbers of lamas. Besides its use as a beast of burden, its flesh is eaten, though it is not highly esteemed. Its wool is employed as a textile material, but is inferior to that of the alpaca. It is of brown or variegated color, slenderly built, and carries about 100 pounds.

**Lama, or Lamas** (GRAND). See LAMAISM, by JANET TUCKEY.

**La'maism** [from Thibetan *lama*, "priest" or "lord"], the present religion of Thibet, Mongolia, and a great part of Tartary, is BoDDHISM, modified by SHAMANISM and SIVAISM (which see), and containing some relics of the ancient Thibetan faith. Its chief characteristic is the worship of grand lamas, in whom BoDDHA is supposed to be incarnate. These priest-gods are very numerous, every lamasery or monastery of note having one at its head. The most important are: the *rGyelwa Rin-po-chhé*, or *Dalai Lama*, at Lhassa; the *Pan-tchen Rin-po-chhé*, at bKra-Shiss-Lhun-po, in Further Thibet; the *Gutson Tamba*, at the lamasery of the Great Kouren, on the river Toulai; the

*Tchang-Kia-Fo*, at Peking; and the *Sa-Dcha-Fo*, at the foot of the Himalayas. After the grand lamas rank the *khutuktus*, or incarnations of celebrated BoDDHISTIC saints; and next to these in the lamaic hierarchy come the *khubilghans*, in whom dwell the souls of former patrons or founders of lamaseries. The lower classes of lamas are incarnations of nobody in particular, and gain consideration only by superior learning or talents; among them, therefore, are found scholars, scribes, artists, physicians and sorcerers (which two terms are in Tartary frequently synonymous), prayer-makers, and artisans. They form a large proportion of the population—about one-third, according to M. Hue. "In most Tartar families," says this writer, "all the sons except the eldest become lamas, and at the age of seven enter a monastery as *chabis* (novices or disciples). This state of things is favored by Chinese rulers, as it keeps down the population of Tartary and Thibet, all classes of lamas being vowed to celibacy." The history of Thibetan BoDDHISM may, according to Csoma de Kőrös, be divided into two distinct periods. The first began in the seventh century A. C., when King Srong-Tsan-Gambo married two princesses from Nepal and China. Both ladies brought to their new home images of BoDDHA and works on the BoDDHISTIC faith, to which the king became a willing convert. He encouraged the building of temples and colleges, and sent to India his minister Thumi Sembhota, who there learned Sanskrit and arranged a Thibetan alphabet after Cashmerian characters. Srong-Tsan-Gambo wrote a historical treatise on BoDDHISM, called *Mani-Kabum*, or "The Hundred Thousand Precious Commandments," and obtained the name of *Chakravartin* ("wheel-turner," or "circulator of doctrine"). Many sacred works were translated from the Sanskrit, and BoDDHISM continued to flourish until the close of the tenth century, when King Langtarma or Langdar, opposed and nearly extirpated it. In the eleventh century it was revived by Atisha, hBrömston, and other learned Thibetans, and from this second period dates its division into sects. "Those persons who still adhere to the ancient forms of worship are called *nyigmapa*, and are most numerous in the parts of Thibet nearest India."

In the fourteenth century, Tsong-Kaba, a native of the province of Amdo, effected a revolution in Thibetan BoDDHISM. This reformer's birth was caused and accompanied by miraculous circumstances. He came into the world with a long white beard; his countenance was grave and majestic; he spoke from the moment of his birth, all his utterances showing a knowledge of the mysteries of existence. At the age of three years he desired to lead a religious life, and his mother, favoring such early devotion, herself cut off his hair and flung it outside the tent. From it sprang a marvellous tree, having fragrant wood and leaves inscribed with sacred characters. Tsong-Kaba withdrew to the mountains, and spent his time in prayer and contemplation, but seldom returning to his parents' tent. During one of his visits thither he met a wandering lama from the West, who remained with him and instructed him in religion. When the teacher died the pupil, eager for further knowledge, travelled westward to seek it, and at last reached Thibet. There he was stopped by a spirit (*lha*), who told him that in that country he was destined to teach prayers and rites. Tsong-Kaba remained at this meeting-place, to which was given the name *Lha-Ssa* ("land of spirits"), and applied himself to reform the worship of BoDDHA. He gained a reputation for sanctity, and in spite of opposition from the priests of higher rank was joined by many lamas, who were called Yellow Caps to distinguish them from the Red-Cap lamas, or adherents to the old forms. The new sect soon spread over all Thibet and Tartary. Its founder died in 1419 at the lamasery of Kaldan, near Lhassa, which he had established, and there, according to Lamaic belief, his body still remains, unchanged in appearance, and miraculously supported above the earth. He left various writings, of which the most important is *Lam-Rim-Tsien-Bo* (the "Progressive Path to Perfection").

The title of *rGyelwa Rin-po-chhé* ("precious" or "holy majesty"), proper to the grand lama of Thibet, was given toward the end of the fifteenth century. The Mongols call him *Dalai*, or *Talé Lama*, by which name he is generally known to Europeans. His territorial power dates from 1640, when Nag-dvang-bLo-bzang-rgya-mtsho was made temporal lord of Thibet by the Mongol conqueror of that country and China. There has since then been a constant succession of Dalai Lamas, none of whom has made any mark in history. These Thibetan sovereigns have no share in secular business, which is transacted by a viceroy called *nomekhan* ("spiritual emperor") and four ministers chosen from the lama class. The Dalai's office, like that of all other living BoDDHAS, is to sit cross-legged in his temple and silently receive the adoration of the faithful, towards whom he occasionally extends his hand in token of blessing. An incarnate BoDDHA never dies. He quits his body only, after



a brief period, to enter that of a young child. Therefore when a grand lama departs no grief is shown—merely an anxiety to know where he may be found in his new form. Sometimes he tells this before his withdrawal, or after it sends a sign, which is interpreted by the augurs. He commonly transmigrates in Tibet, so that long and dangerous journeys must often be undertaken in search of him. When the young living Booddha has been found he must, before his recognition, answer many questions about the lamasery of which he in his former state was head, and identify among various articles those belonging to the late grand lama. This examination, it would appear, is always passed with credit, which fact M. Hue, while owning that deception may sometimes be used, gravely attributes to the possession of the child, not by Booddha, but by Satan. The little grand lama having been joyfully acknowledged, is conducted to his lamasery, where, placed upon an altar, he is worshipped by believers. The Dalai Lama is chosen by lot from three chimerous or living Booddhas of tender age; at least such a form of election is gone through, but its result is determined by the emperor of China or his ministers. Like the Tibetan sovereign, the living Booddha of a lamasery has no real power, that being in the hands of a non-incarnate lama-chief, assisted by subordinate officers.

A lamasery (*dgon-pa*) or monastery is very unlike our idea of such an establishment. It consists of numerous houses or huts built around a temple (*Lha-Khang*, "spirit house"). The lamas have no common refectory, but live according to their wealth, which, as they are not under vows of poverty, is sometimes considerable. Those who have reached a certain rank as theological scholars receive an allowance from the endowment. Some are paid liberally by the faithful for their services as physicians, exorcists, or intercessors for departed souls. Others engage in trade or transcribe the sacred writings. Each lama has under him one or more chabis, who act as his servants, and are instructed by him in religion and the Tibetan language, a knowledge of which is as necessary for a lama as that of Latin for a Roman Catholic priest, or of Hebrew for a Jewish rabbi. Lama temples are built in the Indo-Chinese style, and are profusely adorned with paintings and sculpture. Opposite the principal entrance is a broad flight of steps surmounted by an altar, upon which are the Booddhic images. In front of the chief idol, and hardly more life-like than it, sits the living Booddha. The lamas are called to prayer by a blast blown upon a sea-shell. They enter in procession, bow before the incarnate Booddha, and place themselves in a circle according to their rank. The service is chanted; a bell is rung at intervals, and there is loud and (to European ears) discordant music. Incense is used, the most esteemed being brought from Thibet, the Holy Land of Lamaism. There the incarnate Booddhas transmigrate; the lamaseries there are larger and better endowed, the lamas more learned than those of Tartary and Mongolia.

Besides the *charmanas*, or monk-lamas, there are hermits (*gyil-pas*) who inhabit cells or caves and spend their time in contemplation. Also a large class of wandering lamas, who travel from tent to tent and from lamasery to lamasery, receiving everywhere a welcome as ready as that given in Europe to the itinerant friars of the Middle Ages. Female lamas, or nuns, form a part of the Tibetan-Booddhic system; their number, however, is comparatively small. Clerical assistance is not necessary at weddings and funerals, but the lamas are generally employed to foretell the most fortunate day for a marriage; to facilitate the passage of a departing soul and pray for its happy transmigration; and to specify the best manner for disposing of the dead. Cremation is usual, but bodies are frequently exposed in lonely places, where they are devoured by beasts of prey.

As a rule, Lamaists are devoted to their religion, and give generously for the building of lamaseries and other pious objects. They are fond of going on pilgrimages to holy places, such as Lhasa; the lamasery of the Five Towers (*Ou-Tay*), near which Booddha is said to dwell within a mountain; and Tsong-Kaba's birthplace, where is a famous lamasery called *Kuana-houm* ("Ten Thousand Images"). There grows the tree sprung from the reformer's hair, all efforts to propagate which have, says M. Hue, been unsuccessful. Penance forms a part of the pilgrim's duties. The more zealous penitents make the circuit of the lamasery, prostrating themselves at each step, with their foreheads touching the ground. Or they carry a heavy load of prayer-books, and thus gain credit for having repeated all the prayers therein contained. Lighter forms of penance are—walking round the lamasery while telling the beads of a rosary, or turning a wheel called *Tchu-Kar* ("revolving prayer"). This devotional machine is usually a sort of barrel, moving upon an axis and inscribed all over with Booddhistic petitions. The worshipper sets it going, and it turns prayers for his benefit while

he pursues some more mundane occupation. The most common rosary-prayer is that called the *Mani*, consisting of six syllables: "*Om Mani Padme Houn*" ("Oh, the gem in the lotus! Amen"). According to Klaproth, this is the Tibetan translation of a Sanskrit formula brought from India by Thumi Sembhota. Volumes have been written commenting on it, and ascribing to it various meanings. It probably expresses a desire to attain the gem perfection, and be absorbed into Booddha, of whom the lotus is an emblem.

Even a casual student of Lamaism must observe the similarities between its ceremonial and that of Roman Catholicism. These were pointed out by M. Hue, for which frankness his interesting book was placed in the *Index Expurgatorius*. To account for them, he premised that the wandering lama, Tsong-Kaba's instructor, was in reality a Christian missionary. The canonical books of Tibet exceed in length those of every other country. They are comprised in two collections, the Kan-jur (*bKrañ-hgyur*), consisting of 108 volumes, containing 1083 distinct works; and the Tan-jur (*beTan-hgyur*) of 225 volumes, each weighing from four to five pounds in the Peking edition. A large proportion of both collections is translated from the Sanskrit, but they contain also many original treatises by Thibetan and Tartar authors. (See *Travels*, by E. R. Hue; the works of Alexander Csoma de Körös; *Die Lamaische Hierarchie*, K. Fr. Köppen; *Recherches sur les Langues Tartares*, P. A. Rémusat.) JANET TUCKEY.

**Lamaline**, port of entry of Burin district, Newfoundland, 40 miles by land from Burin, situated on low ground, which is destitute of trees. Very large codfish are here taken. Pop. 310.

**Lamantin**. See MANATEE.

**Lamar**, county of Ala., once SANFORD CO. (which see).

**Lamar**, county of N. Texas, bounded N. by the Red River. Area, 1015 square miles. It is half prairie and half timber-land, very fertile, producing tobacco, cotton, live stock, and corn. Cap. Paris. Pop. 15,790.

**Lamar**, post-tf. of Randolph co., Ala. Pop. 617.

**Lamar**, post-v. and tp., cap. of Barton co., Mo., 20 miles from Kansas line in an open prairie country; has a bank, a steam flouring-mill, a saw-mill, 3 churches, 2 weekly newspapers, 3 hotels, a large graded school, etc. P. 1611. EDWARD BLIER, FOR EDS. "SOUTH-WEST MISSOURIAN."

**Lamar**, post-v. and tp. of Clinton co., Pa., 8 miles S. of Mill Hall. Pop. 1391.

**Lamar** (LUCIUS QUINTUS CINCINNATUS), b. July 15, 1797; studied law at Judge Gould's Litchfield school, Conn., the most famous institution of the kind then in the U. S.; admitted to the bar, removed to Milledgeville, Ga., in 1819, and soon attained high position in his profession. He was chosen by the legislature to compile the statutes of the State from 1810 to 1820. In 1830 he was elevated to the circuit court bench. The duties of this office he discharged with great dignity and ability; his decisions were considered of the highest authority, not only in Georgia, but in the adjoining States. Universally beloved and esteemed, surrounded by a happy family, with the brightest prospects of a high career, and without any known cause, he fell, at his home in Milledgeville, by his own hand, on July 4, 1834. Without any collegiate training, Judge Lamar from boyhood was a lover of books, became distinguished for his attainments in *belles-lettres* and for the classic purity of his composition, and in forensic eloquence stood among the first orators of his day. A. H. STEPHENS.

**Lamar** (LUCIUS QUINTUS CINCINNATUS), son of L. Q. C. Lamar, b. in Jasper co., Ga., in 1826; was educated and graduated at Emory College, Oxford, Ga., with the highest honors of that institution; studied law, was admitted to the bar, and rose rapidly in his profession; subsequently moved to Mississippi, and settled at Oxford in that State; was elected to Congress in 1856; was re-elected to Congress (the 36th), and resigned his seat in that body after Mississippi passed her ordinance of secession in 1861. At the outbreak of the war he accepted a colonelcy in the provisional army of the Confederate States, but was afterwards sent on a European mission. On his entrance into Congress in 1867, Mr. Lamar took a very high position as a debater and orator. Before his retirement he stood among the first in the House. In 1872 he was again elected a member of the House from Mississippi to the 43d Congress. In this body his position was amongst the foremost in logical argument, scholarly accomplishments, patriotic fervor, and forensic display. His speech upon the death of Mr. Sumner was considered one of the most eloquent ever delivered upon the floor of the House. A. H. STEPHENS.

**Lamar** (MIRABEAU B.), b. at Louisville, Ga., Aug. 16, 1798; became a merchant and planter, established in 1828 a State Rights' newspaper, the *Columbian Inquirer*; removed in 1835 to Texas, where he was distinguished at the



battle of San Jacinto; became a major-general, attorney-general of Texas, and secretary of war; in 1836 was chosen Vice President, and was (1838-41) President of Texas. In 1846 he fought at Monterey and on the Comanche frontier. He was appointed in 1857 U. S. minister to the Argentine Republic, and in 1858 to Costa Rica and Nicaragua. D. at Richmond, Tex., Dec. 19, 1859.

**Lamarck', de** (JEAN BAPTISTE PIERRE ANTOINE DE MONET), CHEVALIER, b. at Barcinon, France, Aug. 1, 1744; studied at the Jesuits' College at Amiens; entered the army at the age of seventeen, serving in the Seven Years' war, and at its close devoted himself to medicine and physical science at Paris, and in 1776 published a paper on atmospheric vapors, followed by the *Flore Française* (1778). In 1779 he was chosen to the Academy of Sciences; became botanist of the Jardin du Roi 1788; edited the *Dictionnaire de Botanique* (15 vols., 1785) for Panckoucke's *Encyclopédie Méthodique*, and was professor of zoology at the museum 1794-1818. His principal works are *Système des animaux sans vertèbres* (1801); *Philosophie Zoologique* (1809), in which he announced substantially what is now called the law of evolution, together with some rather fanciful speculations; *Histoire naturelle des animaux sans vertèbres* (1815-22); *Tableau encyclopédique de la Botanique* (1791-1823), and other works. D. at Paris Dec. 8, 1829.

**La Mard**, tp. of Wayne co., Ill. Pop. 1349.

**La Marmora** (ALBERT), COUNT, elder brother of Alfonso, b. at Turin in 1789; d. in 1863; received his military education at Fontainebleau, and in 1808 served in Calabria, then in Lombardy, afterwards in Austria; at Bautzen was decorated by the hand of Napoleon I.; fought at Leipzig; was made prisoner at Torgau, and released only in time to join the Sardinian forces at Grenoble in 1814. Having taken part in the revolutionary movement of 1821, he was banished to Sardinia, where he spent nine years in studying the island, especially its geology. In 1826 appeared his first volume of statistics of Sardinia, reprinted at Paris in 1839. After traversing the island nineteen times, he described it minutely in a work which does him the greatest honor, and which may well serve as a model for the scientific illustration of any country. He was recalled in 1831 by Charles Albert, his military rank was raised, and he was made member of the Turin Academy of Sciences. In 1848 he went to Venice to assist Manin. After being named to the senate he was sent to Sardinia as royal commissioner, and by his earnest and friendly councils he calmed the passions of the Separatist party. In 1857 he published the third and last volume of his *Viaggio in Sardinia*. In 1860 appeared his *Itinerario*.

**La Marmora** (ALFONSO), MARQUIS, b. at Turin in 1804, of an old and noble family; left the military academy in 1823 with the rank of lieutenant of artillery; while in Germany in 1830 was greatly struck with the Prussian military system; reported upon it with a view to the reform of the Piedmontese light artillery; and on the accession of Charles Albert was entrusted with the formation of mounted batteries. In 1831, La Marmora established a school for non-commissioned artillery officers and soldiers, and between that time and 1848 he visited almost every country in Europe for purposes of military study. He took an active and important part in the battles of 1848; saved the life of the king in the insurrection at Milan; was sent on a mission to France, and on his return was made minister of war. In 1849 he was sent to Tuscany to restore the grand duke; then to Genoa to suppress the republican insurrection there—an event which he describes in his recent work, *Un Epilodio del Risorgimento Italiano*. In Oct., 1849, being again minister of war, he established the system of obligatory instruction in the regiments, purged the army of incompetent officers, reduced the number and improved the quality of the troops, enlarged the *bersaglieri* corps, etc. In 1854 he organized and took command of the 15,000 troops sent to the Crimea, led them to the victory of the Tchernaya, and returned to Piedmont to resume his post as minister of war. In 1859 he accompanied Victor Emmanuel to the field, and after the peace of Villafranca he became president of the council. In 1861 he was sent as minister to Prussia, where he laid the foundation of the Italo-Prussian alliance, which he concluded in 1866, and by means of which, notwithstanding the defeats of Custoza and Lissa, Venice was restored to Italy. Sent minister to Paris in 1867, and was governor of Rome in 1870-71. (See his *Quattro Discorsi*, etc., and *Un po' di luce*.) D. at Florence, Italy, Jan. 5, 1878.

**Lamarque'** (MAXIMILIEN), COUNT, b. July 22, 1770, at St. Sever, in the department of Landes; entered the army in 1791, and distinguished himself in Spain by the capture of Fuenterrabia in 1794. In 1801 he was made a brigadier-general; took part in the battle of Austerlitz; accompanied Joachim Murat to Naples in 1808; put down the rebellions in Calabria; captured the island and fortress

of Capri from the English, and was made a general of division. On his return from Elba, Napoleon made him governor of Paris, and later on he sent him to put down the insurrection in the Vendée, which task he fulfilled with as much forbearance as firmness. On the second return of the Bourbons he left France, being exempted from amnesty, and lived at Amsterdam, but was allowed to return in 1818. In 1828 he was elected a member of the Chamber of Deputies, where he sided with the opposition, and exercised some influence by his peculiar eloquence and disinterested character. D. at Paris June 1, 1832. His funeral, June 5, occasioned an insurrection in Paris, which cost many lives.

**Lamartine'**, post-v. and tp. of Fond du Lac co., Wis., 7 miles W. of Fond du Lac. Pop. 1367.

**Lamartine, de** (ALPHONSE MARIE LOUIS), b. at Mâcon, Burgundy, Oct. 21, 1790; d. at Paris Feb. 28, 1869. His name is popular and classical, not only in France—where for nearly thirty years he held the sceptre of poetry, and during four months the sceptre of power—but also throughout the world, for his works were translated into every language. Lamartine was for a few months the real dictator of France, but he was a poetical statesman, like Castelar of Spain, and no practical results came out from his tremendous political power. Still, he left as a statesman a memory as highly honored as his memory as a poet and historian is elevated and unsullied. He was brought up by his mother with a delicacy and tenderness of sentiment which is reflected in the *Méditations*, the first poetical production of Lamartine. After the first fall of Napoleon I., whose rigid and rough rule disagreed with Lamartine, he took service, being a nobleman by birth, in the body-guard of Louis XVIII. in 1811. When Napoleon came back from Elba, Lamartine, instead of following Louis XVIII. to Ghent, travelled for four years in Italy and along the shores of the Mediterranean Sea. In 1820 he published his first volumes of poetry, *Les Méditations*, *Le Lac*, etc., more than 45,000 copies of which—a large number for that time—were immediately sold. He acted afterwards as attaché to the French legation at Naples, London, and then as chargé d'affaires in Tuscany, always thanks to the protection of Chateaubriand, who had become the admirer and the friend of the young poet. A young English lady, possessed of a very large fortune, became at the same time enthusiastic of Lamartine, and he married her. In 1832 he made his famous "journey in the East," the description of which he published under that title. From that time (1834) Lamartine, having been elected deputy to the French Assembly, divided his life between politics and literature. His *History of the Girondists*, published in 1846, built up his reputation as a liberal; and in 1848 he acted as the leader of the provisional government of the French republic, in the capacity of minister for foreign affairs. But he was too much of an aristocratic gentleman, of a genuine *grand seigneur*, not to oppose the daily increasing torrent of revolutionary passions. He had prevented France from adopting the red flag as its national banner by his eloquent apostrophe to a Parisian deputation: "The red flag has only gone around the Champ de Mars, while the tricolor has made the tour of Europe." After the insurrection of June, 1848, Lamartine sank entirely into political oblivion, and he retired into private life. But he had lost his poetical and literary strength; he wrote hastily some works, with the expectation that their sale would pay up the tremendous debt which he had incurred, principally through a generosity of heart. But all his efforts were fruitless to fill up the abyss; he lived almost in poverty, when in 1867 the Corps Législatif voted him a large annuity, which softened his last days, for he died two years after having received this testimonial of the gratefulness of France towards one of her greatest poets, historians, and most honest statesmen. A public subscription was started after his death, and in 1874 a statue was erected to Lamartine near Mâcon, at Milly, a village where he had spent his youth, and which he has so often celebrated in his books. To the list of his works already mentioned above can be added among the most remarkable *History of the Revolution of 1848*, *The Confidences*, *Toussaint L'Ouverture*, a drama, *Geneviève*, *Graziella*, and the numbers of two kinds of periodical reviews exclusively edited by him—*Le Conseiller* and *Cours Familier de Littérature*. FÉLIX AUCAGNE.

**La'mas** (ANDRÉS), b. at Montevideo, Uruguay, about 1817, received an excellent education in his native city, and at an early age became distinguished both in literature and politics, founding the Historical Institute of Montevideo, and filling successively several important offices. He was prefect of Montevideo during a portion of the celebrated nine years' siege; minister of finance, and several times plenipotentiary to Brazil and Buenos Ayres to negotiate the most important concerns of the republic. It is, however, for his vast knowledge of South American history



that he is best known, his private collections of manuscripts being perhaps the most important materials extant upon the subject. He has published several volumes of a vast *Collection of Memoirs and Documents relative to the History and Geography of the Rio de la Plata*, and numerous poems and historical treatises.

**Lamb**, tp. of Dickinson co., Kan. Pop. 462.

**Lamb** (CAROLINE). See MELBOURNE.

**Lamb** (CHARLES), b. in London Feb. 18, 1775. His father, who was a servant to one of the benchers of the Inner Temple, had some literary taste and a rare fund of humor, and was author of a small volume of verse. Charles was educated at the school of Christ's Hospital from his seventh to his fifteenth year, Coleridge being a fellow-pupil and friend, and in 1789 obtained a clerkship in the South Sea House. In 1792 he became an accountant in the office of the East India Company, and remained at this post until 1825, when he retired on a pension. There was a tendency to insanity in the family, which manifested itself in Charles for a short time in 1795, and in his sister Mary the next year, when she killed her mother with a knife. In 1797, Lamb printed a small volume of verses written by himself, Coleridge, and Charles Lloyd. He devoted much attention to early English literature; published in 1807 *Tales from Shakespeare*, and in 1808 *Specimens of English Dramatic Poets who lived about the time of Shakespeare*. He twice appeared as a dramatic author, having printed in 1801 a tragedy, *John Woodrill*, and in 1806 a farce, *Mr. H—*, which was brought out at Drury Lane. Neither of these plays had the slightest success, and the author wisely devoted thereafter his occasional literary efforts to the field in which he is best known and most universally appreciated. Several brilliant *Essays* appeared from time to time in Leigh Hunt's *Reflector* (1810) and in other periodicals, but it was not until 1820 that he began the *Essays of Elia* in the *London Magazine*. They were collected in 1823, and established his reputation as one of the most brilliant and thoughtful of humorists. In 1833 he added the *Last Essays of Elia*. After his retirement in 1825 from the drudgery of office-labor the remaining years of his life were passed in the companionship of a host of literary friends, to whom he was much attached. Among them were, besides Coleridge and Lloyd, Southey, Wordsworth, Godwin, Talfourd, Procter, Leigh Hunt, Hazlitt, De Quincey, and Hood, and their Wednesday evening sessions at Lamb's house in Inner Temple lane were for several years a marked feature of literary life in London. Lamb, though painfully modest and somewhat hesitating in his speech, was an admirable entertainer, and his table-talk, of which fragments have been preserved by his biographers, abounds in the rarest wit. His sympathy with the literary labors of others, even in spheres far removed from his own, was an admirable trait of character, surpassed only by his absolute freedom from exclusiveness in regard to opinions, religious or philosophical. His feeble and delicately strung physique was too susceptible to the effects of liquors and tobacco, which he nevertheless craved, this being his only frailty. He was never married. D. at Edmonton Dec. 27, 1834. An admirable biography and selection from his letters was published by T. N. Talfourd in 1840, and his *Final Memorials* in 1848. The poems of Lamb, though graceful, were never popular, but his reputation rests securely upon his criticisms and the *Essays of Elia*, acknowledged to be one of the most exquisite volumes in the whole range of English literature. —MARY ANNE LAMB, b. in London in 1765, sister of Charles, was a woman of considerable literary talent, and took part in some of her brother's works, especially the *Tales from Shakespeare*. She resided through life with Charles, who was tenderly attached to her; received a pension after his death from the East India Company, and d. at St. John's Wood May 20, 1847. PORTER C. BLISS.

**Lamb** (Gen. JOHN), b. in New York Jan. 1, 1735; assisted his father at the business of optician and maker of mathematical instruments; took a distinguished part in Montgomery's expedition against Quebec, in which he was wounded and taken prisoner; became major and colonel of artillery under Gen. Knox; and did good service throughout the war, closing his career at Yorktown. He was afterwards a member of the New York legislature, and was appointed by Washington collector of customs for the port of New York, which post he held the remainder of his life. D. in New York May 31, 1800. (See *Life of Lamb*, by Lenox, Albany, 1850.)

**Lamballe', de** (MARIE THÉRÈSE LOUISE DE SAVOIE-CARIGNAN), PRINCESS, b. at Turin Sept. 8, 1749, and married in 1767 the prince of Lamballe, son of the duke of Bourbon-Penthièvre, who died next year. Between Marie Antoinette and the princess, who was as much distinguished by her intelligence as by her beauty, arose a friendship which proved true to the last. When the royal family at-

tempted to flee (May 29, 1791) the princess, who was mistress of the royal household, preceded them, but when the attempt failed returned from England to stay with the queen, whose humiliations and sufferings she shared with genuine heroism. Murdered in the massacre of Sept. 8, 1792.

**Lambaye'que**, town of Peru, South America, on the Lambayeque, 5 miles from its mouth into the Pacific, is beautifully situated and well built. It has manufactures of woollen and cotton fabrics, and carries on some trade, though its roadstead is over a mile distant from the shore, and very bad. Pop. 10,000.

**Lam'bert** (DANIEL), b. at Leicester, England, Mar. 13, 1769; was remarkable for his great size, and for some years exhibited himself to visitors in London and the large cities of England. Previous to the age of nineteen he had not been noted for corpulency, but owing perhaps to a sedentary life as keeper of a prison, he attained in 1793 a weight of 448 pounds, and ultimately 739 pounds. He was only 5 feet 11 inches in height, strictly temperate in habits, and distinguished for health, activity, good-humor, and polished manners. D. at Stamford June 21, 1809.

**Lambert** (JOHANN HEINRICH), b. Aug. 29, 1728, at Mülhausen in Alsace, in humble circumstances, but succeeded by industry and perseverance in developing his natural talent for mathematics and natural science; travelled much as private tutor to two young Swiss noblemen, and came in 1764 to Berlin, where Frederick II. made him a member of the Academy of Science and superintendent of the *Astronomical Almanac*. His *Photometria, sive de mensura et gradibus luminis colorum et sonitus* (1760) contains the first scientific representation of the measurement of the intensity of light; and his *Insigniores Orbite Cometaeum Proprietates* still occupies an honorable place in the history of astronomy. His metaphysical writings, on the contrary, have become entirely forgotten. D. at Berlin Sept. 25, 1777.

**Lambert** (Gen. JOHN), b. at Kirkby Malhamdale, Yorkshire, England, Sept. 7, 1619; studied law, and on the outbreak of the great rebellion entered the Parliamentary army as captain under Lord Fairfax. He was conspicuous in the principal battles of the war; was colonel at Marston Moor (1644) and major-general in the Scots war (1650), in which he gained the actions of Hamilton and Inverkeithing; was appointed lord deputy of Ireland in 1652; was a member of Cromwell's council and Parliament (1654); and aided Cromwell to become Protector, but opposed his assumption of sovereign power in 1657, refusing to take the oath of allegiance, and was dismissed from court with a pension. On the accession of Richard Cromwell in 1658, Gen. Lambert headed the confederacy of military commanders which deposed that feeble ruler, and aspired to the Protectorate. In May, 1659, he was chiefly instrumental in the reinstallation of the "Rump Parliament;" defeated the royalists at Chester in August, came into conflict with and forcibly dispersed the Rump in October, thereby becoming head of the committee of safety and virtual ruler of England. Lambert started with an army to oppose Monk (Nov.), but the troops deserting in great numbers, he was soon seized by order of Parliament (Jan., 1660) and cast into the Tower, whence he escaped and reassembled forces against Monk; but being captured a second time, he was tried and condemned to death (June, 1662) by the new court of king's bench under Charles II. His sentence was commuted to banishment, and he d. on the island of Guernsey in 1692.

**Lam'bertville**, post-v. of West Anwell tp., Hunterdon co., N. J., on the Delaware River and the Belvidere division of the Pennsylvania R. R., 14 miles above Trenton, 44 miles from Philadelphia, and 71 from New York. It has 5 churches, 2 weekly newspapers, 5 hotels, 1 national bank, a rubber-factory, iron-foundry, railroad construction and repair shops, a cotton, 2 paper, 2 spoke, and 2 twine mills, with excellent water-power. Pop. 3842.

HAZEN & ROBERTS, EDS. AND PROFS. OF "BEACON."

**Lambèse**, small town of Algeria, in the province of Constantine, is used by the French as a penal colony. It stands on the site of the ancient *Lambesae*, one of the most important cities of Numidia and the station of a Roman legion. Ruins of an amphitheatre, a temple of Esculapius, and a magnificent wall with forty gates are still extant.

**Lam'beth**, one of the suburbs of London, on the S. of the Thames, opposite Westminster, with which it is connected by the Waterloo, Westminster, and Vauxhall bridges. Pop. 379,112. Lambeth Palace, an edifice of the Middle Ages, has been for centuries the principal residence of the archbishops of Canterbury, and has a fine library.

**Lambruschi'ni** (RAFFAELLO), ABBÉ, b. at Genoa in 1788; d. in 1873; passed some years at Rome in the study of theology, after which the young abbé returned to his father, then living in Tuscany, to devote himself to agricultural and philanthropic pursuits, going from time to time to



Florence for the benefit of scientific lectures. At the age of forty, Lambruschini published his first work—a work which proved him an elegant, careful, and thoroughly instructed writer, anxious to promote all real progress. The habit of training plants suggested to him the true method of training men: Vicesseux entrusted to him the education of his nephew, and he afterwards established a boarding college for boys at his villa of San Carboni. In 1836 he took the direction of *La Guida dell' Educatore*. In 1848 he, with Ricasoli and Salvagnoli, wrote political articles for *La Patria*, and was elected deputy to the Tuscan assembly. In 1849 he published his *Libri della Educazione*, then his *Dialoghi sulla Istruzione*, enlarged and reprinted in 1871. In 1859 he was made inspector-general of the schools in Tuscany, afterwards of all the elementary schools of the kingdom, besides being entrusted with the superintendence of the Istituto di Studi Superiori, in which he was professor. He was a member of the senate at the time of his death.

**Lamb'ton**, county of Ontario, Canada, bounded on the N. by Lake Huron and on the W. by the St. Clair River. Petroleum is produced to some extent. The soil is very fertile. The county is traversed by the Grand Trunk R. R. Cap. Sarnia. Pop. 31,994.

**Lame'go**, town of Portugal, in the province of Beira. It is beautifully situated at the foot of the Penude Mountains, on an affluent of the Douro, is surrounded by walls, has an ancient castle, an episcopal palace, a college, a fine Gothic cathedral, and many other ecclesiastical monuments. It has been the seat of a bishopric since the fourth century, and was the residence of the early Moorish kings of Portugal. Pop. 9000.

**Lamellibranchiata**, or **Acephala** (a class of mollusks). See CONCHOLGY, by G. W. TRYON, JR.

**Lamennais', de** (HUGUES FÉLICITÉ ROBERT), ABBÉ, b. June 19, 1782, at St. Malo, Bretagne; acquired very early, through passionate application to studies, a comprehensive knowledge of theology, philosophy, and history; adopted, though only after some hesitation, the ecclesiastical career; received the tonsure in 1811, and took holy orders in 1817. It struck him that lack of true religion was the real cause of all the mental and moral troubles from which the age suffered; and although he moved along through many and very singular windings, and changed his standpoint and allies more than once, at the bottom of all his different views of the world lies the idea that the regeneration of the time depends on a religious revival. The first work in which he set forth his idea with full power was his *Essay sur l'Indifférence en Matière de Religion* (4 vols., 1817-20), a brilliant apology for the Church and the monarchy, hailed with enthusiasm by the Ultramontane clergy and the old-conservative statesmen, but offensive to the Gallican party in the French Church, and hateful to all the different shades of democracy and liberalism. It awakened a certain suspicion, however, even among its best friends. The monarchy was not based on its legitimacy, but on its usefulness to the Church, and in the Church the highest authority was not sought for in the infallibility of the pope, but in the universal consent of all Christians. In his next following works, *La Religion considérée dans les Rapports avec l'Ordre civil et politique* (2 vols., 1825-26) and *Progrès de la Révolution et de la Guerre contre l'Eglise* (1829), this idealization of the existing Church and monarchy developed into a tendency towards reform of both; and after the July revolution in 1830 he openly broke with the old monarchy, and tried in his journal, the *Avenir*, to establish an alliance between the Church and the free constitutional government. He was immediately denounced at Rome, and the pope condemned in 1832 the views set forth in the *Avenir*. Nor was he accepted by the doctrinaires, who felt that his present stand-point was only an intermediate station from which he soon would pass into radicalism. At the first moment he submitted completely to the papal condemnation: the *Avenir* was suspended. But after a year's silence and meditation he published in 1834 his *Paroles d'un Croyant*, which made an unexampled sensation: it ran through 100 editions in a few years, and was translated into all European languages. The pope condemned it, and Lamennais answered by his *Affaires de Rome* (1836). By these two books he broke absolutely with the Church, and in his subsequent works, *Le Livre du Peuple* (1837), *Esquisse d'une Philosophie* (3 vols., 1841-43), *De la Religion* (1841), *Du Passé et de l'Avenir du Peuple* (1842), he appeared as the apostle of the democracy, as the prophetic expounder of the alliance between Christianity and radicalism. In 1849 he was a member of the Constituent Assembly; after the *coup d'état* he lived in absolute retirement. D. Feb. 27, 1854. In accordance with his will, his corpse was brought to Père la Chaise and deposited among the poor and unknown, without any funeral rites; not even a simple stone marks his grave.

**Lamentations, Book of**, a canonical book of the

Old Testament, following the book of Jeremiah, and generally attributed to that prophet. It consists of five chapters, each composed of twenty-two verses (except the third, which has sixty-six), according to the number of letters in the Hebrew alphabet, and is an acrostic, each verse beginning with a distinct letter. The contents are, as indicated by the title, a series of dirges or threnodies upon the downfall of Israel. Some have found the occasion of its composition in the defeat of Josiah at Megiddo, and regard the references to the ruin of Jerusalem as prophetic; but the internal evidence is decisive that it must have been written after the event it commemorates. Little opposition has been made by modern critics to the tradition derived from the Septuagint text and supported by the Talmud, which refers its authorship to Jeremiah, treating it as an appendix to the prophecies.

**Lameth', de** (ALEXANDRE THÉODORE VICTOR), COUNT, b. at Paris Oct. 28, 1760, descended from a noble family of Picardy; was one of three brothers who figured largely in French politics during and subsequent to the Revolution, after having rendered services in the American war of independence on the staff of Count Rochambeau. Alexandre became a colonel in 1785, and was elected a deputy to the States General in 1789, taking an active part in the destruction of the privileges of the nobility and clergy. He was chosen president of the National Assembly Nov. 20, 1790; afforded protection to Louis XVI.; tendered him counsels which were disregarded; was a member of the constitutional committee; had frequent conflicts with Mirabeau, and opposed Robespierre and the Jacobins. On the outbreak of war with Austria (1792), Lameth served as field-marshal in the army of the North; was accused by the Assembly (Aug. 10), together with La Fayette; escaped from France, was seized by the Austrians, and imprisoned three years at Magdeburg; repaired to England in 1795; was well received by Fox and the Whigs, but being ordered by Pitt to leave the country, joined his brother Charles at Hamburg, opening there a commercial house. Under the consulate and empire Lameth was prefect of several departments; was appointed lieutenant-general by Louis XVIII. in 1814, and during his reign was for four sessions a leader of the opposition in the Chamber of Deputies. Lameth wrote much on politics, his most important work being *Histoire de l'Assemblée constituante* (2 vols., 1828-29).

**Lameth, de** (CHARLES MALO FRANÇOIS), COUNT, b. at Paris Oct. 5, 1757, brother of Alexandre; served as captain on the staff of Count Rochambeau in the American Revolutionary war; was wounded at the capture of a British redoubt at Yorktown, and promoted to be colonel. During the Revolution his career was singularly parallel to that of his brother Alexandre; like him, he was at one time (July 5, 1791) chosen president of the National Assembly, served as field-marshal, had to flee after the events of Aug. 10, 1792, and settled at Hamburg. From 1809 to 1814 he served in the army under Napoleon, obtaining the rank of lieutenant-general. After the Restoration he lived in privacy until elected to the Chamber of Deputies in 1829; co-operated in the revolution of 1830, and d. at Paris Dec. 28, 1832.—His elder brother, COUNT THÉODORE, b. at Paris June 24, 1756, also served in America, was a deputy and a field-marshal, but took little part in politics. He wrote a biography of his celebrated brothers, whom he survived many years. D. at Busagny Oct. 19, 1854.

**La Mettrie', de** (JULIEN OFFRAY), b. at St. Malo Dec. 25, 1709; studied medicine, and was appointed physician in the army of the duke of Gramont, but was discharged on account of his *Histoire naturelle de l'Am* (the Hague, 1745), which book was publicly burnt for its materialism and atheism. After the publication of *La Politique du Médecin de Macchiavel* (Amsterdam, 1746) he was compelled to leave France, and sought refuge in Holland, but he was expelled also from this country on account of his *La Faculté vengée* (1747) and *L'Homme-machine* (Leyden, 1748). He removed to Berlin on the invitation of Frederick II., with whom he lived in great intimacy. Here he wrote *L'Homme-plante* (1748), *Art de jouir*, etc., and d. suddenly Nov. 11, 1751, from over-eating. Frederick II. wrote his *éloge*; Voltaire called him a "fool;" and this different impression which his writings made on his time gives them a certain historical interest; else they are entirely destitute of scientific or literary value.

**Lamina'ria** [Lat.], a genus of seaweeds, of which *L. digitata*, *bulbosa*, and *saccharina*, all deep-sea plants, are prized in Europe for the rich supply of iodine afforded by them when burned as kelp. The stem of *Laminaria digitata* (sea-tangle, girdle) is manufactured into bougies and uterine tents for surgeons' use. In some cases these tents are superior to tents of compressed sponge. It is remarkable that the sea-tangle of the American coasts, specifically identical with that of Europe, is unfit for this use.



**La Mine**, post-v. and tp. of Cooper co., Mo., on La Mine River, 7 miles W. of Booneville. Pop. 1088.

**Lammas Day**, the festival of St. Peter's chains (Aug. 1), probably so called because it was an ancient practice on this day to make an offering of bread as the first fruits of the year; hence "loaf-mass," corrupted to Lammas.

**Lammergyer** (Ger., "lamb-vulture"), called also **Griffon** and **Bearded Vulture**, the *Tyrannus barbatulus*, one of the largest, perhaps the largest, of the birds of prey, since the condor has by recent authors been described as rather inferior to the lammergyer in size; an Old World bird, a vulture in anatomy, but an eagle in habits, rarely feeding upon carrion. It is a strong and bold hunter, sometimes reaching ten feet in expanse of wing.

**Lammermoors'**, a range of hills, 1732 feet high, forming the boundary between East Lothian and Berwickshire, Scotland, and covering the south-eastern part of the latter county, where it presents a bold, rocky, and dangerous coast to the North Sea.

**Lamnidae** [from *Lamna*, the typical genus, and *-idae*], a family of sharks, with a fusiform body; the caudal fin with the lower lobe a little smaller than the upper; with a keel on each side of the tail; and two dorsal fins, the first of which is behind the pectorals. Head with a pointed snout; mouth large, inferior; teeth large; the nostrils not confluent with the mouth; the spiracles obsolete or entirely wanting; the branchial apertures very wide. The family thus defined embraces several genera, including the mackerel shark and the formidable "man-eater" of the American waters. The row of teeth on the upper jaw in all these forms exhibits a break a short distance from the symphysis on each side, where the teeth are much smaller than the others. Two well-defined groups represent the family—viz. *Lamnæ*, in which the teeth are lanceolate or sigmoidally curved, and not serrated; and *Carcharodontes*, in which the teeth are triangular and serrated. The two groups are represented in the Atlantic as well as Pacific waters of North America, the Atlantic species being *Turopsia Dekayi* and *Carcharodon Atwoodi*. The family was well represented in past geological epochs, and enormous teeth of *Carcharodon* are found in Tertiary beds. THEODORE GILL.

**Lamoille'**, county of N. Vermont. Area, 450 square miles. It is quite mountainous, but generally very fertile, affording fine pasturage. Cattle, grain, wool, potatoes, hay, and dairy products are the agricultural staples. Lumber, leather, and starch are manufactured. The county is traversed by the Lamoille River and by the Portland and Ogdensburg R. R. Cap. Hyde Park. Pop. 12,448.

**Lamoille**, post-tp. of Bureau co., Ill. Pop. 1408.

**Lamoille River** rises in the mountains of Vermont, and flows westward into Lake Champlain, through Lamoille, Franklin, and Chittenden cos. It furnishes extensive water-power.

**Lamoille Valley**, a v. of Elko co., Nev. Pop. 134.

**La Moine**, tp. of McDonough co., Ill. Pop. 1167.

**Lamoine'**, post-tp. of Hancock co., Me., on the seacoast, N. of Mt. Desert Island. Pop. 612.

**Lamont'**, post-v. of Ottawa co., Mich., on Grand River.

**Lamonte'**, post-v. of Elk Fork tp., Pettis co., Mo., on the Missouri Pacific R. R. Pop. 184.

**Lamorcierié, de** (CHRISTOPHE LOUIS LÉON), b. at Nantes Feb. 6, 1806; was a pupil of the Polytechnic School; entered the army, took part in the campaigns against the Arabs of Algeria, and captured Abd el Kader in 1847. After the revolution of Feb., 1848, he was elected representative in the National Assembly, and as a general fought against the Paris insurgents. As soon as they were defeated he was appointed minister of war June 28, 1848, but resigned on the election of Louis Napoleon as President, and in the Assembly opposed the Bonapartist policy. On the night of the *coup d'état*, Dec. 2, 1851, he was sent as prisoner to the fortress of Ham, and thence exiled from France. In 1860 he took the command of the papal troops, but was defeated at Castellidardo by Victor Emmanuel's generals. He returned to France, thanks to a pardon already granted to him in 1847 by Napoleon III., and d. in his château at Prouzel near Amiens Sept. 10, 1865. FÉLIX ALAIGNE.

**Lamotte'**, tp. of Sanilac co., Mich. Pop. 94.

**Lamotte, de** (ANTOINE HOLLANDA), b. at Paris, France, in 1672; studied in a Jesuit college, obtained success in writing operas of the pastoral type, and with four tragedies, one of which, *Luc de Castro* (1723), has maintained a place on the French stage. He became blind at the age of forty; was admitted to the Academy in 1710; was dramatic censor, and was noted for the literary paradoxes he maintained in his critical essays. He wrote many fables, odes, and eulogues, depreciated Homer, and brought out an "improved and corrected" *Iliad* in French verse,

reduced to ten books, which involved him in a violent controversy with Madame Dacier. D. at Paris in 1751. His complete works form 10 vols. (1754).

**Lamotte, de** (JEANNE DE LUZ DE SAINT RÉMY DE VALOIS), COUNTESS, b. at Fontenay, in Champagne, July 22, 1756, of a noble but degenerated family; educated by the countess of Boulaingvilliers, and received a pension of Louis XV. on account of her descent from the house of Valois. After marrying the count de Lamotte, a penniless adventurer, she settled in Paris about 1780, and soon began the intrigue with Cardinal Rohan which has become famous under the name of the "necklace story." It ended with her conviction May 31, 1785. She was whipped, branded, and put in the Salpêtrière. In 1787 she escaped, came to London, and d. there Aug. 23, 1791, falling during a night-revel out of a window. (Consult *The Diamond Necklace* (Carlyle's) and Louis Blanc's *Histoire de la Révolution française*, and Campardon's *Marie Antoinette et le Poëme du Collier* (1864).)

**Lamoure'**, county of E. Central Dakota, traversed by the Dakota River. Area, 1800 square miles. It is almost entirely uninhabited by white men.

**Lamp** [Fr. *lampe*; Lat. *lampas*; Gr. *λαμπάς*, from *λάμπειν*, to "shine"]. Defined till within a few years as a receptacle for oil with a wick for illumination, the inventions of the past and present generation have made it impossible to distinguish between the *lamp* properly so called and any other artificial means of giving light. Known to the Egyptians, Hebrews, and Greeks, lamps were originally simple flat vessels of oblong or round shape, at one end of which was a small handle, at the other a little projection with a hole forming a nozzle, and with a larger opening on the back and in the centre into which the oil was poured. The oil used was generally vegetable, but, according to Pliny, sometimes of liquid bitumen. These lamps, of terra cotta or metal, many of very elegant form, were placed on or hung with chains to bronze candelabra. Tarentum and Ægina were famed for making the latter of great elegance. But though the ancients confined their ingenuity to the ornamentation of the lamp and its stand, Hero of Alexandria (A. D. 221), in his *Treatise on Pneumatics*, details four inventions, by one of which "oil can be raised by water within its stand," and by the other "raised by means of air." All the older lamps formed a crust on the wick, which was removed by a needle or picker; none of them gave a good light, and the majority of the poorest persons of the younger generation, especially in our cities, have literally no idea of the limited artificial illumination, even of the rich, before the days of gas, camphene, lard oil, and hydrocarbons.

From the earliest times until within a century the lamp remained the same, consisting simply of oil and a wick in a receiver. In 1784, M. Ami Argand (or, according to some, M. Quinquet) produced an entire revolution in artificial light by the invention of a burner with a circular wick, the flame being thus supplied with an outer and inner current of air, the effect of which was increased by means of a glass chimney. Argand was also the inventor of the chimney itself as applied to other lamps. Soon after Argand, Peter Kerr 1787, made the great invention—which was only fully developed of late by Aronson—of raising the supply of oil by means of another fluid whose specific gravity is greater than that of oil, this being generally salt in water. The principal inventions since his are as follows: John Miles (1787), invented a portable carriage lamp, also one with a reservoir on the same principle as "a birdcage water-fountain," and a burner of twisted wire. Th. H. Stokes (1787) patented a new and peculiar method of raising oil in lamps to supply the wick, and J. Smethurst (1791) and J. Lucas, with W. Baylis (1793), made ingenious applications of lenses to light. Eckhardt and Morton (1797) set forth a "method of making lamps and candlesticks by means of sliding pillars, so that they may be raised or contracted." M. Carel in 1798 invented a lamp in which the oil was raised by clockwork. This and Stokes's lamp are the parents of the moderator lamp. About seventy varieties of this or the pressure lamp have been patented in England. A modification of the Carel lamp known as the *Düfrenoy* was long popular in America. In 1849 an American named Wood wrote a singular novel, consisting of the adventures of a lady in search of a really good lamp, in which the successful end was the attainment of the *Düfrenoy*. James Smethurst and Michael Paul (1802) patented the register tube, air-tubes, and a readily removable burner, with reflectors. Porter's "automaton" 1804 was very ingenious, "the lamp being suspended on an axis counterbalanced by a weight, so as to make it hang level when full and at an angle of 45° when empty, so as to feed itself evenly by the gradual ascent of the burners." G. B. Abcock 1806 supplied oil by means of a piston and tube, also with a tube and syringe, which forced the oil up by compressed air "or



any heavier fluid than oil." Elizabeth Perryman (1809) invented an improved street and hall lamp. J. Smethurst (1811) offered several improvements, one of a spiral burner with screw-valve; also the double-cone globe. Peter Durand (1811) attempted to "render illumination more soft and agreeable to the eye." Lord Cochrane (1818) invented lamps for burning the "spirit" or "oil of tar," and made an arrangement for allowing the direct rays of light to fall perpendicularly on the ground beneath the flame. Samuel Parker, Jr. (1822), made the important improvement of fixing French chimneys upon burners by means of metal supports affixed to the turning adjuster of the lampwick. J. C. Hadlan and J. Johnston (1838) invented an ingenious candle-lamp with a spring, the candle being made without a wick, the wick being in a short tube above, up to which the candle rose as it melted. Robert Rettie entered (1840) an improved method of signaling on sea or land with colored glass lamps, shades, and reflectors, also an excellent arrangement of reflectors for lighthouses. W. C. Wilkins (1846) devised a number of inventions connected with raising oil by atmospheric pressure, with gas-burners and heating gas. Robert Hesketh (1852) claimed the invention of the combination reflector, also that of glass in corrugated sections, every alternate face being silvered. Edwin Whale (1852) invented candle-lamps which did not require snuffing, and candle-clocks. Abel Easton (1853) patented a self-generating gas-lamp, the gas being made from spirits of wine. Edward Maneire (1854) patented lamps in which the oil-reservoir was raised above the surface of the burner, and so placed that its inner surface acted as a reflector. Ed. Simons (1855) invented an apparatus for condensing and absorbing the smoke, etc. arising from gas and other flames, and increasing the light. Theodule Cavé (1856) suggested a "continual lamp" to burn twenty-four hours without requiring attention, by means of a plunger and elastic India-rubber tube. John Macdonald (1856) presented improvements for regulating the supply of oil to lamps, or of liquids of any kind for any useful purposes, by means of air-tubes and valves. Charles E. Heinke (1856) contrived an improved apparatus for illuminating objects beneath the surface of the water, or lighting mines where explosive gases exist. This was another form of safety-lamp, originally invented by Dr. Clanny of Sunderland in 1813, and perfected by Humphry Davy and George Stephenson in 1815, the former receiving all the credit of the invention. A much better lamp of the same kind was patented by J. Roberts and George Upton (1827). A. V. Newton (1859) made an improved construction of lamp for burning hydrocarbons without the aid of the usual glass chimney. M. A. F. Mennous (1859) invented a very curious apparatus for the distribution of heat as evolved by lamps, and the application of it to heating and cooking. A. V. Newton (1860) suggested an improved lamp for burning hydrocarbons without a chimney; and again, in the same year, for smokeless lamps, the principle being that of a blower supplying enough oxygen to cause complete combustion. H. R. Fanshawe (1862) patented a submerged light, or reflectors for the purpose of alluring fish. Solomon and A. J. Grant (1864) invented several improvements in lamps for burning magnesium and other metallic substances, the wire being fed by clockwork. W. Ryder (1864) suggested burning paraffin, etc. in lamps by means of an inconsumable *metalikos* wick or burner—i. e. a wick of glass fibres in metal tubes. E. J. C. Welch (1865) offered an improved clockwork apparatus for supplying with a regular pressure air to burners of hydrocarbons. W. B. Dalston (1865) improved an atmospheric-pressure lamp for burning hydrocarbons, in which the oil was consumed in the form of gas. The apparatus comprised an air-pump, a cup of alcohol, tubes, a copper coil or cylinder, and a regulator. C. Rahn (1865) invented an improvement for concentrating light, applicable to dental and other operations, by means of a combination of lenses. Giacomo Felice Marchisio (1865) recorded improvements in apparatus for obtaining light without danger of explosion, by the use of air which has been rendered inflammable by admixture with the vapors of petroleum and other hydrocarbons. The apparatus consisted of a mechanical motor, a circular chamber and drum in compartments, with openings for the inlet and outlet of air, the chamber being half filled with air, upon which the hydrocarbon floats. The count De Fontaine Moreau (1865) invented an illuminating apparatus for burning petroleum in the open air without the use of a chimney. Count de Moreau also suggested a number of improvements in the Carcel or moderator lamps for burning mineral oils. Though elaborate and complicated, his inventions are ingenious and suggestive. C. T. Müller also made improvements for burning hydrocarbons and turpentine, by which atmospheric air was mingled with the gas. It may be remarked that the difficulty of distinguishing between inventions relative to lamps and

those referring to general illumination does not appear before so recent a period as 1865, when the introduction of petroleum into England greatly stimulated studies in all practical methods of generating light. Thus, the apparatus of William Clark (1865) for lighting and heating, by combining air and gas from hydrocarbons by means of a simple reservoir and tubes, with diaphragms of wire-gauze to prevent explosion, is as applicable to gasworks or cooking as to a hand-lamp. H. A. Bonneville (1865) invented a safety-lamp in which the flame must be extinguished before the gauze cylinder can be removed. J. Maublanc (1865) attempted what has since been perfected by J. Aronson—a kerosene lamp which can be lighted without removing the shade. The force of the old Hindoo proverb, that "it is always dark under the lamp," was attempted to be removed in the same year by Levi Hewitt, who invented a contrivance to remedy the inconvenience caused by the extensive shadow cast under ordinary illuminators, by means of horizontal burners of paraffin. D. Gallafent (1856) attempted to adapt the Argand principle to paraffin. Louis Pebyre (1865) suggested an improved apparatus for burning hydrocarbon oils in the open air without a chimney. It consisted of a cap and two wick-tubes, the former having two air-holes in its top or sides, with an opening below, putting it in communication with the oil-vessel, the wick-tubes extending above and below the cap. Eliz. Leichenstadt (1866) patented an ingenious lamp for the purpose of burning a mixture of crude benzole, camphor, and aconite root. Alexandre Magnin (1866) offered an improved lamp containing in a reservoir a sponge filled with petroleum, in which was a tube of wire-gauze through which a wick passed. This wick absorbed only the vapor of the petroleum, forming a gas-lamp. William James Current (1866) invented a system of telegraphing with colored lights, and devised a lamp for the purpose. Charles Brown (1866) offered a very valuable invention for consuming smoke from lamps. Edward Howard (1866) attempted to make a non-explosive lamp for all kinds of highly inflammable oils. The principle was ingenious, but the application was imperfect. (See PETROLEUM.)

The chief improvements in lamps of late years have been, with few exceptions, modifications of the foregoing. It is remarkable that the first specific invention of the kind ever made, that of Hero of Alexandria, in which the oil was raised by water, involves the pressure principle since developed as the *moderator* in nearly a hundred forms, the last of which is that of Joseph N. Aronson, applied to burning kerosene and other inflammable fluids, though it may be used for any oils. In this the reservoir and tube for oil are accompanied by another containing water, their connection being such that by the least deflection of the lamp from the perpendicular, the oil supply is cut off near the burning point. While burning, this lamp may be rolled on the ground, upset, or reversed for any time, without danger. Its blaze is remarkably steady and clear, and from the great simplicity of its principle the lamp is not likely to get out of order. The gas-sunlight apparatus of R. G. Berford is intended to concentrate light for work or reading. It consists of a hemispherical cup made of glass, filled with water, and placed beneath a horizontal burner. It is especially adapted for reading, engraving, writing, or sewing. The lamp-burner of J. Aronson (1875) is a simple but effective invention by which a lamp may be lighted, trimmed, or filled even in the dark, without removing the chimney, globe, or shade, the latter remaining stationary. Capt. Doty, an American, has invented a lamp for light-houses, signals, etc., which has been extensively adopted in France. The most important recent inventions in lamps are chiefly American. CHARLES G. LELAND.

**Lampasas**, county of Central Texas. Area, 835 square miles. It is mostly rolling prairie, with some hills and fertile wooded valleys. It is bounded on the W. by the Colorado River. Live-stock and grain are staple products. The county abounds in mineral springs. Cap. Lampasas. Pop. 1344.

**Lampasas**, post-v., cap. of Lampasas co., Tex. It has 1 weekly newspaper.

**Lampblack**. This term is applied technically to carbonaceous pulverulent matters deposited during the imperfect fuliginous combustion of carburetted gases or vapors, in the presence of inadequate supply of air or oxygen. The quality, both as regards fineness and color, for use in pigments, blacking, and printing inks, varies greatly with the materials burned in the manufacture and with the methods employed. For the cheaper commercial qualities the materials employed are *gas-tar*, *wood-tar*, *petroleum*, soft resinous woods like *pine*, *pitch*, *rosin*, and even *bituminous coals*. In making ordinary lampblack several qualities are obtained at the same time in the same apparatus, by means of the following arrangement, which is here de-



scribed in but a general way: The fireplace is connected with the soot-chambers by means of a brickwork gallery or horizontal flue at least 14 feet long, in which inferior tarry material deposits. A series of chambers or condensers then usually follows, in which the successive deposits increase in fineness and value successively. The last chamber has suspended over it a loose conical hood, of coarse woollen material, through which the draught percolates, and which of course collects the finest black of all. As the pores of this hood become clogged it is shaken or tapped. Its contents are reserved for fine printer's ink and similar uses.

For special uses lampblacks of special kinds are sometimes prepared from costly oils and resinous substances, for which extravagant prices are required. For instance, it is said that the finest *genoum* India inks are made of soot obtained by burning the costly material *camphor*. It would appear as if the very finest blacks ought to be now made very cheaply by proper manipulation of our cheap American mineral oils. It is also stated that the natural gas of the gas wells in different sections of the U. S. may be converted into fine qualities of lampblack on a large scale.

Lampblack in crude form always contains some oily, tarry, or resinous matters, and sometimes, according to Reichenbach, a little naphthalene. Braconnot found in lampblack from resinous wood—

Carbon .....	79.1
Moisture .....	8.0
Resin .....	5.3
Tar .....	1.7
Uphine .....	0.5
Sulphate of ammonia .....	3.3

with some other small impurities. When printer's inks or oil colors are to be prepared, these impurities are immaterial, but when water-colors are wanted, as when to be ground with gum-water to make imitation India inks, etc., the resinous and tarry matters must be removed beforehand. This may be done by careful calcination, but not without detriment to the quality of the finer blacks. A better way, therefore, is to work into a paste with heated oil of vitriol, which chars and destroys the hydrocarbonaceous matters. Thorough washing with water yields then a very superior material for India ink. HENRY WURTZ.

**Lamperti'co** (FEDILE), b. at Vicenza in 1833, of a wealthy commercial family; received his earliest instruction from his mother, a lady of intelligence and of a strong will; pursued his classical studies as a day pupil in the seminary of Vicenza; his other studies preparatory to a legal course were prosecuted at home. At this time he formed relations with Pasini, Messedaglia, and Luzzati. In 1854 he published an article on the advantages which economical science may derive from poetry. In 1859 the Institute of Venice honored with a prize his memoir *Sulle conseguenze del taglio dell' Istmo di Suez*. His other principal works are a memoir *Della Vita e delle Dottrine di Gian Maria Ortes*; *Sulla Statistica Teorica in generale e su Melchiorre Gioia in particolare*; *Studi sulla Legislazione Minervaria*; *Introduzione ad un corso di Scienza Economica*; *Il Lavoro*. Since his twenty-first year he has continued to occupy positions of the highest trust in his native town. In 1866 he was elected deputy to Parliament, was re-elected in 1867, and was named to the senate by the minister Minghetti when he had scarcely attained to the required age.

**Lamporec'chio**, town of Italy, in the province of Florence. It contains a remarkable work of Luca della Robbia, and is known as the birthplace of Berni, the author of *Olando Innamorato*. Pop. 8293.

**Lamp'rey**, or **Lamper Eel**, the common name of the Petromyzontide, cartilaginous fishes of the group Hyperoartia, class Marsipobranchii, having an eel-like body, a round sucking mouth with numerous teeth, and having seven round gill holes on each side of the neck. Europe has two abundant species, the *Petromyzon marinus* and *Lamprocyba fluviatilis*; the U. S. have a number of species, among which are *P. Americanus*, very nearly related to the *P. marinus*, and species of *Lamprocyba* and nearly allied genera. They are prized as food by some. The lampreys are represented in Australia by the pouched lamprey (*Geotria australis*), which has an enormous pouch upon the throat. (See PETROMYZONTIDÆ.) THEODORE GILL.

**Lamprid'ide** [from *Lampreia*, the type of the family, and *-ida*], a family of acanthopteron teleostcephalus fishes of the mackerel group, characterized by the much compressed body, small deciduous scales, small mouth, absence of teeth in adults, six branchiostegial rays, long undivided dorsals, multiradiate thoracic ventral fins, numerous pyloric caeca, and large posteriorly bifurcate air bladder. A single genus *Lampridius* is known, whose representatives (probably belonging to but one species, the *Ojich* or *L. luna*) are found in the northern Atlantic and Mediterranean. The *L. luna* has been recorded as an inhabitant of the eastern American coast, but is doubtless a mere straggler. THEODORE GILL.

**Lamprid'ius** (ÆLIUS), one of the *Scriptores Historie Auguste*, lived at the time of Constantine the Great. Four biographies are inscribed with his name—namely, those of Commodus, Antoninus Diadumenus, Elagabalus, and Alexander Severus—but there is good evidence, both internal and external, for his identity with Ælius Spartianus, to whom the biographies of Hadrianus, Verus, Julianus, Severus, Pescennius Niger, and Geta are ascribed.

**Lamp'sacus** [Λάμπσακος], a Greek city on the Hellespont, in Mysia, opposite Callipolis, was anciently called *Pityusa*, and was famous for its wine and its phallic-worship. Near its site stands the village of Lamsaki.

**Lamp'-shell**, a name applied in a large sense to all the BRACHIOPODA (which see), but especially to those of the family TEREBRATULIDÆ (which see). The valves are united, and the pedicle for attachment passes out through a foramen of the projecting one, as the wick passed out of an ancient lamp; hence the name. Shells of several species of mollusks are also used as lamps (as the *Fusus antiquus* in Shetland). THEODORE GILL.

**Lamp'son** (SIR CURTIS MIRANDA, BART., b. in Vermont Sept. 21, 1806; went in 1830 to England, where he was naturalized in 1848; became a wealthy merchant of London, a Hudson's Bay director, a trustee of the Peabody fund, and rendered important services in laying the Atlantic cable, for which in 1866 he was made a baronet. He is deputy governor of the Hudson's Bay Company.

**Lamps, Safety.** See SAFETY LAMPS, by MRS. S. B. HERDICK.

**Lan'ark**, town of Scotland, the capital of the county of Lanarkshire. The beautiful scenery in its vicinity attracts many tourists. Pop. 5099.

**Lanark**, county of Ontario, Canada. Area, 1180 square miles. It is traversed by the Ottawa and St. Lawrence Railway. It abounds in lakes and streams. There are two ridings. Cap. Perth. Pop. 33,020.

**Lanark**, post-v. of Rock Creek tp., Carroll co., Ill., 21 miles S. W. of Freeport, on the Western Union R. R., has 1 national bank, 1 weekly newspaper, 6 churches, 2 hotels, several warehouses and elevators, 24 stores, and a flouring-mill. Pop. 972. J. R. HOWLETT, Ed. "GAZETTE."

**Lanark**, tp. of Portage co., Wis. Pop. 471.

**Lan'arkshire**, or **Clydesdale**, county of Scotland, comprising the upper basin of the Clyde, between Edinburghshire on the E. and Ayr and Renfrew on the W. Area, 889 square miles, of which only one-half is under cultivation. Pop. 763,279. Along the Clyde the surface is level and well adapted to agriculture, but the southern part is mountainous and the soil sterile. It is rich, however, in coal, iron, and lead—richer perhaps than any other region in Great Britain; 150 collieries and 13 iron-works are worked, and 90 furnaces in blast. Almost every kind of manufacture is carried on in or about GLASGOW (which see).

**Lanc'ashire**, or **Lancastershire**, county of England, bordering on the Irish Sea. Area, 1905 square miles. Pop. 2,818,904. The northern and western parts are covered with ranges of hills which separate Lancashire from the county of York, and of which the highest point, Conistone Fell, is 2577 feet. The rest is low and level, consisting of a sandy loam, watered by the Lune, Wyre, Mersey, and Irwell, and generally fertile. Manufactures, however, and not agriculture, are the chief interest of Lancashire, and its manufactures depend mainly on its immense coal-beds, covering nearly 400 square miles. Although almost everything is manufactured in or around Manchester, Liverpool, Hamilton, and Preston, yet cotton goods form the principal item, and in 1860 no less than 315,630 persons were engaged in this branch of industry, consuming 2,392,000 bales of cotton and producing goods to the value of £80,000,000.

**Lanc'aster**, county of S. E. Nebraska. Area, 864 square miles. It has a highly fertile soil, productive of grain. The county contains several salt-basins which yield considerable salt. There are also quarries of fine building-stone. The county is traversed by Salt Creek, whose waters are brackish, and by the various railroads centering at Lincoln, the capital of the county and State. Pop. 7074.

**Lancaster**, county of S. E. Pennsylvania. Area, 920 square miles. It is a beautiful region, diversified with low hills, and is one of the most fertile districts in the world. Live-stock, tobacco, grain, hay, and dairy produce are the principal staples. The manufactures are very important, and include flour, carriages, tobacco, clothing, saddlery, furniture, metallic wares, cooperage, leather, iron, lumber, agricultural implements, and many other kinds of



goods. The county is traversed by the Reading and Columbia and the Pennsylvania R. Rs. and their branches. The county has much water-power, an abundance of micaceous roofing-slate and blue-limestone, and some marble. Cap. Lancaster. Pop. 121,340.

**Lancaster**, county of South Carolina, bounded on the N. by North Carolina and on the W. by Wateree River. Area, 600 square miles. It is uneven in surface and generally fertile. Corn and cotton are staple crops. Cap. Lancaster Court-house. Pop. 12,087.

**Lancaster**, county of Virginia, bounded S. E. by Chesapeake Bay and S. W. by the navigable Rappahannock River. It is level and naturally fertile. Corn and wheat are staple products. Area, 108 square miles. Cap. Lancaster Court-house. Pop. 5355.

**Lancaster**, town of England, the capital of Lancashire, on the Lune, near its mouth. It is a neatly-built town, with an old castle, a fine aqueduct, which carries the Lancaster Canal across the Lune, and manufactures of furniture, leather, and cast-iron work. Pop. 17,248.

**Lancaster**, post-v. and tp. of Cass co., Ill., on the Springfield and Illinois South-eastern R. R. (Philadelphia Station). Pop. 1239.

**Lancaster**, tp. of Stephenson co., Ill. Pop. 986.

**Lancaster**, tp. of Huntington co., Ind. Pop. 1492.

**Lancaster**, post-v. and tp. of Jefferson co., Ind. The township is traversed by the Madison and Indianapolis R. R. (Bright's Station). Pop. 1442.

**Lancaster**, tp. of Wells co., Ind. Pop. 1381.

**Lancaster**, post-v. and tp. of Keokuk co., Ia. Pop. of v. 135; of tp. 1325.

**Lancaster**, post-v. and tp. of Atchison co., Kan. Pop. 909.

**Lancaster**, post-v., cap. of Garrard co., Ky., 112 miles S. E. of Louisville, on the Louisville Nashville and Great Southern R. R. (Richmond branch), has 6 churches, 3 hotels, 1 weekly newspaper, 1 national and 1 deposit bank, 2 high schools, a planing-mill, a tobacco-factory, a wheat-fan factory, 4 society lodges, and about 70 business-firms. There is a company of U. S. troops in garrison. Lancaster is in the "Blue-grass region," and is noted for its fine corn and wheat. Pop. 741.

JOS. B. RUCKER, ED. "CENTRAL KENTUCKY NEWS."

**Lancaster**, a thriving and beautiful town of Worcester co., Mass., on the Worcester and Nashua R. R., 19 miles N. by E. of Worcester. It has a fine memorial hall, a public library, a national and a savings bank, and is the seat of the State industrial school for girls. Its streets are shaded by noble elms. It is the oldest town in the county, and was incorporated in 1653. Pop. 1845.

**Lancaster**, post-v. of Liberty tp., cap. of Schuyler co., Mo., on the Missouri Iowa and Nebraska R. R., 2 miles E. of the St. Louis Kansas City and Northern R. R., 226 miles N. W. of St. Louis, has county buildings, 3 hotels, 2 churches, 1 national bank, 1 weekly newspaper, a fine seminary building, and a number of stores and shops. There is abundance of coal in the vicinity. Principal industry, farming and dairying. Pop. 427.

HENRY A. MILLER, ED. "EXCELSIOR."

**Lancaster**, post-tp., cap. of Coos co., N. H., 137 miles N. of Concord, on the Boston Concord and Montreal R. R., has 5 churches, 2 weekly newspapers, an academy, a savings bank, a paper-mill, a foundry, 50 stores and shops. Pop. 2248. W. F. WILLIAMS, ED. "COOS REPUBLICAN."

**Lancaster**, post-v. and tp. of Erie co., N. Y., on the New York Central and the Erie R. Rs., 10 miles E. of Buffalo. It has 6 churches, a number of manufactories, and a bank. Pop. 1697. The township contains several other villages, and has a pop. of 4336.

**Lancaster**, city of Hocking tp., cap. of Fairfield co., O., on the Hocking River, at the intersection of the Cincinnati and Zanesville with the Hocking Valley R. R., 21 miles N. E. of Circleville and 30 S. E. of Columbus. It has 10 churches, 1 private and 2 national banks, a magnificent court-house (cost \$150,000), 2 weekly newspapers, several foundries, flouring mills, and manufactories, 2 new public-school buildings (cost \$30,000 each), a good city hall, and several wine-cellars, one of which will hold 40,000 gallons. The State reform farm for boys is located near by, and maintains 400 boys. There are few cities in the U. S. more beautifully situated than Lancaster. Pop. 4725.

T. WETZLER, ED. "EAGLE."

**Lancaster**, tp. of Butler co., Pa. (P. O. Middle Lancaster). Pop. 1053.

**Lancaster**, city and tp., cap. of Lancaster co., Pa., on the Pennsylvania R. R., 63 miles W. of Philadelphia, was in

1818, when William Cobbett visited it, the largest "inland" town in the U. S. It is located in the centre of the largest and most productive limestone region in the State, if not in the U. S. It was at one time the capital of Pennsylvania, and when the British troops occupied Philadelphia the Continental Congress met here. It is laid out regularly, the streets crossing each other at right angles; the principal streets are macadamized, and the houses almost invariably of brick. There are 14 macadamized roads leading to the city. The city is lighted with gas, has a neat theatre, 3 daily and 7 weekly (2 German) newspapers, and 7 monthly publications, fine free schools, and free night schools during the winter months, 33 churches and chapels, 4 handsome cemeteries, a volunteer fire department with 7 steam-engines, 3 national banks with a capital of over \$1,000,000, 5 other banks, waterworks on a vast scale, extensive foundries, and iron manufactures of the most varied kind. There is invested here in the manufacture of cotton goods over \$1,500,000, employing 1700 hands and paying to them annually \$450,000 in wages. It is the centre of a large seed-leaf tobacco business, nearly 20,000,000 cigars being annually manufactured. At least 25,000 barrels of lager beer are brewed here annually, most of which finds its market elsewhere. Lancaster has a court-house erected in 1853 at a cost of \$160,000, a hospital, almshouse, and prison, all of approved modern construction, and a home for friendless children. It is the seat of Franklin and Marshall College and Theological Seminary, under the control of the German Reformed Church, and was the residence and place of burial of Pres. James Buchanan and of Thaddeus Stevens. Pop. of city, 20,233; of tp. 1062.

JOHN A. HIESTAND, ED. "DAILY EXAMINER."

**Lancaster**, post-v., cap. of Lancaster co., S. C., 28 miles E. of Chester, has 3 churches, 1 weekly newspaper, a high school, a hotel, and several stores and shops. Principal industry, farming. Pop. 591.

D. J. CARTER, ED. "LEDGER."

**Lancaster**, post-v. of Dallas co., Tex., has some manufactures.

**Lancaster**, post-tp., cap. of Grant co., Wis., 25 miles N. W. of Galena, Ill., and 20 miles N. of Dubuque, Ia., is a thriving inland town, located in the midst of a rich agricultural and lead-ore region. It has 1 bank, 2 weekly newspapers, 6 churches, 4 hotels, a large woollen-mill, and a sash and door factory. Pop. 2716.

JOHN COVER, ED. "GRANT CO. HERALD."

**Lancaster**, DUCHY and COUNTY PALATINE OF, a territorial division of England nearly corresponding to the county of Lancashire, but distinguished from it in law as a separate administrative entity. It derives its origin from a royal charter of Edward III., by which it was conferred upon Henry, earl of Derby, Mar. 6, 1351, and on his death in 1362 it was granted to John of Gaunt and his heirs for ever; received a grant of a chancery and palatine privileges in 1377; became a Crown possession on the accession of Henry IV. to the throne in 1399, at which time the order of succession to the duchy was declared to be independent of the succession of the Crown, so that should the house of Lancaster lose the latter, it might still retain the former. This expectation was not met, for on the accession of the house of York in 1461, Edward IV. confiscated it to the Crown, and in turn attempted to make it a private appanage of his descendants. The result has been that down to the present time the government of the duchy has been vested in the sovereign, not as king of England, but as duke of Lancaster. The county palatine is a portion of the duchy, and is governed by a separate court, presided over by a chancellor, who is usually also chancellor of the duchy, an officer who of late years has been a member of the cabinet. The duchy court is held at Westminster.

**Lancaster** (Sir JAMES), b. in England about 1550; commanded two naval expeditions to the East Indies in 1591 and 1601, which opened trade with Ceylon, Sumatra, Java, and other islands, and was largely concerned in promoting the search after a N. W. passage to Asia. Lancaster Sound was named from him. D. in 1620.

**Lancaster** (JOSEPH), b. in London Nov., 1778, opened a school for children in Southwark in 1798 on the principle of mutual instruction, and having achieved a brilliant success, numerous schools on the same plan were speedily established by him in other cities, and he devoted himself to the popularization of his method. He came to the U. S. in 1818, where he had some success, and obtained from the legislature of Canada a grant for the purpose of establishing his system of instruction. He was a Quaker. D. in New York Oct. 24, 1838. His family removed to Mexico, where several of his grandchildren, under the name of Lancaster-Jones, have figured in politics, and where his system is now (1875) in full operation, supported by legis-

lative grants under the management of a national Lancasterian society. The same system has also been largely adopted in Colombia and other parts of South America.

**Lancaster Court-house**, post-v., cap. of Lancaster co., Va., 60 miles E. by N. of Richmond.

**Lancaster Gun**, a system of artillery devised by Mr. Lancaster, an Englishman. The gun had a twisted elliptical bore and an elongated elliptical shot, but no grooves. The plan has not been adopted to any extent.

**Lancaster, House of**. See ENGLAND, JOHN OF GAUNT, HENRY IV., etc.

**Lancaster Sound** leads from Baffin's Bay to Barrow Strait, between the island of North Devon on its northern side and several minor islands on its southern. It is 200 miles long, forms the entrance to the N. W. passage, and was discovered in 1616 by Baffin.

**Lancelet**. See AMPHIOXUS and LEPTOCARDIA.

**Lancelot** (CLAUDE), b. in Paris in 1615; was educated under the influence of the Abbé de Saint Cyran, who brought him into connection with the religious association of Port Royal, in Paris. In the schools of this association he taught mathematics and Greek, and wrote for the use of his pupils a *Grammaire grecque* (1660), *Le Jardin des Rameaux Grecques*, a Greek dictionary (1667), *Nouvelle méthode pour apprendre la langue grecque*, a Greek grammar (1655), and several other works. After the suspension of the school in 1660, he was tutor to the princes of Conti till 1672, when he retired first to St. Cyran, and then to Quimperlé, where he spent his time in prayers, meditations, and penitence, and d. Apr. 15, 1695. He was neither a great philologist nor a great grammarian, though his books are remarkable for clearness and precision; but he was a great pedagogue. His method of instruction and education was in strong opposition to the barbarous pedantry of the Middle Ages, and exercised great influence on the method adopted by the eighteenth century.

**Lancers**, a name given to such cavalry regiments as are armed with lances. The Cossacks, the Polish lancers, and the Uhlan (lancer) regiments of various armies are among the most celebrated corps of cavalry. Most of them carry a lance or spear of ash, eight, ten, or sixteen feet long, armed with a steel point and decorated with a pennon. The 5th, 9th, 12th, 16th, and 17th British light cavalry are lancers. There is a wide difference of opinion among military critics as to the value of the lance in the warfare of the present day.

**Lancet Window**, in Gothic architecture, is a narrow window with a sharply pointed head. Lancet windows generally appear in groups. The lancet window is one of the characteristic marks of the Early English or First Pointed Style and the French Ogivale Primitif; hence these are often called the Lancet styles of Gothic building.

**Lance-wood**, the wood of *Quercus virgata* and *laurifolia*, used (especially the former) for the shafts of carriages. The tree is tall and very straight. It is of the order Anonaceae, and grows in the West Indies.

**Lancia'no** [Lat. *Anagnin*], town of S. Italy. This is one of the most beautiful towns in the Abruzzi. It has many fine public buildings, among which the cathedral should be first named. This church, "Our Lady of the Bridge," stands high above the river-valley on grand and lofty Roman bridges of the time of Diocletian, and from some points of view seems to be suspended in the air rather than resting on the earth. Its architecture, both external and internal, is striking. Lancia'no is in railway communication with Ancona and with Naples, and good common roads connect it with the neighboring towns. It manufactures linen on a large scale; also silk, wool, and various chemical products. Pop. in 1874, 17,310.

**Land**. See REAL PROPERTY.

**Landaff**, post tp. of Grafton co., N. H., 85 miles N. N. W. of Concord. It has extensive manufactures of starch, lumber, etc. Pop. 882.

**Land'au**, town of Rhenish Bavaria, on the river Queich. It was from olden times a fortress. In the Thirty Years' war it was taken eight times. It is still a fortress, and has considerable tobacco manufactures. Pop. 12,305, besides a garrison of more than 6000 persons. In 1684 it was fortified by Vauban, and was supposed to have been made impregnable, but in 1702 Louis of Baden took it.

**Land'-crab**, a name applied to a rather large number of crabs, remarkable as being gilled animals, which in the perfect state are air-breathers. One of the best known species of the U. S. is the *Gelasimus vocans* or fiddler. (See CRAB.)

**Land'enburg**, post-v. of New Garden tp., Chester co.,

Pa., on the Wilmington and Western R. R., 20 miles N. W. of Wilmington.

**Land'er**, county of Nevada, bounded N. by Oregon and Idaho. Its surface is broken by numerous N. and S. mountain-ranges and valleys. Some of the latter are fertile, and are especially adapted to stock-growing. The county is traversed by Humboldt River and the Central Pacific R. R. Silver and lead are mined and smelted, and some gold is obtained in the N. Cap. Austin. Pop. 2815.

**Lander** (Gen. FREDERIC WEST), b. at Salem, Mass., Dec. 17, 1822; studied at the Military Academy at Norwich, Vt., and conducted two perilous surveys for a railroad to the Pacific, being the only survivor of the second expedition. In May, 1861, he was appointed a brigadier-general; distinguished himself for daring in the Virginian campaigns, and d. of congestion on the brain at Paw Paw, Va., Mar. 2, 1862. His wife, JEAN MARGARET DAVENPORT, b. in Wolverhampton, Eng., May 3, 1829, was a distinguished actress previous to her marriage in 1860; acted as a hospital nurse during the war; and in 1865 returned to the stage.

**Lander** (LOUISA), b. at Salem, Mass., about 1835, early manifested her genius for sculpture by modelling likenesses of members of her family and executing cameo heads; went to Rome in 1855; became a pupil of Crawford, and soon after finished in marble her two earliest statues, *To-Day* and *Galatea*, which obtained her considerable celebrity. Among her later works are busts of Hawthorne and Gov. Gore of Massachusetts, statuettes of *Virginia Dare* and *Undine*, a life-size statue of *Virginia*, a reclining statue of *Evangeline*, *Elizabeth*, the *Ecstasy of St. John*, a statuette of *Ceres mourning for Proserpine*, *A Sylph Alighting*, and several portrait busts.

**Lander** (RICHARD), b. in Truro, England, in 1804; accompanied Capt. Clapperton on his second African expedition, and published the narrative from Clapperton's papers (1829-30). In 1830 he and his brother John made a successful expedition, descending the Niger to its mouth. In 1832 he returned to the upper Niger in two steam-vessels, on a commercial expedition, was mortally wounded in a conflict with the natives, and d. at Fernando Po Feb., 1834.

**Landernau'**, town of France, 14 miles E. of Brest, in the department of Finistère. It manufactures good leather and paper, has a considerable trade in wine and iron, a good harbor, a fine Gothic church, and extensive marine barracks. Pop. 7893.

**Landersville**, post-v. and tp. of Lawrence co., Ala. Pop. 631.

**Landes**, department of France, bounded N. by the Gironde, S. by the Basses-Pyrénées, and W. by the Bay of Biscay. Area, 3590 square miles, with 300,528 inhabitants. The eastern and southern parts are hilly and fertile, and well adapted for agriculture; much and excellent wine is produced. But the western part, bordering on the ocean, consists only of desolate tracts (*landes*) of sandbanks, marshes, and swamps, covered with heath and dwarf shrubs, and inhabited by a few scattered families, whose members stalk along on stilts in the sand, herding their sheep and swine. On the downs are planted forests of pine and cork trees, and these plantations afford some resources to the inhabitants in cork-cutting and charcoal-burning. In 1861, out of 38,005 children, 18,590 received no school information at all. Cap. Mont de Marsan.

**Land'grove**, post-tp. of Bennington co., Vt., 12 miles N. E. of Manchester. It has manufactures of lumber and charcoal. Pop. 502.

**Land'is**, tp. of Cumberland co., N. J. It contains the town of VINELAND (which see). Pop. 7079.

**Land'isburg**, post-b. of Tyrone tp., Perry co., Pa. Pop. 569.

**Land'isville**, post-v. of E. Hempfield tp., Lancaster co., Pa., 12 miles N. W. of Lancaster, at the crossing of the Reading and Columbia and the Pennsylvania R. R.

**Landit'**, a celebrated historical *foire*, or fair and market, which was the type of those of the same kind so numerous in the Middle Ages, and which are now continued in France only by the famous *foires* of Beaucuire and the ham and gingerbread fairs held in Paris during the weeks preceding and following Easter. The name *landit* is a corruption of *Landis*, Monday. In the Landit fair opened both in Paris and in St. Denis on the first Monday after the 11th of June, St. Barnabas's Day. The tables and benches of the Middle Ages are filled with allusions to the Landit, which lasted for one week, and which was much frequented by the university students. It was both a festival, a kind of French kermesse, and a market. It is said that Charlemagne instituted the Landit, which was solemnly opened every year by a procession in which attended the bishop



of Paris, with the rector of the university, all the priests and officials, and the students. The Revolution put an end to the Landit, and now it is no more than an ordinary market for sheep, which are allowed to be brought to St. Denis and sold there between the 11th and 19th of June of each year.

FÉLIX AUCAIGNE.

**Landivar** (RAFAEL), b. in Guatemala Oct. 27, 1791; graduated at the university of that city; entered the order of Jesuits in 1750 in Mexico, and rose to be the head of the seminary of San Borja. Expelled as a Jesuit on the suppression of that order in Spain and America (1767), he passed his remaining years at Bologna, Italy, and acquired distinction by his elegant Latin poetry, descriptive of tropical life in America. Besides miscellaneous verses, he published in 1782 *Rositiato Mexicano*, in fifteen cantos, in which he describes the lakes of Mexico, the volcanoes, the mines of gold and silver, the wild animals, birds, and plants of New Spain, upon the model of Virgil's *Georgics*. D. at Bologna Sept. 27, 1793.

**Landlord and Tenant in Law.** This phrase is used to express a relation between the owner of land and one to whom he transfers it for such a period or in such a manner as to leave an interest still remaining in himself, technically called a reversion. The more common mode of transfer is to create an estate in the land for a fixed period, called an estate for years. It is not necessary that the time should be measured by years, the leading thought being that the time for the commencement and the termination of the estate is certain. Thus, an estate for a month, or even for a day, is of the same grade as one for a thousand years, unless there is some statute to the contrary. The common law makes a principal division of estates into those of freehold and less than freehold. An estate for years belongs to the latter class, and is thus inferior in dignity to an estate for life, which is a freehold. An estate for years is ranked as a chattel, no matter how long it may last. Partaking to some extent of the nature of land, it is called a chattel real. The reason of this rule is of a historical nature. When these interests were first introduced into the law, they belonged to the sphere of contracts. They were granted to husbandmen, whose only remedy in case of a violation of right was derived from the law of contracts. The right itself was of a personal nature. Although a tenant for years is now regarded as having an estate in the land, it partakes to some extent of its original character. Accordingly, if an owner of it dies, his unexpired interest does not descend to his heirs as land, but passes to his administrators or executors as a chattel. An owner of such an interest is said to have a *term* for years. The word "term" is here used to point out the fact that the estate has a fixed and definite termination. A distinction is thus drawn between the meaning of the words "term" and "time." Thus, if one should grant an estate for three years to A, and at the end of his term to B, the estate of the latter would begin whenever A's interest might terminate, whether by surrender of his estate or by lapse of time. If, on the other hand, the word "time" had been used, B's estate could not commence in possession until three years had actually elapsed.

An estate for years usually commences by means of an instrument called a *lease*. The person making it is called a *lessor*, and the person receiving it is termed a *lessee*. It frequently becomes important to distinguish between a lease and an agreement for a lease. One of these creates an estate, and is "executed" in its nature; the other confers a right to an estate, and is "executory." The rights and remedies in the two cases are quite different. In the case of a strict lease, the lessee may insist on possession when the proper time arrives, and to that end, if possession be refused, may bring an action of ejectment; in the case of an agreement for lease, his regular remedy would be to bring an action in a court of equity to obtain a lease, and subsequently he might, by means of the lease thus obtained, acquire the possession. To which class any particular instrument belongs depends mainly upon the intention of the parties as derived from the terms of the contract. Entry by the lessee is an essential element in constituting an estate for years. A distinction is thus taken between the strict estate and an *interesse termini* (or a mere interest in a term). This phrase is applied in two ways. Its first signification has reference to the interval between the execution of the lease and the time fixed for the estate to commence. Thus, if a lease were executed in February, and the estate was to commence in possession on May 1st, during the intervening period the lessee would have an "interesse termini." This expression also applies to the case where the time for taking possession has arrived, and yet there has been no entry. The lessee cannot avoid responsibility by refusing to enter, though the remedies of the lessor would not be the same as if an entry had taken place. Nice distinctions, which need not here be discussed,

are derived from the doctrines of *interesse termini*. One important difference between the first form of it and that of an actual lease may be noted. If a lessee has actually taken possession of a house and lot, and the house be destroyed by fire wholly without his fault, the lessee, in the absence of an agreement or of a statute to the contrary, is liable for rent. This would not be the case if he had but an *interesse termini*. When the relation of landlord and tenant has been fully constituted, there is a twofold relation, or so-called "privity," between them—privity of contract and privity of estate. Privity of contract is derived from the terms of their agreement; "privity of estate" partakes of a feudal origin, and expresses all the relations springing up between the parties from the fact that one of them has a temporary interest, and the other is the ultimate owner. This is a very important distinction, and will be again recurrd to in the course of this article. These observations are preliminary to a discussion of the main subject, which is very complicated and forms the topic of extended treatises. It will only be possible to give a cursory view of the rights and relations of the parties. The subject will be considered under the following principal divisions: I. The creation of the relation; II. Its termination or destruction; III. The respective rights and obligations of the parties; IV. Assignment and sub-letting.

I. It has been already observed that the common course is to create this relation by a written instrument. By the rules of the common law an estate for years may be created orally. The statute of frauds (see *FRAUDS, STATUTE OF*), however, applies to the case, and the estate, unless the term be short, must be created by writing. The terms of the statute vary in the different States as to the estates which may be created without writing. The general fact remains that oral leases are only allowed where the term is short. In some of the States the name of the lessor must be subscribed; in others, it may appear anywhere in the instrument. An agent may act for the lessor, but where the latter must execute a written lease the agent should have written authority, and should sign the principal's name, adding his own as agent. It is prudent, in most cases, though not usually necessary, to attach a seal to the instrument. The rules as to parties are substantially the same as in other contracts. The presumption is that an owner may lease; incapacity is the exception. The principal classes of incapacitated persons are the insane, intoxicated persons, such as are under duress, infants, and married women. The latter may in some States by statute make leases; the transactions of infants are in general voidable, rather than void, and may be ratified upon attaining majority. The same general rule applies to persons mentally unsound, who may ratify on the recovery of their reason, unless they were at the time of entering into the lease under judicial guardianship. In that case, by a technical rule, the lease is wholly void. Trustees may, acting within the scope of their trusts, make leases, and so also may corporations under like limitations. The capacity to take a lease which is clearly beneficial to a lessee may exist even where he could not be a lessor. Thus, a young child or a person bereft of reason may be presumed to accept a benefit when he could not be allowed to assume a burden. As a general rule, a lease can only be made of such an interest as a lessor may have at the time of its execution. Thus, if a person having a life estate in land should purport to lease it for twenty-one years, and should die within a few days afterwards, the lease would terminate at the moment of his death. Owing to this fact, life tenants are frequently unable to make advantageous leases. To remedy this defect it is not uncommon for one who creates a life estate to confer upon the life tenant a *power* (see *POWERS*) or authority to create a lease commencing during his tenancy, and continuing for a moderate period—viz. twenty-one years. If this power is executed, the result is, that while the life tenant lives the rent is payable to him; after his death, to the next owner (or so-called reversioner). Should his death occur during the currency of a quarter, the rent belongs as a unit to the reversioner, unless there is some clause in the instrument or a statutory provision to the contrary. Should the life tenant live till after the expiration of the lease, he may execute another under the power, etc.

Should a party having no interest whatever in land purport to make a lease of it, he would of course convey nothing. Still, should he afterwards acquire it, the instrument might operate, on the theory of an estoppel (see *ESTOPPEL*), to prevent him from setting up a title as against his lessee. This would only be where he had *no estate whatever* when he made the lease. If he had some estate, though less than what he purported to convey, the lease would pass what he had, and would spend its force. If he had, for example, an estate for ten years, and made a lease for twenty, the lease would pass the ten years, and would have no further operation.



II. *The Dissolution or Destruction of the Relation.*—The leading modes in which the relation of landlord and tenant may be broken up or dissolved are—(1) by eviction, (2) by surrender, (3) by merger, (4) by destruction of the subject-matter of the lease, (5) by forfeiture, including the act of disclaiming the relation on the part of the tenant.

(1) *Eviction.*—By this term is meant the act of depriving the tenant of the estate. It may be either by some person having a superior title, or by the landlord. A mere stranger or wrongdoer cannot legally cause an eviction. Should such a person turn the tenant out of possession, he would still be liable to pay rent. But in the case of a true eviction the tenant is discharged. An eviction may either be partial or total. The former does not necessarily discharge the tenant absolutely. He may still be liable to perform in part the obligations of the lease. Thus, if a landlord should lease two houses for a gross rent, and the tenant should be evicted from one of them by a person having a better title, rent would still be due for that portion of the premises actually enjoyed by the tenant. This rule does not apply to a partial eviction by the wrongful act of the landlord. In this case the entire rent is suspended while the eviction continues, as he is guilty of a breach of his portion of the contract. The doctrine of "constructive eviction" should be referred to. This is a modern principle, allowing the tenant, in case the landlord renders the occupation of the premises practically valueless by his own wrongful act, to abandon them, and make use of this theoretical eviction as a defence to the payment of the rent. This ground cannot be taken unless the tenant vacates the premises. The mere deterioration of the premises in value is no eviction. Accordingly, if one hires a house and lot, and the building is accidentally destroyed by fire, the tenant cannot, by the rules of the common law, leave the premises and cease to pay rent. The land still remains, and by legal theory the rent is indivisible and cannot be apportioned. So far is this doctrine extended that if the landlord insures with his own funds, the tenant cannot insist that the insurance-money be applied to rebuild the house, though he might if the premiums of insurance had been paid by himself, as he would in that case practically be the insurer. There may be a clause inserted in the lease that on the buildings becoming untenable the tenant may abandon the premises and be relieved from liability. The same result is attained in some of the States by statute modifying the common law. The rule itself is not to be extended to the case where the subject-matter of the lease has wholly ceased to exist. This is not properly a case of eviction, but rather of a want of material for the contract of the parties to operate upon. The doctrines of eviction sometimes work a hardship, as where a landlord who has failed to receive rent ejects a tenant for that reason during the currency of a quarter. He may thus lose his rent for the portion of time which has elapsed since the last rent-day. This result, however, may be avoided by the insertion of appropriate clauses in the lease.

(2) *Surrender.*—By this word is meant the act of the tenant yielding up his estate to the landlord. It requires the assent of both parties. A surrender may be made either by words or acts. When made by words, the statute of frauds as to the necessity of writing may be applicable; when made by acts, no writing will be necessary. This is called a surrender by "act and operation of law." Such a surrender will only take place where the act on which reliance is placed is inconsistent with the continuance of the tenancy. Thus, if the landlord should substitute a new tenant in the place of the former one with his consent, or should himself take possession in the same manner, a surrender might be presumed, as there would be a plain inconsistency between the new state of things and the continuance of the tenancy. However, if the landlord should merely assent in words to the tenant's leaving the premises, without taking any step on his part, there would be no surrender by means of an act of which it could be affirmed that there was an inconsistency between it and the continued enjoyment by the tenant of the premises; and if the statute of frauds were not complied with as to writing, there would be no valid surrender. The delivery and acceptance of the key have in many instances been held to be evidence from which an intent to surrender might be inferred. The effect of a surrender is to break up the relation of landlord and tenant. Accordingly, if it should take place during a quarter, no rent could be collected for that portion of it which had elapsed. This remark, of course, could not be applied to rents which had actually become due before the surrender. Nor can a surrender be held to affect the previously acquired rights of third persons. An instance of the application of this rule is found in case the tenant has made a sub-lease of which the landlord is cognizant. The landlord could not accept a surrender so as to impair the rights of the under-tenant without his consent.

(3) *Merger.*—This topic resembles that of surrender. It,

however, proceeds upon a different theory. It depends upon a rule of law founded upon public convenience, preventing a person from holding inconsistent rights and interests in the same property. In the case now under consideration it might be applied to the act of the tenant acquiring the estate of the landlord, as well as to that of the landlord in becoming owner of the lease. In either case the estate of the tenant would in general merge in that of the landlord. Another form of statement is that the prior estate merges in that which is future and reversionary in its nature where the latter is of a superior or of an equal grade. Thus, an estate for years may merge in a life estate, or even in an estate for years reversionary in its nature. The subject of merger is full of thorny distinctions, for a full account of which Mr. Preston's treatise on the subject may be consulted. It is not necessary or expedient to present them here. It may be much controlled by the intent of the parties wherever any good reason can be found for keeping the two estates distinct and separate in the same person.

(4) *Destruction of the Subject-matter.*—The rights and obligations growing out of the contract are reciprocal. They depend upon the existence of property to be leased. If that is totally destroyed, the contract is at an end. An illustration may be found in the lease of a room in a building which is totally destroyed by fire. The room having ceased to exist, the relation of landlord and tenant is terminated.

(5) *Forfeiture.*—There are various grounds on which a lease may be forfeited. They depend in general upon clauses found in the instrument of demise. Forfeiture may also be caused by a violation of the implied obligations growing out of the contract, as by disaffirming the landlord's title, and transferring the performance of the tenant's obligations to another. Spoil or destruction of the premises, termed waste (see WASTE), is also a ground of forfeiture, as being a breach of the tenant's duty. It is, however, a general rule that a mere wrongful act or breach of contract does not of itself cause a dissolution of the tenancy. It rather gives the landlord an option to uphold or to overturn the estate. Accordingly, if no affirmative steps are taken by him the estate will continue. He may also waive his right to enforce the forfeiture, either by express words or by implication. An instance of the latter is an acceptance of rent with full knowledge on his part of a breach of contract. This subject will be again referred to in connection with *Conditions*. Forfeiture when enforced terminates in eviction. It is, however, a lawful act, and the result of a right exercised under the contract, while eviction, as ordinarily understood, is either an act performed by a stranger having a superior title, without reference to the contract, or is a wrongful act on the landlord's part.

III. There are certain rights and obligations implied by law from the relations of the parties. These may be increased, modified, or diminished by special clauses in the lease. The parties may make any agreement not inconsistent with law or with the rules of public policy. It will not be possible to arrange, or even to state, the special provisions thus resorted to. They assume two general forms: they are either conditions or covenants. The main distinction between these is that the office of a condition is to enable the lessor to declare the lease forfeited; that of a covenant is to confer a right of action in case of its breach. This action will sometimes be in a court of law for damages; at other times, in a court of equity for an injunction or a specific performance of the covenant. A clause may be drawn both as a condition and a covenant, when the lessee will have his choice of remedies. The rules of law governing conditions are more strict than those which prevail concerning covenants, since a forfeiture is frequently very severe. The distinction may well be illustrated in the case of non-payment of rent. Where there is a condition in a lease entailing a forfeiture for its non-payment, it is necessary for the landlord to demand the exact rent on the day it is due at a specified hour at the front door of the house, etc., otherwise the forfeiture could not take place. If his object were simply to collect the rent by action, this precision would not be necessary. If the tenant did not pay promptly an action could at once be maintained. Another instance may be alluded to. There is frequently a condition that a lessee shall not assign without the consent of the lessor. A consent to assign to one person dispenses with the condition altogether. The doctrine of waiver is also readily applied, and the courts infer that a forfeiture is waived by any act on the landlord's part inconsistent with it, such as acceptance of rent with knowledge of the act of forfeiture.

Independent of express clauses in the lease, the law will in general impose upon the tenant the following duties: (1) to pay rent, (2) to render fealty or to be faithful to the lessor, (3) to refrain from committing acts of waste, (4) to make ordinary repairs, (5) to render up possession at



the end of the term. (1) The duty to pay rent is fairly to be implied from the enjoyment of the premises. There is usually an express covenant to this effect. Where there is none, the tenant may be liable to a reasonable amount for "use and occupation." Rent until it is due is deemed to be real estate; after it is payable, even though not paid, it becomes a debt, and is a mere right of action, and is regarded as personal property. The landlord's right to rent is of a different nature from the tenant's estate; the former is incorporeal, the latter is corporeal; the former is real estate, the latter is personal property (chattel real). (2) Fealty is a word of feudal origin, and expresses the duty of the tenant to be faithful to the landlord. The leading rule in modern law, derived from this view, is, that the tenant cannot dispute the title of the landlord. Practically, the rule amounts to this, that so long as a tenant remains in undisturbed possession he cannot set up as a defence to an action for rent by his landlord that the latter has no title. On similar principles, all encroachments made by the tenant on the land of others enure to the benefit of the landlord as between him and the tenant. In other words, the latter is not permitted to deny that he was acting for his landlord. The rule ceases to prevail as soon as the tenant is evicted by some person having a superior title. So, if he be threatened with an eviction by such a person, he may yield the possession to him or become his tenant, and set up these facts as a defence to any action by his lessor. It may be further stated that the tenant, while he cannot deny his landlord's original title, may show that it has expired or has been subverted. Thus, if the lessor has fallen in debt, and his estate is sold on an execution, the tenant may purchase it and himself become owner. The effect of such a transaction would be to destroy the claims of the lessor under the lease. (3) The subject of waste will be treated separately. (See WASTE.) It is enough to say here that it is an act on the part of the tenant to the injury of the landlord, and leading to a forfeiture. It is either negative or positive, "permissive or voluntary." Under this doctrine it is the duty of the tenant to refrain from cutting down timber trees, or destroying or impairing buildings, or opening mines, or from acts of neglect tending to injure the estate. He is to use the property as a prudent owner would, without doing injury to the reversioner. As he is in possession, he is bound to see that others do not commit similar acts. He is in some sort an insurer, though his liability is not extended in this country so far as to make him responsible for accidental fires, though he might be for such as were caused by his negligence. There may be clauses inserted in the lease permitting him to commit waste, either in an unlimited way or under restrictions. These will not be extended so far by the courts as to allow mere wanton destruction, and acts of that kind will be restrained by courts of equity. (4) The tenant is also bound to make ordinary repairs. He must, for instance, keep roofs and windows tight. Accordingly, in the absence of special agreement, he cannot call upon the landlord to make repairs. This matter is frequently regulated by special agreement, the landlord assuming more or less fully the duty of making the repairs. If a tenant agrees to make full repairs, he will, in general, be liable to replace buildings destroyed by an accidental fire or otherwise, the word "repair" being construed as equivalent to "rebuild." A duty sometimes springs up as between the tenant and third persons or the public to keep the premises in good order. Thus, if he should allow them, being on a public street, to become dilapidated and to cause injury to persons passing by, he might be liable to an action for damages. (5) When the tenant's term ceases he should render up possession to the landlord. At this point a question frequently arises as to his right to remove such improvements as he may have made for the purposes of trade or manufacture, or for other reasons. This topic has been fully discussed in the article on fixtures. (See FIXTURES.) If the tenant continues in possession after his term expires, legal proceedings to eject him may be resorted to. The regular course is to bring an action of ejectment against him. This remedy is expensive and dilatory, while despatch is frequently of great consequence to the landlord's interests. Statutory remedies of a summary nature are resorted to in a number of the States. These provide in substance that the tenant may be summoned before a magistrate—*i. e.* a justice of the peace—and required to show cause why he does not leave the premises. This summons is speedily returnable; it may be within a few hours. If no good cause for the delay is shown, a mandate is addressed to an officer of the court requiring him to dispossess the tenant. In some instances the landlord takes the law into his own hands, and by his own act dispossesses a refractory tenant. This course is to be discouraged, particularly in those States where the summary proceedings prevail, and may lead to a breach of the peace, and may

transgress statutes to prevent forcible entry, and may, perhaps, be regarded in that case as nugatory by the courts. Should the landlord permit the tenant to hold over for a considerable period of time beyond his term, he may become a "tenant at sufferance." (See TENANT AT SUFFERANCE.)

Thus far, the duties of the tenant have been considered. Those of the landlord may be briefly referred to. They are principally to secure the tenant in quiet enjoyment of the premises, and to discharge all taxes upon the land unless there is some agreement to the contrary. In every sealed lease there is an implied covenant by the landlord for quiet enjoyment. This means such enjoyment as against persons having a paramount title. The tenant must defend himself against strangers. It is the better opinion that if the State takes the land under the right of eminent domain, the landlord is not responsible, nor has the tenant any defence for that reason to an action for rent. This is not deemed to be a paramount title, and the tenant must look to the State for indemnity.

IV. *Assignment and Sub-tenancy.*—Either of the parties may assign or transfer his interest, either in whole or in part. This fact greatly increases the complexity of the interests and rights connected with this subject. The transfer of interests may be considered under two principal divisions: (1) By the tenant; (2) by the landlord.

(1) A distinction must be taken in the outset between assignment and a sub-tenancy. In a complete assignment the tenant parts with his entire interest; in a partial assignment he transfers all his interest in a portion of the premises. The case may be illustrated by a lease of two houses for a specified time and for an entire rent. Should the tenant sell all his interest in one of the houses, there would be a partial assignment. In a sub-tenancy the tenant still retains some interest. The importance of the distinction between the two transactions is very great, as an entirely different set of rules is applied in the two cases. In order to understand the effect of an assignment it is necessary to recur to the subject of "privity," which has already been referred to. It was stated that there is between a landlord and tenant a twofold privity—that of contract and of estate. When an assignment takes place there is privity of estate between the lessor and the assignee; the privity of contract between the lessor and the lessee remains as before. The result of this theory is that the lessor has his choice of remedies. He may either pursue the lessee upon the "privity of contract," or the assignee upon the "privity of estate." This proposition involves the doctrine of covenants "running with the land." By this technical phrase is meant that there are or may be two classes of covenants in a lease, some of which may bind an assignee, and others not, since they solely affect the lessee. Those which will bind an assignee are said "to run with the land." It is frequently a question of much nicety to determine whether a covenant has this characteristic. As a general rule, in order that a covenant may bind an assignee it must concern the property embraced in the lease. Instances are promises to pay rent, to keep a house insured, to cleanse a sewer upon the premises, etc. etc. In some instances a covenant which would not regularly "run with the land" is made to do so, because the assignees of the lessee are referred to in the lease. When the promise has nothing to do with the land, or is "collateral," it will not be binding upon the assignee. The details of this subject are well stated in a note to *Spencer's case* in *Smith's Leading Cases*. The lessee, in any event, remains liable during the entire tenancy, or until the contract between the parties has spent its force. The assignee, on the other hand, being liable to the lessor only on the ground of his relation to the estate, may terminate all responsibility to him by making an assignment to a second assignee. He may even assign to a beggar to relieve himself from liability. There may thus be an indefinite series of assignees, any one of whom will be liable for a breach of covenant occurring during his ownership, but not for any transpiring after he has parted with his estate. However, if the lessee is made liable, he will in general have a remedy over as against the assignee who was owner when the breach of covenant took place. The lessee is on this view deemed to be a surety for the assignee. Similar principles will be adopted in the case of a partial assignment. Such an assignee will be liable to the landlord in proportion to the interest which he has acquired. None of these rules will be applied to a sub-tenancy. Assume, for example, that a lessee has taken a lease for five years, and then sub-lets the entire premises for four years, retaining one year at the close of the term to himself. He has thus become landlord to his own lessee. There is now no "privity of estate" between the original landlord and the sub-lessee. The latter does not claim the estate of the original lessee, but holds under a new and derivative contract. It is, however, true that the sub-lessee can have in general no greater rights than the lessee. His interest



being derived from that person's estate, must stand or fall with it. If, therefore, the lessee fails to perform his covenants, so as to be liable to eviction, the sub-lessee may also be deprived of his estate. If threatened with an eviction for that reason, he may by agreement with the original lessor become his tenant, and relieve himself from obligation to his own immediate landlord, the original lessee.

A word should be added as to the effect of a mortgage of a lease. This is properly to be regarded as an assignment. A lease being a chattel interest, a mortgage of it must, according to the usual rules prevailing in mortgages of chattels, be regarded as a sale or assignment. Still, it is not in general deemed to be such an assignment as to render the mortgagee liable upon the covenants in the lease binding upon the lessee, and "running with the land," unless the mortgage goes into possession. In that case he would be liable.

(2) *Assignments by the Landlord.*—For the sake of clearness, the only case that will be considered is that of an owner in fee parting with a smaller estate than he possesses. In such a case he has a reversion to which rent and fealty are incidental. If he assigns his reversion, the rent goes with it, though it is not expressly mentioned. This remark would not be applicable to rent then due, which is a mere debt, and in legal contemplation separated from the land. The rent, even when not due, may be assigned by express words without the reversion, or the reversion without the rent. There were some difficulties in the common law attending an assignment both of the lease and the reversion. These were removed in England during the reign of Henry VIII. by a well-known enactment by Parliament, sometimes called the statute of monasteries. If there are any covenants in the lease binding on the landlord, these, if they are of a nature to "run with the land," will attach to the purchasers of the reversion. There may be a partial as well as a total assignment of the reversion. The same general rules as to proportional rights and liabilities will be applied as in the case of a partial assignment of a lease. The reversion may be apportioned by operation of law, as where the owner dies leaving several heirs who take undivided interests as tenants in common. In order to render the lessee liable to the assignee of the reversion, notice of the assignment must usually be given. If not, any payment of rents made to the lessor before notice of the assignment must be allowed to the lessee. Registration of the assignment will not be notice to the lessee, as he could not be expected to examine the public records to see if an assignment has taken place. He may assume, until he has notice to the contrary, that the original state of things continues. (See REGISTRATION.) [Further information upon the general subject may be sought in the works on real property, such as Cruise's *Digest*; Washburn on *Real Property*; Hilbard on *do.*; Kent's *Commentaries*; Platt on *Leases*, also on *Covenants*, etc., etc.] T. W. DWIGHT.

**Lan'do**, POPE, b. at Sabina, succeeded Anastasius III. in 913; d. in 914.

**Landon** (LETITIA ELIZABETH). See MACLEAN.

**Lan'dor** (WALTER SAVAGE), b. at Ipsley Court, Warwickshire, England, Jan. 30, 1775. Being the son of wealthy parents, he was intended for the army; received a careful early training from private tutors and at Rugby School (1785); entered Trinity College, Oxford, in 1793; was rusticated in the summer of 1794 for a breach of discipline, and never returned; printed in 1795 a small volume of poems, which attracted no attention; studied law, though never called to the bar, and issued in 1798 a poem (*Gebir*) of considerable length, which in 1802 he published in a Latin translation (*Gebiræ*), and which Jeffrey declared to be equally unintelligible in both languages, while Southey and De Quincey prided themselves upon being its only readers. Landon visited Paris in 1802, succeeded soon after to his patrimonial estates, spent immense sums in improving them, in buying others in Monmouthshire, and in building a palatial mansion; but in 1806, in a moment of irritation, sold all his lands, ordered his magnificent house to be torn down, and prepared to live abroad. In 1808 he raised a body of troops at his own expense, joined the Spanish general Blake in defending the Peninsula against the French invasion, and contributed a large sum to the Spanish military treasury, receiving the thanks of the supreme junta and a commission as colonel. Landon married in 1811; resigned his commission on the return of Ferdinand VII. to Spain, and in 1815 settled in Florence, Italy, where for seven years he occupied the palace of the Medici, and afterwards bought the celebrated villa Gherardesca at Piesole. In 1812 he published *Count Julian, a Tragedy*, which elicited the warmest praise from Southey; in 1820, *Idyllia Heronia*, in Latin (published at Pisa); in 1824, another volume of *Latin Poems*, and in the same year the first series (2 vols.) of his most celebrated work, *Imagi-*

*nary Conversations of Literary Men and Statesmen*, of which the second series appeared in 1829. This work in its best passages rises to a sublimity rarely equalled in English literature, while there is an abundant display of cynicism, ill-temper, and worse logic. A passionate enemy of conventionalism and of tyranny, whether political or social, he indulged in startling paradoxes, defending Tiberius and Nero, and advising the Greeks in their struggle with the Turks to discard firearms and employ only the weapons of their classical forefathers. After thirty years' residence in Italy, Landon took up his residence at Bath in 1835, published in 1836 one of his best works, *Pericles and Aspasia*, followed by *A Satire on Satirists* (1836), *Pentameron* and *Pentalogue* (1837), and the dramas *Andrea of Hungary* and *Giocanna of Naples*, all written in Italy; *The Helioles* (1847), *Papery, British and Foreign* (1851), *Last Fruit off an Old Tree* (1853), *Antony and Octavius* (1856), and *Dry Sticks Fagot* (1858), besides some minor works and a voluminous literary correspondence in the columns of the *Examiner*. The last-named volume contained some poems satirizing a lady at Bath, who obtained a verdict against the poet for libel, with a judgment of £1000. It was evident to his admirers that the great poet was in his dotage, but the public refused to accept such a doubtful excuse, and amid a storm of obloquy Landon retired to Florence, where he d. Sept. 17, 1864. A collective edition of his works appeared in 1846 (2 vols.), and a complete edition, to be contained in 7 vols., was commenced in 1874. His biography was written by John Forster (1869; new ed. 1874). Landon's writings have never been popular, but they all contain unmistakable evidences of a high order of genius, which is best appreciated by the "fit audience though few" of poets possessing kindred gifts. PORTER C. BLISS.

**Lands'berg**, town of Prussia, in the province of Brandenburg, on the Warta. It has large breweries and celebrated nurseries of fruit trees. Pop. 18,531.

**Land'scape Gardening.** Landscape gardening is a branch of horticulture, the highest results of which may be attained by processes of a comparatively simple character—simpler, for instance, than those of kitchen or of floral gardening. Failure of success in it being often due to a halting purpose than to lack of science, of means, or of skill, this article will be chiefly given to establishing the definition and limitation of the general end proper to the art; some indications being incidentally presented of the manner in which, under the requirement of different individual tastes and different local conditions, it may be judiciously pursued.

There are two other branches of horticulture, which in ordinary practice are often so much confounded with that of landscape gardening that the reader may find it convenient to have them set apart from it at the outset. One of them is the cultivation of plants with special regard to an interest in their distinctive individual qualities. The other is the cultivation of plants (trees, shrubs, perennials, and annuals) with a view to the production of effects on the principles commonly studied in the arrangement of precious stones, enamel, and gold in an elaborate piece of jewelry, or of flowers when sorted by colors and arranged for the decoration of a head-dress, a dinner-table, or a terrace. Whether, in any undertaking, one of these two leading motives or that of landscape gardening be adopted, it may be presumed that the result will satisfy that motive in proportion as it shall be followed to the end with singleness of purpose. We now turn, therefore, from the two which have been defined to consider what, in distinction from them, the leading motive of landscape gardening may be.

Derivatively, the word "landscape" is thought to apply only to such a scene as enables the observer to comprehend the shape of the earth's surface far before him, or, as we say in common idiom, "to get the lie of the land," the land's shape. Consistently with this view, it will be found, on comparing a variety of scenes, that those which would be most unhesitatingly classed as landscapes are distinguished by a certain degree of breadth and distance of view. Looking at the face of a thick wood near at hand or of a precipitous rock, we do not use the term. Pursuing the comparison farther, it will be found that in each of those scenes to which the word more aptly applies there is a more marked subordination of various details to a characteristic effect of the scene as a whole. As Lowell says, "A real landscape never presents itself to us as a disjointed succession of isolated particulars; we take it in with one sweep of the eyes—its light, its shadow, its melting gradations of distance." But there are many situations in which plant beauty is desired where the area to be operated upon is so limited, or so shaped and circumstanced, that the depth and breadth of a landscape scene must be considered impracticable of attainment. In American gardening is required for the decoration of places of this class many thousand times for one



in which such restraining conditions are not encountered; and the question may be asked whether they must all be excluded from the field of landscape gardening, and if not, what, in these cases, can be the significance of the prefix "landscape"? As a general rule, probably, so many purposes require to be served, and so many diverse conditions to be reconciled, that the only rule of art that can be consistently applied is that of architecture, which would prescribe that every plant, as well as every moulding, shall bear its part in the "adornment of a service." To this end, parterre and specimen gardening are more available than landscape gardening. But it may happen that where, with due regard to considerations of health and convenience, there would be scant space for more than two or three middle-sized trees to grow, there will yet be room for a great deal of careful study, and, with careful study, of success in producing effects the value of which has nothing in common with either of the objects of horticulture thus far defined.

As an example, suppose a common village dooryard, in which are found, as too often there may be, a dozen trees of different sorts planted twenty years before, and that, by good chance, among them there is one, standing a little way from the centre, our fair Western kinsmaid of the linden (*T. heterophylla*). Trampled under by ruder and greedier neighbors, and half starved, youth and a good constitution may yet have left it in such condition that, all the rest being rooted out, sunlight given it on all sides, shortened in, balanced, cleaned, watered, drained, stimulated, fed, guarded from insidious enemies, its twigs will grow long, delicate, and pliant; its branches low and trailing, its bark become like a soft, finely-grained leather, its upper leaf-surface like silk, and its lower leaf-surface of such texture and tint that, with the faintest sunlight and the softest summer breeze, a constant wavering sheen, as of a damask hanging, will be flowing over the whole body of its foliage. While it regains its birthright in this respect it will also acquire, with fulness of form and moderate play of contour, a stateliness of carriage unusual in a tree of its age and stature. If landscape gardening is for the time to take its order from this princess of the fields, and all within the little court made becoming with her state, the original level surface of the ground need be but slightly modified, yet it may perceptibly fall away from near her, dipping in a long and very gentle wave to rise again with a varying double curve on all sides. There cannot, then, be too much pains taken to spread over it a velvet carpet of perfect turf, uniform in color and quality. Looking upon this from the house, it should seem to be margined on all sides by a rich, thick bank, generally low in front and rising as it recedes, of shrubs and flowering plants; the preparation for which may have required for years a clean-lined border, curve playing into curve, all the way round. A very few plants of delicate and refined character may stand out in advance, but such interruptions of the quiet of the turf must be made very cautiously. Of furniture or artificial ornaments there must be none, or next to none, for even bodily comfort may willingly defer a little to the dainty genius of the place. They may well walk, for instance, a few steps farther who would take a lounging seat, put up their feet, and knock the ashes from their pipes. Yet a single Chinese garden-stool of a softly mottled turquoise-blue will have a good effect if set where a flickering light will fall upon it on the shady side of the tree. The rear rank of shrubs will need to stand so far back that there will be no room to cultivate a suitable hedge against the street. The fence will then best be a wall of cut stone, with decorated gate-piers; or with a base of stone it may be of deftly-wrought iron touched with gilt. By no means a casting with clumsy and overdone effort at feeble ornament—much better a wooden construction of less cost, in which there is a reflection, with variety, of the style of the house if that is of wood also, or if it is not, then something like a banister-rail of turned work, but with no obviously weak parts. The gateway being formed in a symmetrical recess of the fence nearly opposite the tree, the house-door being on the side, the approach to it will bend, with a moderate double curve, in such a way as to seem to give place to the tree, and at the same time allow the greatest expanse of unbroken lawn-surface. Near the gateway, and again near the corner farthest from it, there may be a small tree or a cluster of small trees or large shrubs, forming low, broad heads (dogwood grown in tree-form, sassafras kept low, or, to save time, the neat white mulberry), the tops of which, playing into that of the loftier linden on the right, will in time give to those sitting at the bay-window of the living-room a flowing sky-line, depressed and apparently receding along the middle. If there is a tall building over the way with signs, or which otherwise offends, and the sidewalk space outside admits, we will plant upon it two trees only, adjusting them, as to both kind and position, so that they will almost repeat the

depressed line of the nearer foliage, at no greater distance than is necessary to obscure the building. Quite hidden it need not be, lest, also, there should be some of the sky lost, banishment from the lower fields of the sky being a punishment that we should strive not to need. But let us hope that at the worst we have but our neighbor's stable opposite, and that the tops of more distant trees may be seen over it; we shall then still be glad to have the chance of bringing up two trees, set somewhat farther apart than before, on the roadside, as their effect will be to make an enlarged consistency of character; to close in and gather together all that makes up the home-scene, and to aid the turf in relieving it of a tendency to pettiness and excitement which lies in and under the shrubbery.

Let a different theme be sung on the same ground. Suppose that it is an aged beech that we have found, badly used in its middle age as the linden in its youth—storm-bent, lop-limbed, and one-sided, its veteran trunk furrowed, scarred, patched, scaly, and spreading far out to its knotted roots, that heave all the ground about like taut-set cables. If we had wanted a fine dressy place, this interesting object would have been cut away though it were the last tree within a mile. Accepting it, nothing would be more common, and nothing less like landscape gardening, than to attempt to make a smooth and even surface under it. Let it be acknowledged that fitness and propriety require that there should be some place before the house of repose for the eye, and that nowhere in the little property, to all parts of which we may wish at times to lead our friends in fine attire, can we risk danger of a dusty or a muddy surface. Starting from the corner nearest the tree, and running broader and deeper after it has passed it and before the house, there shall be a swale (a gentle water-way) of cleanly turf (best kept so by the cropping of a tethered cosset and a little play now and then of a grasshook, but if this is unbandy we will admit the hand lawn-mower). Now, to carry this fine turf right up over the exposed roots of the beech would be the height of landscape gardening indelicacy; to let it come near, but cut a clean circle out about the tree, would be a landscape gardening barbarism. What is required is a very nice management, under which the turf in rising from the lower and presumably more humid ground shall become gradually thinner and looser, and at length darned with moss, and finally patched with plants that on the linden's lawn would be a sin—tufts of clover and locks and mats of loosestrife, liverwort, and dogtooth-violets; even plantain and sorrel may timidly appear. The surface of the ground will continue rising, but with a broken swell towards the tree, and, in deference to its bent form, hold rising for a space on the other side; but nowhere will its superior roots be fully covered.

Suppose that we are to come to this house, as it is likely we may, three times out of four from the side opposite to where the beech stands; our path then shall strike in well over on that opposite side and diagonally to the line of the road; there will be a little branch from it leading towards and lost near the tree (the children's path), while the main stem bends short away toward a broad bowery porch facing the road at the corner nearest the gate. The path must needs be smooth for ease of foot and welcome, but if its edges chance to be trodden out a little, we will not be in haste to fully repair them. Slanting and sagging off from a ringbolt in the porch there is to be a hammock slung, its farther lanyard caught with two half-hitches on an old stub well up on the trunk of the beech. A strong, brown, seafaring hammock. There shall be a seat, too, under the tree of stout stuff, deep, high-backed, armed, and, whether of rustic-work or plank, fitted by jointing (not held together by nails, bolts, or screws). It may even be rough-hewn, and the more checked, weather-worn, and gray it becomes, without dilapidation or discomfort to the sitter, the better; here you may draw your matches and clean out your pipe, and welcome. We will have nothing in front to prevent a hedge, but must that mean a poor pretence of a wall in leafage? Perhaps it must have that character for a few years till it has become thick and strong enough at bottom, and always it may be a moderately trim affair on the roadside, otherwise we should be trespassers on our neighbors' rights. But its bushes shall not be all of one sort, and in good time they shall be bushes in earnest, leaping up with loose and feathery tops, six, eight, and sometimes ten feet high. And they shall leap out also towards us. Yet from the house half their height shall be lost behind an under and out-growth of brake and bind-weed, dog-rose and golden-rod, asters, gentians, buttercups, poppies, and irises. Here and there a spray of low brambles shall be thrown out before all, and the dead gray canes of last year shall not be every one removed. There will be coves and capes and islands of chickweed, catnip, cinquefoil, wild strawberry, hepatica, forget-me-not, and lilies-of-the-valley, and, still farther out, shoals under the



turf, where crocuses and daffodils are waiting to gladden the children and welcome the bluebird in the spring. But near the gate the hedge shall be a little overrun and the gateposts overhung and lost in sweet clematis; nay, as the gate must be set in a little, because the path enters sideways, there shall be a strong bit of lattice over it, and from the other side a honeysuckle shall reinforce the clematis; and if it whirls off also into the thorn tree that is to grow beyond, the thorn tree will be none the worse to be held to a lowly attitude, bowing stiffly towards the beech. Inside the gate, by the pathside, and again down by the porch, there may be cock-scombs, marygolfs, pinks, and pansies. But nothing of plants tied to the stake, or of plants the names of which, before they can command due interest, must be set before us on enamelled cards, as properly in a botanic garden or museum. Above all, no priggish little spruces and arbovitæ, whether native or from Satsuma; if the neighbors harbor them, any common woodside or fence-row bushes of the vicinity may be set near the edge of the property to put them out of sight; nannyberry, hazel, shadblow, dogwood, even elder, or if an evergreen (conifer) will befit the place, a stout, short, shock-headed mountain-pine, with two or three low savins and a prostrate juniper at their feet. Finally, let the roadside be managed as before. Then, if the gate be left open not much will be lost by it: not all the world will so much as look in, and some who do will afterwards choose to keep the other side of the way, as it is better they should. Yet from the porch, the window beyond, or the old seat under the tree there will be nothing under view that is raw or rude or vulgar; on the contrary, there will be a scene of much refinement as well as of much beauty, and those who live in the house, especially if they have a way of getting their work or their books out under the beech, will find, as the sun goes round and the clouds drift over, that taking it altogether there is a quality more lovable in it than is to be found in all the glasshouses, all the ribbon borders, all the crown jewels of the world.

The same will be equally true of the result of the very different kind of gardening design first supposed. We come thus to the question, What is the distinctive quality of this beauty? In each case there has been an ideal in view, and in each element introduced a consistent pursuit of that ideal, but it is not in this fact of consistency that we find the beauty. We term it landscape beauty, although there is none of the expanse which is the first distinguishing quality of a landscape. This brings us to the consideration that from the point of view of art or of the science of the imagination we may ask for something more in a landscape than breadth, depth, composition, and consistency. A traveller, suddenly turning his eyes upon a landscape that is new to him, and which cannot be directly associated with any former experience, may find himself touched as if by a deep sympathy, so that in an instant his eyes moisten. After long and intimate acquaintance with such a landscape it will often be found to have a persistent influence which may be called its charm—a charm possibly of such power as to appreciably affect the development of the character and shape the course of life. Landscapes of particular type associate naturally and agreeably with certain events. Their fitness in this respect is due to the fact that, through some subtle action on the imagination, they affect the same or kindred sensibilities. If in these door-yards there is something to which every element contributes, comparable in this respect to a poetic or a musical theme, as well, in the one case, of elegance and neatness, carried perhaps to the point of quaint primness, as in the other of homely comfort and good-nature, carried close to the point of careless habits, then the design and process by which it has been attained may lay some slight claim to be considered as a work of art, and the highest art-significance of the term landscape may properly be used to distinguish its character in this respect.

In the possibility, not of making a perfect copy of any charming natural landscape, or of any parts or elements of it, but of leading to the production, where it does not exist, under required conditions and restrictions, of some degree of the poetic beauty of all natural landscapes, we shall thus find not only the special function and the justification of the term landscape gardening, but also the first object of study for the landscape gardener, and the standard by which alone his work is to be fairly judged.

There are those who will question the propriety of regarding the production of the poetic beauty of natural landscape as the end of landscape gardening, on the ground that the very term "natural beauty" means beauty not of man's design, and that the best result of all man's labor will be but a poor counterfeit, in which it is vain to look for the poetry of nature. Much has been written to this effect; with what truth to the nature of man it will be well cautiously to consider.

As with reference to landscape effect, it is not to be overlooked that nature acts both happily and unhappily. A man may take measures to secure the happy action and to guard against the unhappy action in this respect with no more effrontery than with respect to the production of food or protection from lightning, storm, frost, or malaria. He need not wait for the slow and uncertain process by which in nature a certain position would be adapted for a certain tree. He may make the soil fertile at once. He need not take the chance that a certain thick growth of saplings will be so thinned by the operation of what are called natural causes that a few of them may yet have a chance to become vigorous, long-lived, umbrageous trees. Knowing how much more valuable a very few of these will be in the situation, with the adjoining turf holding green under their canopy, than the thousands that for long years may otherwise occupy it, struggling with one another and barring out the light which is the life of all beneath them he may make sure of what is best with axo and bill-hook. The ultimate result is not less natural or beautiful when he has done so than it would have been if at the same time the same trees had been eaten out by worms or taken away, as trees sometimes are, by an epidemic disease.

On the other hand, there are several considerations, neglect of which is apt to cause too much to be asked of landscape gardening, and sometimes perhaps too much to be professed and attempted. The common comparison of the work of a landscape gardener with that of a landscape painter, for example, easily becomes a very unjust one. The artist in landscape gardening can never have, like the landscape painter, a clean canvas to work upon. Always there will be conditions of local topography, soil, and climate by which his operations must be limited. He cannot whenever it suits him introduce the ocean or a snow-capped mountain into his background. He cannot illuminate his picture with constant sunshine nor soften it by a perpetual Indian summer. Commonly, he is allowed only to modify the elements of scenery, or perhaps to bring about unity and distinctness of expression and suggestion in a locality where elements of beautiful landscape already abound, but are partly obscured or seen in awkward, confusing, and contradicting associations. This is especially likely to be the case in undulating and partially wooded localities, such as in America are oftenest chosen for rural homes. Again, the artist in landscape gardening cannot determine precisely the form and color of the details of his work, because each species of plant will grow up with features which cannot be exactly foreknown in its seed or sapling condition. Thus, he can see his designed and imaginary landscape only as one may see an existing and tangible landscape with half-closed eyes, its finer details not being wholly lost, yet nowhere perfectly definable. Still, again, it is to be remembered that works in landscape gardening have, as a general rule, to be seen from many points of view. The trees which form the background, still oftener those which form the middle distance, of one view must be in the foreground of another. Thus, the working out of one motive must be limited by the necessities of the working out of others on the same ground, and to a greater or less degree of the same materials. Finally, the conditions of health and convenience in connection with a dwelling are incompatible with various forms of captivating landscape beauty. A house may be placed in a lovely situation, therefore, and the end of long and costly labors of improvement about it prove comparatively dull, formal, and uninteresting. What is lost is a part of the price of health and convenience of dwelling. The landscape gardener may have made the best of the case under the conditions prescribed to him.

It has been said that landscapes of a particular type associate naturally and agreeably with certain events. It is to be added that the merit of landscape gardening consists largely in the degree in which their designer has been inspired by a spirit congenial to elements of locality and occasion which are not, strictly speaking, gardening elements. The grounds for an ordinary modest home, for instance, may desirably be designed to give the house, gardens, and offices an aspect of retirement and seclusion, as if these had nestled cozily down together among the trees in escape from the outside world. The grounds of a great public building—a monument of architecture—will, on the other hand, be desirably as large in scale, as open, simple, and broad in spaces of turf and masses of foliage, as convenience of approach will allow, and every tree arranged in subordination to, and support of, the building. The grounds of a church and of an inn, of a cottage and of an arsenal, of a burying-place and of a place of amusement, will thus differ, in each case correspondingly to their primary purpose. Realizing this, it will be recognized that the choice of the site, of the elevation, aspect, entrances, and outlooks of a



building for no purpose can be judiciously determined except in connection with a study of the leading features of a plan, of its approaches, and grounds. Also, that in the design of roads, walks, lakes, and bridges, of the method of dealing with various natural circumstances, as standing wood, rocks, and water; in a determination of what is possible and desirable in respect to drainage, water-supply, distant prospects to be opened or shut out, the avoidance of malaria and other evils,—all these and many other duties are necessarily intimately associated with those of gardening (or the cultivation of plants) with a view to landscape effects.

FREDERICK LAW OLMS TED.

**Land'seer** (CHARLES), son of John and brother of Edwin, b. in 1799; received instruction from his father; studied in the schools of the Royal Academy, and exhibited in 1828; was chosen an associate in 1837, a member in 1845, and keeper in 1851. He was a painter of historical pieces. His *Plundering of Basing House*, an incident of the civil war in England, is well known. Other pictures are—*Charles's Harbour in Prison*, *The Departure of Charles II. in Disguise*, *The Monks of Melrose*, *The Return of the Dove to the Ark*. D. July 22, 1879. O. B. FROTHINGHAM.

**Landseer** (Sir EDWIN), younger brother of Charles, b. in London in 1802; excelled while a boy in the painting of animals; became a student of the Academy in 1816; began to exhibit when only fourteen years old. Sketches made when he was but five years old are in the South Kensington Museum. In 1820, at the suggestion of Haydon, he took advantage of the death of a lion at Exeter Exchange to study the anatomy of the animal, and subsequently he painted several pictures introducing the lion—*The Lion Reposing*, *The Lion Disturbed*, *Van Amburgh and the Lions*. The four bronze lions at the base of the Nelson Monument in Trafalgar Square were his work; they were done by order of the government (1859), and uncovered Jan. 31, 1867. Landseer is beyond question the greatest animal painter of his time as respects anatomical truth, vigor of treatment, and power of characterization; he treats his subjects suggestively, often with humor, and excels equally in producing comic and tragic effects. His pictures, which are very numerous and of great variety, are too well known through engravings to need mention. Some of his best originals may be seen in the Vernon Collection (National Gallery) and the Sheepshanks Collection at South Kensington. His subjects were taken from animal life in all regions—deer of the Scottish Highlands, polar bears from the Arctic, and dogs of every breed. Edwin Landseer was elected an associate of the Royal Academy in 1826, and a member in 1831. In 1850 he received knighthood from the queen. On the death of Sir Charles Eastlake in 1866, he was elected president of the Royal Academy, but declined the honor. O. B. FROTHINGHAM.

**Landseer** (JOHN), b. in 1761; d. Feb. 29, 1852; was the son of a jeweller; received his earliest instruction from Wm. Byne. His first productions were vignettes for Macmillan's Bible and Bowyer's *History of England* (1793); in 1799 was engaged on a series of views in the Isle of Wight for J. M. W. Turner and J. C. Ibbetson; afterwards published engravings of animals, after Rubens, Snijders, Rembrandt, and others; in 1806 gave lectures on engraving at the Royal Institute, which were published; in 1807 was chosen associate engraver by the Academy; in 1814 began a series of line engravings illustrating the antiquities of Dacca (British India), 20 plates; in 1817 read a paper to the Society of Antiquaries on *Engraved Gems from Babylon*, and later gave a course of lectures on *Engraved Hieroglyphics*; in 1823 published *Nubian Researches*, a volume, and in 1834 a catalogue, descriptive, explanatory, and critical, of the earliest pictures in the National Gallery. As late as 1851 exhibited at the Royal Academy views of Druidical temples in the islands of Guernsey and Jersey. One of his early pictures, *Dogs of Mr. St. Bernard*, was finely engraved by his father. O. B. FROTHINGHAM.

**Landseer** (THOMAS), A. R. A., elder brother of Edwin and Charles, an engraver of ability and repute. His best work is the reproduction of his brother's pictures, which he executed with spirit and delicacy. The plate of Rosa Bonheur's *Horse Fair*, published in 1861, gave him celebrity. He wrote the *Life of William Bewick* (artist) in 2 vols. (1871). D. Jan., 1880. O. B. FROTHINGHAM.

**Land's End.** See CORNWALL.

**Lands'ford**, post-v. and tp. of Chester co., S. C. Pop. 2400.

**Lands'hut**, a quaint old town of Bavaria, capital of the district of Lower Bavaria, on the Isar. It has large breweries and manufactures of tobacco, and many interesting buildings, among which are St. Martin's church, built in 1450, with a tower 454 feet high; the old castle, built in 1232; a royal palace, with beautiful frescoes. From

1800 to 1826 it was the seat of a university, previously located at Ingolstadt, and subsequently removed to Munich. In the fifteenth century it was the capital of the duchy of Bavaria-Landshut. Pop. 14,141.

**Landshut**, town of Prussia, in the province of Silesia, at the confluence of the Zieder and the Bober, has some linen and woollen manufactures, and is noted for the victory which the Austrians gained here over the Prussians, June 23, 1760. Pop. 5673.

**Lands'krona**, town of Sweden, in the province of Malmö, on the Sound, has a good harbor, and some manufactures of leather and tobacco. On the island of Hven, a mile distant, was the residence and observatory of Tycho Brahe, the celebrated astronomer, of which nothing now remains. Pop. 7323.

**Land'slip**, a sort of avalanche of earth and rocks from the sides of mountains or hills. Earthquakes, frost, and especially the action of water, are frequent causes. Soils resting on inclined planes of smooth rock or upon beds of loose gravel are liable to slide *en masse* during long-continued rains. Elevated peat-swamps have been known to absorb so much water as to burst and deluge lower regions with torrents of mud. Underlying strata of clay may become liquefied and gush out, leaving the surface to topple in. A remarkable land-slide occurred near Nice, France, when the castle and village of Rocca-bruna, surrounded by orange and lemon groves, moved for some distance down the mountain without disturbing the houses. One of the most famous land-slides was that in which Goldau in Switzerland was destroyed. In 1826 there was an extensive land-slide 2 miles from the Notch in the White Mountains of New Hampshire, which destroyed the Willey family, choked up the Saco River, and flooded the surrounding country.

**Landsturm.** See GERMAN EMPIRE—Army and Navy.

**Land Tax**, a revenue derived by a government from an assessment on land. (See TAXATION, by Rev. A. L. CHAPIN, S. T. D.)

**Landwehr.** See GERMAN EMPIRE—Army and Navy.

**Lane**, county of W. Kansas. Area, 720 square miles. It is a prairie region, watered by tributaries of Walnut Creek.

**Lane**, county of Oregon, extending from the Cascade Range W. to the Pacific. Area, 1500 square miles. Its E. part is in the Willamette Valley, and is highly fertile. Cattle, grain, and wool are leading products. The county is traversed by the Oregon and California R. R. Cap. Eugene City. Pop. 6426.

**Lane**, tp. of Warrick co., Ind. Pop. 870.

**Lane**, tp. of Greenwood co., Kan. Pop. 320.

**Lane** (EBENEZER), LL.D., b. at Northampton, Mass., Sept. 17, 1793; graduated at Harvard in 1811; studied law with Matthew Griswold, his uncle; removed in 1817 to Ohio, and in 1822 became a resident of Sandusky. He was 1824–30 a judge of the common pleas; of the State supreme court 1830–37; chief-justice 1837–45, and afterwards a railroad manager. D. at Sandusky, O., June 12, 1866.

**Lane** (EDWARD WILLIAM), PH. D., b. at Hereford, England, in 1801; was educated for the Church, but never took orders; went to Egypt in 1825, and resided there three years, studying the Arabic language and literature, and making two voyages up the Nile; again spent two years there (1833–35), preparing, at the request of the Society for the Diffusion of Useful Knowledge, his popular and entertaining work on the *Manners and Customs of the Modern Egyptians*, which was published in 1836; made a translation of the *Arabian Nights*, with notes (1841); went to Egypt for the third time in 1842, and afterward resided in Cairo, principally engaged in the preparation of an Arabic lexicon, under the patronage of the duke of Northumberland, and after the death of that nobleman with the support of the British government. The first part appeared in 1863, the second in 1865, and others more recently, but was left unfinished. Mr. Lane also published *Selections from the Kuran* (1843) and *Arabian Tales and Anecdotes* (1845); was in 1864 made corresponding member of the Institute of France, and in Feb., 1875, received the degrees of master of philosophy and doctor of literature from the University of Leyden. D. Aug. 10, 1876.

**Lane** (Rev. GEORGE W.), b. in Wilkesbarre, Pa., Jan. 15, 1815, a son of the Rev. George Lane; was licensed to preach in Georgia in Mar., 1834; was classical teacher in the manual-labor school near Covington, Ga., and then, for ten years, professor of languages in Emory College. He was a man of large attainments and indomitable energy, zealous and successful as a minister, and belonged to the Georgia M. E. conference. D. Sept. 21, 1848. T. O. SUMMERS.



**Lane** (HENRY S.), b. in Montgomery co., Ky., Feb. 21, 1811; was early in life admitted to the Indiana bar; was in Congress 1841-43; lieutenant-colonel of volunteers in the Mexican war; chosen U. S. Senator in 1859, but unseated; elected governor of Indiana 1861; U. S. Senator from Indiana 1861-67.

**Lane** (JAMES HENRY), b. at Lawrenceburg, Ind., June 22, 1814, was a son of Hon. Amos Lane, an able lawyer and politician. J. H. Lane was admitted to the bar in 1840; enlisted in the 3d Indiana Vols. in 1846 as a private, but became a colonel, and at Buena Vista commanded a brigade with great credit; was 1847-48 colonel of the 5th Indiana. In 1848 he was chosen lieutenant-governor; was in Congress 1853-55, and voted for the Nebraska bill; removed in 1855 to Kansas; was a prominent member of the first Free State government; was president of both the Topeka and the Leavenworth (1857) constitutional conventions, and major-general of the Free State forces. In 1856 he was chosen by the Free State legislature as U. S. Senator, but was not allowed a seat, and in the same year was indicted for high treason by the enemies of the Topeka constitution, and compelled to flee. In 1858 he was indicted and tried for the murder of a neighbor whom he had killed in a quarrel, but was acquitted. In 1861, and again in 1863, he was sent from Kansas to the U. S. Senate. He served efficiently for some time during the civil war as a brigadier-general of volunteers. In 1866 he received a paralytic stroke, and on July 11, 1866, took his own life, at Leavenworth, Kan.

**Lane** (Rev. JOHN), b. in Virginia Apr. 8, 1789; entered the ministry in the South Carolina M. E. conference in 1814, and in 1816 became a pioneer of Methodism in Mississippi. He was present at the first session of the Mississippi conference, in which for many years he was a standard-bearer. He was also a probate judge in Warren co., where he exercised a wide influence, having married a daughter of Mr. Vick, after whom Vicksburg was named. D. at Vicksburg, Miss., Oct. 10, 1855. T. O. SUMMERS.

**Lane** (JOSEPH), b. in Buncombe co., N. C., Dec. 14, 1801; removed in youth to Indiana, where he engaged in mercantile pursuits and in politics; served as colonel of the 2d Indiana Vols. in the Mexican war, and was made a brigadier and brevet major-general for gallantry at Buena Vista and in many minor actions; became in 1848, and again in 1853, governor of Oregon Territory; was a delegate in 1851-59; U. S. Senator 1859-61; and in 1860 was nominated for Vice-President on the Breckenridge ticket.

**Lane** (Sir RALPH), b. in Northamptonshire, England, about 1530; entered the service of Queen Elizabeth in 1563 as equerry; served with credit in the rebellion of 1569, and in Ireland in 1583-84, and was appointed by Sir Walter Raleigh in Feb., 1585, governor of Virginia. He abandoned the province in the following year, returning to England with Sir Francis Drake; was colonel in Drake's expedition against Portugal in 1589; wounded in an Irish campaign in 1591, knighted in 1593, and d. in Ireland in 1604.

**Lane Prairie**, tp. of Otter Tail co., Minn. Pop. 80.

**Lane's**, tp. of Morgan co., Ala. Pop. 722.

**Lanes'boro'**, post-v. and tp. of Anson co., N. C., on the Carolina Central R. R. Pop. 1295.

**Lanes'borough**, a pleasant post-tp. of Berkshire co., Mass., on the Pittsfield and North Adams R. R., 5 miles N. of Pittsfield. It has quarries of marble and limestone, and mines of iron and glass-sand, a literary association, 4 churches, a public library, and manufactures of iron, glass, lime, etc. It is widely known for its scenery, at some points wild and grand, at others remarkably beautiful. Pop. 1393.

**Lanesborough**, post-v. of Carrollton tp., Fillmore co., Minn., on the Southern Minnesota R. R., 50 miles W. by S. of La Crosse, Wis., has 1 weekly newspaper. Pop. 655.

**Lanesborough**, post-v. of Harmony tp., Susquehanna co., Pa., on the Erie R. R., 1 mile N. E. of Susquehanna Depot, and on the Susquehanna River.

**Lanes'burg**, tp. of Le Sueur co., Minn. Pop. 1123.

**Lane's Creek**, post-tp. of Union co., N. C. Pop. 1575.

**Lanes'ville**, a thriving post-v. in the N. E. part of Gloucester tp., Essex co., Mass., 5 miles from Gloucester Village, on the N. shore of Cape Ann.

**Laneville**, tp. of Hale co., Ala. Pop. 2560.

**Lan'franc**, b. at Pavia, Italy, about 1005; studied at Bologna, and taught jurisprudence and dialectic at Pavia with applause; removed to France, and, probably in 1039, settled at Avranches; entered the Benedictine abbey of Bee 1042, which soon became a renowned school of theology, patristics, and dialectic; was made prior in 1046; took part 1050-69 in the controversy with Berengarius; became abbot of Caen 1066, and was appointed archbishop of Canter-

bury by William the Conqueror 1070—a position which was rendered a trying one by the self-will of the Conqueror and his successor, the refractory conduct of some of the clergy, and the unsettled relations of the pope to the king in regard to church preferments. Lanfranc was one of the founders of scholasticism. His most important existing works are *De corpore et sanguine Domini* and commentaries on the Pauline Epistles. D. at Canterbury May 24, 1089.

**Lanfrey'** (PIERRE), b. in 1828 at Chambéry, Savoy, then a part of the kingdom of Sardinia. His father was a Frenchman who had been a military officer under the empire. Pierre entered the Jesuit college at Chambéry, but left on account of having written a pamphlet against his reverend instructors, and completed his studies at the Collège Bourbon in Paris, where he qualified for the bar, but afterwards turned his attention to philosophical and historical studies. His first work, *The Church and the Philosophers of the Eighteenth Century* (1857), made a considerable sensation, which was deepened by *An Essay on the French Revolution* (1858), *The Political History of the Popes* (1860), *Political Studies and Portraits* (1863), and *The Restoration of Poland* (1863). In 1867, M. Lanfrey commenced the publication of his most important work, a *History of Napoleon I.*, of which the fifth volume appeared in 1874, the ablest and most complete arraignment of the First Empire at the bar of history that has appeared. M. Lanfrey served in the *mobiles* of Savoy during the Franco-German war, was elected to the National Assembly in Feb., 1871, and in October of that year was appointed by Thiers minister to Switzerland, but resigned in 1873; elected life senator in 1875. D. Nov. 15, 1877.

**Lang** (JOHN DUNMORE), D. D., b. at Largs, Ayrshire, Scotland, about 1800; emigrated to Sydney at an early age, and became principal of the Australian College. In 1834 he published *The History of New South Wales, both as a Penal Settlement and as a British Colony*, the first historical work on that colony possessing any claims to fullness and authority. It has passed through several editions. Dr. Lang wrote briefer works upon other separate colonies, including New Zealand (1840), Philipland (1847), Cooksland (1847), and *Freedom and Independence for the Golden Lands of Australia* (1853), republished in 1870 under the title *The Coming Event*.

**Lang** (LOUIS), b. at Waldsee, Würtemberg, Mar. 29, 1814; became noted at an early age for skill in painting likenesses in pastel; resided at Constance (1830-34) and at Paris (1834-37); came to the U. S. in 1838; went to Italy in 1841, studying at Venice, Bologna, Florence, and Rome; then spent two years in the U. S. (1845-47), engaged in the artistic decoration of houses, and after another visit to Rome (1847-49) made his permanent residence in New York City.

**Langdale** (Sir MARMADUKE), b. in Yorkshire, England, about 1590; was sheriff of that county in 1642; embraced the Royalist cause, and became one of the most valiant generals of Charles I., defeating the Scotch at Corbridge and raising the siege of Pontefract Castle (1644); commanded at the battle of Naseby, June 14, 1645, which was lost through the imprudence of Prince Rupert; joined Montrose; was defeated; escaped to the Isle of Man; went thence to the Continent; joined the Scotch royalist army in 1648; took Berwick by surprise (May); defeated by Cromwell at Preston (Aug. 17); captured and imprisoned in Nottingham Castle; escaped to Flanders; was made baron by Charles II.; was lord lieutenant of Yorkshire on the Restoration in 1660, and d. at York Aug. 5, 1661. Clarendon in his *History of the Rebellion* gives him a high reputation for courage and skill.

**Lang'dell** (CHRISTOPHER COLUMBUS), A. M., LL. B., A. B., dean of the law faculty of Cambridge University, Cambridge, Mass., b. in Hillsborough co., N. H., May 22, 1826; entered Phillips Exeter Academy in 1845, and Harvard College in 1848; left college to pursue teaching in 1849, and decided not to return, hence did not graduate with his class; in 1850 began the study of law, and attended Harvard Law School in the subsequent year. At the annual commencement in 1853 he received the degree of LL. B., and at the following commencement the honorary degree of A. M.; removed to New York, where he practised law until he was appointed Dane professor of law in Cambridge University. At the annual commencement in 1870 he received the degree of A. B. as a member of the class of 1851, and was appointed to the position he now holds at the beginning of the academic year of 1870-71.

J. S. OTHERS.

**Lang'don**, post-tp. of Sullivan co., N. H., 56 miles W. of Concord. It has manufactures of lumber. Pop. 411.

**Langdon** (CHARLES C.), of Northern birth; emigrated about 1836 to Alabama, and became a merchant of Perry



co.; was afterwards editor of the *Mobile Register*, a Whig paper; was mayor of Mobile, and in 1861 opposed secession; chosen in 1865 to Congress, was not allowed to take his seat; was the founder of Citronelle, Mobile co., Ala., where he has since resided.

**Langdon** (JOHN), LL.D., a patriot of New Hampshire, b. at Portsmouth in 1741, became a successful merchant of that town. In 1774 he assisted in securing for the colonies the ordnance stores in the fort near Portsmouth. In 1775 he was sent to the Congress. In 1776 he became navy agent, Speaker of the New Hampshire assembly, and judge of the common pleas. He gave the money with which Stark's famous brigade was equipped, and in person commanded a company at Bennington, Saratoga, and elsewhere. In 1779 he was president of the New Hampshire convention and Continental agent. In 1783 he was sent to Congress, and was afterwards more than once Speaker in the New Hampshire legislature. He was president of New Hampshire in 1785, and in 1787 was in the convention which drafted the Federal Constitution. In 1788 he was governor, and again in 1805-09 and 1810-12. He was a U. S. Senator 1789-1801, and declined the secretaryship of the navy and the Vice-Presidency of the U. S. D. Sept. 18, 1819.

**Langdon** (SAMUEL), D. D., ABERDEEN, b. in Boston, Mass., Jan. 12, 1723, and graduated at Harvard in 1740. He became master of a grammar school at Portsmouth, N. H.; was a chaplain in the Louisburg expedition 1745; assistant minister, and afterwards (1747-74) pastor, of the First Congregational church at Portsmouth; president of Harvard College 1774-80, and afterwards a minister at Hampton Falls, N. H. He was prominent in the public affairs of the State. Published many sermons, and several volumes upon theological and religious subjects. D. Nov. 29, 1797.

**Langdon** (WOODBURY), brother of John Langdon (1741-1819), b. at Portsmouth, N. H., in 1739; served in Congress 1779-80; a judge of the New Hampshire supreme court 1782, and again 1786-90, and held other public offices. D. at Portsmouth Jan. 13, 1805.

**Lange** (JOHANN PETER), b. Apr. 10, 1802, at Sonuborn, near Elberfeld, in Rhenish Prussia, in humble circumstances; acquired his first education by his own energy; attended for a year and a half the gymnasium of Düsseldorf; studied theology at Bonn; preached in several places, and was appointed professor of theology at Zurich in 1841, and in 1854 at Bonn. His *Leben Jesu* (3 vols., 1844-47), translated into English by Sophia Taylor and J. E. Ryland (Philadelphia, 1872), *Christliche Dogmatik* (3 vols., 1849-52), and *Apostolische Zeitalter* (2 vols., 1853-54), exercised a widespread and highly beneficial influence; of his *Theologisch-homiletische Bibelwerk* an English edition has been prepared under the title of *Lange's Commentary*, by Philip Schaff, and published at New York (1865, seq.).

**Lang'eland** ("long land"), an island of Denmark, in the Baltic, between Funen and Laaland. It is 33 miles long and 3 miles broad. Area, 106 square miles. Pop. 18,399. It is exceedingly fertile, producing wheat, apples, good timber, and excellent cattle. Principal town, Rudkiöbing.

**Lang'emarcq**, town of Belgium, in the province of West Flanders, has extensive manufactures of lace and linen. Pop. 6158.

**Lang'enzielau**, a number of villages in Silesia, Prussia, on the Peila, consisting of Upper, Lower, Great, Little, New, and Old Langenzielau, which together form a town of 12,700 inhabitants. Many kinds of manufactures are carried on, especially cotton.

**Langensal'za**, town of Prussia, in the province of Saxony, numbering about 10,000 inhabitants; was several times the theatre of battles. On Feb. 15, 1761, the allied Prussians and Englishmen, under Sydow and Spöcken, defeated the German imperial army under Steinville; Apr. 17, 1813, the Prussians defeated the Bavarians; June 27, 1866, a bloody contest took place between the Prussians and the Hanoverians. Under the command of King George, who had allied himself closely to Austria, the Hanoverian army, numbering about 20,000 men, broke up from Göttingen and moved southward in order to join the Bavarians, who stood on the other side of the Thüringer Wald. A Prussian corps under the command of Gen. von Fliess, reinforced by troops from Saxe-Gotha, and numbering about 10,000 men, pushed forward from Gotha in order to detain them. At Langensalza an encounter took place, in which the Hanoverians, although victorious, suffered so much that they were unable to continue their march. They lost 102 officers and 1327 men; the Prussians, 846 in all. As a superior number of Prussian troops came on from other sides during the next days, the Hanoverians had to capitulate; the army became prisoners of war, and soon after the kingdom ceased to exist. AUGUST NIEMANN.

**Langeron', de** (ANDRAULT), COUNT, b. at Paris Jan. 13, 1763; served in America as sub-lieutenant during the closing year of the war of the Revolution; rose to be colonel in 1786; emigrated from France at the outbreak of the French Revolution; took service in Russia in 1790, first against Sweden, and afterwards against Turkey (1790-91); was with the Austrian forces in the invasions of the Low Countries and of France (1792-94); returned to Russia, and rapidly rose to the rank of lieutenant-general and count (1799); commanded a Russian division at Austerlitz, and on the Danube in the Turkish war from 1807 to 1812; bore a distinguished part in resisting the grand army of Napoleon in the invasion of Russia (1812-13), in the victory of Leipsic (Oct. 18), and the advance upon Paris (1814); was governor-general of New Russia in 1822; served in Turkish war 1828-29, and d. at St. Petersburg July 4, 1831. He left MS. memoirs which were used by Thiers in the *History of the Consulate and Empire*.

**Langevin'** (HECTOR LOUIS), C. B., b. at Quebec Aug. 15, 1820; was educated at the Quebec College and in Montreal; became an advocate in 1850; was for a time a journalist in Montreal, and afterwards in Quebec; was mayor of Quebec 1857-60, and a member of the Provincial Parliament 1858-66. In 1864 he became solicitor-general, and in 1866 postmaster-general. He was (1866-69) secretary of state in the Dominion cabinet, and 1869-72 minister of public works. He sits (1875) in the House of Commons for Dorchester, Quebec; was made C. B. in 1868. Author of *Droit Administratif des Paroisses* (1862), and is a conservative in politics.

**Lang'ham, de** (SIMON), CARDINAL, b. probably at Langham, Rutlandshire, England, about 1310; became a monk in Westminster in 1335, prior and abbot in 1349, high treasurer of England 1360, bishop of Ely 1362, chancellor 1363, and archbishop of Canterbury by papal provision July 22, 1366. His most noted action was the removal of Wycliffe from the wardenship of Balliol College, Oxford, in which he was supported by Pope Urban V., who signaled his approval by making Langham a cardinal-priest (1368), while the king, Edward III., was favorable to the Reformer. The new cardinal was forced to resign his archbishopric (Nov., 1368), and retired to Avignon, where he became a trusted counsellor of Pope Gregory XI., and d. July 22, 1376. After the accession of Richard II. his remains were removed with great pomp to Westminster Abbey in 1379.

**Lang'home** (JOHN), D. D., b. at Kirkby-Stephen, Westmoreland, England, in Mar., 1735; entered Clare Hall, Cambridge, in 1760; became curate of St. John's, Clerkenwell, and of Blagden, Somersetshire, and was some time assistant preacher of Lincoln's Inn. In 1768 he removed to Folkestone, where his brother William (1721-72) was perpetual curate, and with him made a translation of Plutarch's *Lives* (6 vols., 1770), which still holds its position as one of the most widely-read of any translation from a classic author. He published many poems, tales, and sermons of little value, and in 1777 became prebend in the cathedral of Wells, Somersetshire. D. at Blagden Apr. 1, 1779.

**Lang'land, Langelande, or Longland** (ROBERT), b. probably at Cleobury Mortimer, Shropshire, about 1332; was educated at Oxford; became a fellow of Oriel College, and a monk at Malvern. His *Vision of Piers Plowman*, in alliterative verse, written about 1362, was a satire upon the clergy, and is one of the earliest works written in the English language; first printed in 1550. The best edition is that of Thomas Wright (London, 1856). Langland d. about 1400.

**Langlès** (LOUIS MATHIEU), b. at Perenne, Haute-Loire, Aug. 23, 1763; studied Oriental languages at Paris, and attracted considerable attention in 1787 by his translation into French from the Persian of Tamerlane's *Institutes*. In 1789-90 he edited Father Amiot's Mantchou-French dictionary, and in 1795 he induced the French republican government to establish a special school of Oriental languages, of which he himself became the first administrator and professor in the Persian. Through this school, and through the Geographical Society of Paris, of which he also was the founder, he exercised a large and beneficial influence. He was also the author of numerous works relating to Oriental languages and literature. D. at Paris Jan. 28, 1824.

**Langlois'** (VICTOR), b. at Dieppe Mar. 20, 1829; studied Oriental languages, and travelled in 1852-53 in Cilicia and Armenia, where he discovered over eighty new Greek inscriptions, and undertook excavations at Tarsus, from which he brought many interesting antiquities to Paris. In 1867 he published *Le Mont Athos et ses Monastères*, containing a photo-lithographic reproduction of the geographical work of Ptolemy. In 1868 he began the publication



of *Collection des Historiens anciens et modernes de l'Arménie*, which was unfinished when he d. May 11, 1869.

**Lang'nau**, town of Switzerland, in the canton of Berne, has iron foundries, tanneries, manufactures of tobacco and watches, and an active trade in linen and cheese. Pop. 5860.

**Lango'la**, post-v. and tp. of Benton co., Minn., on the Mississippi River. Pop. 80.

**Lang Plantation**, tp. of Franklin co., Me. Pop. 36.

**Langres**, town of France, in the department of Haute-Marne, situated on the left bank of the Marne, on a plateau at an elevation of 1460 feet. It is an old town, with a cathedral of the eleventh century, a college, and theological seminary. Large trade in grain and cattle, and celebrated manufacture of fine cutlery. It is the birthplace of Diderot, to whose memory a monument was erected here. Pop. 8320.

**Lang's**, tp. of Darlington co., S. C. Pop. 1214.

**Lang'ston**, post-v. of Montcalm co., Mich., 10 miles from Greenville Station, which is on the Detroit Lansing and Lake Michigan R. R.

**Langston** (JOHN MEREDITH), LL.D., b. at Louisa Court-house, Louisa co., Va., Dec. 11, 1829. By birth a slave, he was emancipated when six years old; educated at Oberlin College, where he graduated in 1849, and from the theological department of the same college in 1853; studied law, being admitted to the Ohio bar in 1854; pursued his profession for thirteen years in Ohio, when he was called to a professorship in the law department of the Howard University at Washington, D. C.; became dean of the faculty, and in 1873 vice-president and acting president of the university. Was appointed in 1871, by the President of the U. S., a member of the board of health of the District of Columbia, of which in 1875 he was elected secretary. Author of various addresses and papers upon political, biographic, literary, and scientific subjects, and is distinguished as an orator and scholar.

**Langstroth** (LORENZO LORRAINE), b. at Philadelphia Dec. 25, 1810; graduated at Yale 1831; tutor there 1834-35; pastor of the South Congregational church, Andover, Mass., 1836-39; principal of Abbott Female Seminary, Andover, 1838-39; of Greenfield (Mass.) High School 1839-43; pastor of Second Church, Greenfield, Mass., 1843-48; principal of a young ladies' school, Philadelphia, 1848-52. Since 1858 has resided at Oxford, O. Mr. Langstroth is famous as the inventor of the movable-comb hive, which has wrought a revolution in bee-keeping. Author of the *Hive and Honey Bee*, etc.

**Lang'toft** (PETER), b. in the second half of the thirteenth century, was a canon of the order of St. Augustine at Bridlington, Yorkshire, and derived his name from a parish of the same county, perhaps his native place. He translated from the Latin into French verse Herbert Bosenham's *Life of Thomas à Becket* (1300?), and wrote, also in verse, a *French Chronicle of England* from the siege of Troy to the reign of Edward I., translated into English verse by Robert de Brunne, and edited by Hearne (Oxford, 1755).

**Langton** (STEPHEN), CARDINAL, b. in Devonshire, Lincoln, or Sussex, Eng., about 1160; was educated at Paris, taking degrees in philosophy and theology; became a professor and chancellor of the university and canon of Notre Dame; was a fellow-student with Lothario Conti, who became pope in 1198, and was named in the same year a member of the papal household. In 1206, Langton, while on a visit to Rome, was made a cardinal, and in December of the same year was by express order of the pope elected archbishop of Canterbury in opposition to the will of King John. Though consecrated by the pope at Viterbo in June, 1207, Langton was not permitted to take possession of his see until the submission of King John to the papacy in 1213, when he immediately joined the insurgent barons in their conflict with that monarch, assisted them at Bury St. Edmund's (Nov. 20, 1214) in drawing up the basis of Magna Charta, and headed the list of baronial signers of that instrument at Runnymede (June 15, 1215). For this conduct he incurred the censure of the pope, and notwithstanding a visit to Rome was suspended from his functions in December of that year, but restored Feb. 1216. He returned to England in 1218; crowned Henry III. in 1220; presided at the Council of Osney in 1222, which drew up a code of canon law; watched over the observance of Magna Charta; and in 1223 again placed himself at the head of the barons to demand its confirmation from Henry III. The division of the Bible into chapters has been commonly attributed to him. He is represented as having been a man of great learning and author of numerous theological works, none of which, however, is extant. D. at Shindon, Sussex, July 9, 1228. (See Hook's *Archbishops of Canterbury*.)

Vol. II.—103

**Lan'guage**. The word *language* comes from the Latin *lingua*, "tongue," through derivative forms represented by Fr. *langage*, It. *linguaggio*. It signifies, then, primarily, utterance by the tongue, that being the most active and essential of the articulating organs. It is in accordance with this that we use the word; it denotes articulate utterance for the expression of thought. But this also in two ways. First, we mean by *language* the general power or faculty of expression of thought by articulate utterance, a power possessed and exercised by all normally constituted and circumstanced human beings (not by the deaf nor by the solitary); in this sense, *speech* is its common synonym. Secondly, we mean a particular body of articulate utterances, signs for thought, used in some definite community, present or past, as their means of expression; intelligible between members of that community, but not to outsiders. It is of the highest importance to hold these two senses clearly apart, for upon their confusion depends no small part of the false views of language more or less commonly held.

We shall begin by considering the external body of language, the audible sounds. These are produced by an apparatus located in the throat and mouth, supplied with material by the lungs. The lungs send forth a current of air through the throat and mouth. This receives tone and pitch in the larynx by the action of the vocal cords, which are the membranous edges of a pair of half valves, capable of being brought close together and made tense across the passage of the throat, so that the expelled air causes them to vibrate like the tongue or reed of an organ-pipe; and this vibration, transmitted to our organs of hearing by the sympathetic movement of the air, is cognized by us as sound. Above this vibrating apparatus is set the cavity of the pharynx, the mouth, and the nose, in the manner of a sounding box; and voluntary changes made in the walls and apertures of this box differentiate the sound, giving rise to a great variety of distinguishable products, which are our alphabetic sounds. That branch of linguistics which concerns itself with the physical character of alphabetic sounds, as dependent on the voluntary movements of the organs, is called phonetics or phonology; it involves something of acoustics, and something of anatomy, but is quite distinct from either. A very brief consideration of its leading principles will be all that is needed here.

The number of distinct articulations capable of being produced by the organs of utterance is indefinitely great. Nearly 300 have been represented separately by Ellis in his "Paleotype" (first chapter of *Early English Pronunciation*). But many of these are variations, hardly perceptible to any but skilled and observant ears, of what is practically the same sound; and no single language uses for purposes of speech more than a fraction of this number. The most important division of the system is into vowels and consonants. The vowels are the opener sounds, those in which the modifying action of the mouth-organs on the intoned currents of breath is least, which are therefore mainly tone; the consonants are the closer sounds, those in which the element of oral action prevails more or less over that of tone. Upon the antithesis of vowel and consonant, the succession of alternately opener and closer sounds, depends what we call the *articulate* character of our utterance; the stream of audible sound, consisting especially of the vowels, is narrowed or cut off from point to point by the consonants, and so broken into *articuli*, "joints," being thus made both distinct and flexible to a degree that would be attainable in no other way. There is a class of consonants—*p b, k g, t d*—in which the interference of the mouth-organs with the stream of breath is carried to the extreme of complete stoppage; these are called *mutes* (stops, checks). There is another in which the organs are so closely approached that a rustling or buzzing is heard at the orifice, and is the conspicuous element in the sound produced; these are called *fricatives*; they are conveniently divided into *sibilants*, such as *s, z, sh, ch* (of *azure*)—and *spirants*, such as *f, v*, the two *th* sounds (*thin, then*), and the German *ch*. Another very distinct class is that of the nasals or resonants; in these there is a complete closure of the mouth-organs at the same points as in the utterance of the mutes, but the nasal passage is unclosed, so that the sounds are sonorous and continuous—as *m, n, ng* in *man, strong*. In the nasal vowels (e. g. of French) there is an admixture of the nasal passage along with ordinary vowel utterance, giving an added twang to the product. One more class of consonants remains, the semi-vowels *l, r, i, u*—sounds which stand on the line between vowel and consonant, being only infinitesimally different from the rest *p, b, k, g, t, d*, the *s* sound, and *w* from the *u* of *cut*, the *e* sound, and *y* and *i* being convertible, and by many languages converted, to vowel uses.

In English, and in the majority of other languages, there are in the mouth three phases of complete closure, produ-



cing mutes—a front, or labial, at the lips, giving *p* and *b*; a back, or palatal, between the back of the tongue and the soft palate, giving *k* and *g*; and an intermediate, or lingual, between the tip or front part of the tongue and the roof of the mouth at or back of the upper front teeth, giving *t* and *d*. The last two pairs may vary in character according to the place on the palate and the parts of the tongue used; and different *t*'s and *k*'s are sometimes found side by side in the same language. Usually there is, as in English, a corresponding nasal for each mute closure. But the other consonants also often have the same organs of production: thus, the *f* and *v* and *w* are more labial; the *h*, *th*, *s* and *z*, and the *x* and *l*, are lingual; and the *ch*, the *sh* and *zh*, and the *y* and *e* more palatal. And even the vowels show the same tendency: from the *a* sound of *far*, which is the purest alphabetic one, most unmodified by the mouth-organs, the tongue approaches the palate, toward the *k*-position, more and more in the *e* of *pen*, the *i* of *pen*, and the *i* of *pin*, giving thus a palatal series of vowels; and the lips are more and more rounded and approached in the *o* of *all*, the *oo* of *po*, and the *oo* of *rule*, giving a labial series.

There is one more principle of relationship to be noted: that of sonant to non-sonant or surd sounds. The *s* and *z*, for example, are uttered with the same articulating position of the mouth-organs, but the former with simple breath, the other with intonated breath or sound; the former a hiss, the latter a buzz. And the difference of *t* and *d* is the same, sound beginning in the former only immediately after the breach of mute contact, which is made with breath alone, but in the latter before the breach, by forcing air enough to support for a moment the sonant vibration of the vocal cords up into the closed cavity of the mouth. Thus, the mutes and fricatives go usually in pairs, of surd and sonant. But in the opener positions the mere breath is not sufficiently characterized to give an alphabetic constituent for each position, and we throw all the different products together as *h*.

The principles, then, which determine the system of the alphabet are: (1) the degree of approach of the organs, between the absolute openness of *a* (*far*) and the absolute closure of *k*, *t*, *p*; (2) the particular organs or parts of the mouth brought toward or against one another; and (3) the kind of material furnished to the mouth-organs by the throat, whether breath or sound. Annexed is a sample alphabet thus arranged, containing (with neglect of some minor distinctions) the simple sounds of the English language:

	$\begin{matrix} & & & \alpha & & \\ & & & \text{æ} & & \text{A} \\ & & i & \text{e} & o & u \\ & y & & & & \end{matrix}$						vowels.	
sonant.								
		<i>ng</i>	<i>r, l</i>	<i>n</i>	<i>u</i>	<i>w</i>	semi-vowels.	} consonants.
surd.	<i>h</i>						nasals.	
sonant.	<i>ch</i>		<i>z</i>				aspiration.	
sonant.	<i>sh</i>		<i>s</i>				sibilants.	
sonant.			<i>dh</i>			<i>v</i>	spirants.	
sonant.			<i>th</i>			<i>f</i>		
sonant.	<i>g</i>		<i>d</i>			<i>p</i>	mutes.	
surd.	<i>k</i>		<i>t</i>			<i>b</i>		
	palatal series.		lingual series.			labial series.		

In this scheme, *a* represents the *ā*-sound in *pan*, *A* the sound in *all*, and *æ* the "neutral" vowel-sound in *hut*, *hurt*.

The spoken alphabet of every language may be reduced to a systematic form resembling this. Alphabets are, however, of very different character as regards both the number and the identity of the sounds composing them. And languages differ not only in their sounds, but in the combinations of sounds allowed in forming syllables, and in the combinations of syllables allowed in forming words. Some have hardly more than a dozen articulations, all told, while the Sanskrit and English each possess near fifty; some allow only one consonant in a syllable, and that always before the vowel, while the English makes such intricate and difficult combinations as *strands*, *twelfths*; some (as Chinese) admit only words of one syllable, while American Indian languages sometimes count the syllables of a word by the score. And as they differ in these respects, so also, and much more, in the combinations of sounds by which they represent any given conception: whence the diversity and mutual unintelligibility of human languages. This diversity, which is very different from what we might feel ourselves authorized to expect, considering the fundamental unity of the human mind and its operations, is one of the problems which the science of language has to explain.

We have said that articulate sounds are produced by the voluntary action of their utterers. Of course this does not imply that the speaker understands at all the mechanism which he sets in motion, or commands it otherwise than as he commands the mechanism of locomotion or of gesture. Each human organ is capable of making all the sounds

that are found in any human alphabet, and a great many more; and apart from special individual disabilities) any sound is equally easy at the outset, before habits are formed, to all human beings; there is nothing characteristic of race in the alphabets of different races. But each person grows up to produce by imitation just those sounds which he hears others make about him. Some sounds, however, are easier and sooner learned than others; the norm in every language is given by the practised adult speakers, and the child, beginning by reproducing only imperfectly what he hears, gradually acquires the same facility and accuracy as his fellows possess. Just so, every well-endowed child is capable of gaining the skill of eye and hand required for any one of an indefinite number of trades; and he actually gains that to which he is made to apply himself. Without such application he would learn none; and so he would acquire no language if he were not taught it. There are, we shall say, a thousand different languages in the world, and each of them has a different word for "hand," or "green," or "run;" there is no reason why any human being uses one of these thousand words instead of another, except that he hears it used by others, and then himself learns to reproduce it by imitation, and to associate it with the same idea which it represents in their use. There is no such relation between the articulating apparatus and the apparatus of mental action, of perceiving, and comparing, and judging, that anywhere in the world a human being produces a series of articulate sounds by an internal and natural impulse as representative of a conception. The relation of uttered signs for ideas is precisely what that of acted signs would be; the hands and arms are capable of making an infinity of combinations of motions, and, as the experience of the deaf-mute shows us, a person is capable of associating conceptions with these motions to such an extent as to make them a full apparatus for the expression of thought. We see clearly enough that the tie between such signs and the movements of the mind is an external and artificial one; but it is not less the case with our own signs. That is to say, every uttered word is an arbitrary and conventional sign—arbitrary, because any other could have been made to answer the same purpose; conventional, because the selection of this one has its sole ground in the accordant usage of a community. It was learned by the direct instruction or from the example of others who used it already; it has no tie with its inner content or meaning save that of a mental association. He who has acquired and learned to use one set of signs may add another and another, and use them also with readiness, even forgetting, if the shift be made early enough, his first acquired set, or "native language," in their favor.

We see, then, clearly, what the "gift of language" is to man. It is a general power of expression. It consists in such gifts of mind and of body, and in such command over them, that any human being can possess himself of any of the systems of expression established and current in the world, and make use of it, more or less perfectly, for communication and for the operations of his thought. It places all existing languages within his reach, but puts none into his possession; he can learn to speak anything, but can speak nothing without learning. But the power to use implies also, at least to a certain extent, the power to produce. If there could be such a thing started as a speechless community of human beings, it would, by the exercise of its gift, make a beginning of supplying itself a language, which would become increased and extended and perfected until, after generations enough had made their contributions to it, it would compare with some of those now current. Of what kind the beginnings would be we shall see better after considering the main facts relating to the life and growth of the existing tongues.

Men are, even now and everywhere, makers as well as learners and users of language. If the whole life of language consisted in simple teaching and learning, every language would continue the same from age to age. But not one does in fact continue the same: all are changing, some more and some less rapidly. The English has changed so that the form of a thousand years ago, which we call Anglo-Saxon, is as a wholly strange tongue to us. Latin changed into Old French, and this into modern French; old High-German changed into Middle, and this into New; and so on. This is simply the effect of the collective mind of the speaking community working underneath its apparatus of expression, and adapting the latter to its changing needs and shifting preferences. Nothing is plainer than that whatever new knowledge and altered conceptions may arise in a community must somehow find expression in its speech—that the passing out of mind of old conceptions is accompanied by the oblivion of their signs (if not transferred to new uses); and then there is, besides, a kind of wear and tear of words, by which they change shape or disappear, and a constant production of new material to take the



place of what is lost, and to extend and improve the means of expression. To understand these changes is to understand the growth of language; and in order to be understood, in themselves and in their causes, they need to be studied in their detail; the general effect is only the sum of details, each of which has its own history and occasion.

The changes of language may be best grouped under three heads: (1) alterations of old material; (2) loss of material; (3) additions of new material. Alterations of old material, again, are made either in the external andible form of words or in their internal content, their meaning. Each kind of alteration is independent of the other; and for the reason that the tie between form and meaning is, as pointed out above, only one of the convenience of use; otherwise the two could not be divorced. Each is determined by the requirements of the convenience of the users; and this, so far as alteration of outward form is concerned, makes towards ease of utterance, economy of the muscular effort of enunciation. The principle of ease is that which underlies the whole department of phonetic change. It shows itself most obviously in the constant abridgment which words undergo by the loss of initial, and especially of final, sounds and syllables, and the omission or contraction of interior elements. Thus, *bear* in "we bear" is from *bharanasi*, *bore* in "we bore" from *babbharanasi*, *had* in "had we" from *habhaddhina*; *alms* is from *eleḥ-masmi*; and so on. We may follow the gradual reduction of a word like *bharanasi* through such forms as *pharanes* (dial. Greek) and *pharinas* (Lat.), and *beiran* (Goth.); and so in innumerable similar cases. By this means especially the endings which once showed the grammatical forms of words are worn out and lost. As is well known, no language shows the results of this abbreviating process in such a degree as the English. The monosyllables which form two-thirds to three-quarters of our language as spoken or written were all of them words of two or three or more syllables in its earlier condition. But also the constituent elements of words that are spared become variously altered. The character and extent of the spoken alphabet are all the time slowly changing. Old sounds go out of use; new ones are introduced; both vowels and consonants are shifted to other places and modes of utterance. Thus, the old Indo-European aspirates (mutes with a puff of *flatus*, a kind of *h*, following the breach of their contact) have long since disappeared in Europe, becoming variously altered; the root *bhar*, instanced above, is in ancient Greek *pher* (*ph*), in modern Greek, as in Latin, *fer* (the *f* a vowel not found at all in the original alphabet); in Germanic, *ber*; the *hab* of *haban* (our *have*) is Latin *cap* (*capere*); and so on. All such transitions of sound are more or less strictly reducible to rule, being governed by the physical relations of sounds and by the general tendencies of language, as modified by the special tendencies and habits of each particular community. To trace them out, and, so far as is possible, explain them, is the task of phonetic science. Assimilation is the head under which the larger part of them fall; both on the smaller scale, making difficult combinations more pronounceable, and on the larger scale, approximating the whole vowel and consonant systems to one another, making the vowels closer and the consonants opener, and thus filling up the alphabetic system with intermediate, more slightly differentiated, sounds. In Indo-European, *s* was the only fricative consonant, and *a* (*far*), (*piquer*), and *u* (*rule*) the only vowel-sounds, and a formed a quarter to a third of the whole utterance, while with *u* *a* has sunk to much less than a hundredth. There are examples of the opposite principle, dissimilation, and more difficult and anomalous cases; of which the most noted and intricate is the so-called Grimm's law of the rotation of mutes in Germanic language, whereby, of the original sord, aspirate, and sonant mutes (in this order) each is by the majority of Germanic dialects pushed around one step, and in the High-German two steps; thus, Sans. *tad*, Eng. *that*, Ger. *dass* (the *s* silent replacing the aspirate).

The changes of internal content or meaning of words are quite as indefinitely various as those of form, and even more irreducible to systematic order. There is hardly a conceivable transfer of use which may not be found exemplified in the history of words. But much the greater part of them may be rudely classified under two great heads—restriction and extension. By restriction or specialization is meant the taking of a general word expressive of quality or action, and making of it the specific appellation of some thing or class of things possessing that along with other qualities. Thus, the *sun* is named from its "shining," the *moon* from her "measuring" of time; a *planet* from its "wandering" motion; the *electric force* from its displaying itself in "amber" (when rubbed); a *creascent* from the shape of the "growing" moon; a *board* from its being "broad" in proportion to its thickness; and so on. This is one of the earliest, most constant, and most fruitful

methods by which names of things have been won. But a name, once won, becomes the appellation of a class of related things, and the limits of classes are constantly shifting and spreading by direct and indirect means. Even *sun* and *moon* become class-names when the progress of astronomy discloses other bodies of analogous character with them; *planet* is, by the same means, both changed in application (made to exclude *sun* and include *earth*) and widened to take in Uranus and Neptune and the asteroids). But not ties of scientific classification alone, ties of analogy, of every kind and degree, are used to extend the sphere of application of words. *Board* is made to signify the "table," and then the food set on it, and the body of men that sit round it (*board* of directors, etc.). *Put*, literally "put, placed," gets a whole scheme of meanings, seemingly of utter diversity, although each is really fastened to some one of the others by a traceable tie of association. Thus, a great part of our words come to have a variety of senses more or less remote from one another—senses which it is the office of the lexicographer to place in their right mutual relations, but which the ordinary speaker would often be puzzled to explain. But there are two special departments of this change which require a word or two of additional notice. In the first place, all our expressions for intellectual and moral conceptions and relations are obtained thus from terms originally indicative of what is physical and sensible: thus, *right* is "straight," and *wrong* is "wrung" or "twisted;" *understand* is "stand in the midst" of anything; *imply* is "fold in," *apply* is "fold to," *reply* is "bend back," *comply* is "bend along with;" *develop* is "unwrap;" *occur* is "run against;" *apprehend* is "take hold;" and so on. In the second place, words indicative of relation, form-words, connectives, auxiliaries, are made from words formerly of more definite and material meaning by a gradual extension so wide that it results in a complete effacement, by attenuation, of that meaning. Thus, the verb *be*, the copula between subject and predicate, is made up of roots signifying originally "grow," "dwell," "sit," "stand," and the like. The auxiliary *have*, now a sign of past time (*I have done*), of future obligation (*I have to go*), and so on, is from a root meaning "seize," "grasp;" *will* comes from "enclose," *shall* from "offend," *may* from "be strong." The articles are from demonstratives and numerals; relatives, from demonstratives and interrogatives; conjunctions, from adverbs and other parts of speech.

By both these methods the material of a growing and cultivating language is constantly undergoing conversion to finer, more formal, more conceptual uses, and this is perhaps the grandest general movement that goes on in it. There are minor movements of every kind, many of which are made the subject of exposition and illustration in such works as Trench's *Study of Words* and *English Past and Present*; there is no space to dwell upon them here.

The second general division of linguistic change is that of loss. It is a comparatively simple subject. As language is maintained and kept in existence only by use, disuse causes disappearance of any of its elements. A word is lost when the conception for which it stood dies out of men's knowledge and remembrance; so, for example, the phraseology of ancient religion and ancient arts, when these are superseded by new, unless, indeed, some of the old words should take on new and changed meanings; then we have only that minor kind of loss which consists in the disappearance of an internal content. But words are also crowded out of use by the uprisal of new terms which come into fashion and make them dispensable. When, for example, the flood of words of Latin origin was brought in upon English, it caused the obsolescence of many an equally good term of Saxon origin; and sporadic cases are always liable to happen of words being allowed by carelessness, as it were, to die out, which we afterwards regret.

A more important department of loss consists in the disappearance of the signs of grammatical distinctions, and with these of the consciousness of the distinctions themselves, chiefly as a result of the wearing out processes of phonetic decay. As already noted, no modern language offers such abundant exemplification of this as our English. Thus, the seven original cases of our family have been reduced to two (in certain pronouns, three); the five original tenses, to two; the agreement of the adjective with its noun, in two forms of declension, is entirely lost; the scheme of artificial or grammatical gender is obliterated; the subjunctive mood is nearly gone. But the same thing is true in less degree of all the languages akin with ours, and of all others which have any grammatical structure at all. The law of abbreviation is inexorable in its working, and, along with what can well enough be spared, takes away what is valuable.

The third division of change includes additions to the material of language. Of the addition of new meaning to old words, sufficient notice has already been taken; and it



is evident that by this means the resources of expression of a language may be very much increased without any corresponding outside show. It is possible, too, to no small extent, to pile away the results of new knowledge in the old words: however much we may come to know more than of old about the *sun, heat, rising and falling*, and innumerable other subjects, it does not disturb our employment of the traditional names. These are just as real parts of the growth of language, produced by the same forces and for the same purposes, as the more external additions. External additions are of two kinds: those made by borrowing from abroad, and those made by the development of native material. Borrowing is a wellnigh universal process of language-making; there is hardly one unmixed tongue in the world, unless here and there a dialect which never comes into contact with any other. But only those languages borrow on a large scale of which the speakers have derived to a large extent their culture, knowledge, institutions, from other communities. The Persian in this way gets material of expression indefinitely from the Arabic; the Turkish, from the Persian and Arabic; the modern dialects of India, from the Sanskrit; the Japanese, from the Chinese. And so all the peoples who inherit Greek and Roman civilization have taken abundantly from the Greek and Latin vocabularies. And our English has borrowed more than any other language that is not descended directly from the Latin; partly because the forcible fusion of a Germanic and a Romanic dialect which was the result of the Norman Conquest opened the door to such borrowing and made it easy; and partly because the native processes of composition and derivation in English had become so inactive that not much growth could be accomplished by their aid. As our vocabulary presents itself in the dictionaries, about five-sevenths of it are of classical origin. Of course, in actual use, in speaking or writing, the proportion is very different, because the core of the language, embracing the words of most frequent use, is almost exclusively Germanic: the Germanic part is 60 to 90 per cent. Names of things are most easily and directly borrowed, connectives least easily, grammatical apparatus, endings of derivation and inflection, almost not at all. The foreign material is stripped of its native grammatical form, and often shaped over a little to assimilate it to the native stock of the borrowing language; and it is prepared for free practical use by means of the grammatical apparatus of the latter, each borrowed element thus often becoming the nucleus of a little family of derived and inflected words. What thus comes into a language is to a very great extent only words of learned use, employed almost exclusively by those who know it as of foreign origin and recognize its source; but more or less of it, according to circumstances, works its way down into popular use, and is then in no way distinguishable from that which is of ultimately native growth: the mass of speakers use their words simply because they are in use, neither knowing nor caring whence they came.

For obtaining new resources of expression out of the old material of a language, the methods cannot, of course, be very various. In the course of the phonetic changes of language a single word sometimes divides into two or even more forms, which then go on to lead an independent life; so Anglo-Saxon of has separated *into* and *off*, Anglo-Saxon *an* into *one* and *an* or *an*, *also* into *also* and *as*; and we have such doubts as *minute* and *minut*, *conduct* and *conduct*, *gentle* and *gentel* and *gentile*, and so on; but such a method operates only on a very restricted scale. A process of much wider reach and greater importance is that of the formation of compound words, which is very extensively and fruitfully resorted to by all the tongues of our family, although much more by some than by others. We have in English, for example, combinations of every grade—from such loose ones as *book-cover*, *chair-back*, through closer, like *tablecloth*, *independent*, *homestead*, *railroad*, *steamboat*, to such as have been so far altered in pronunciation or meaning, or both, that we do not ordinarily think of them as compound at all, like *breakfast*, *forehead*, *boatswain*, or such as have their origin wholly concealed from all but learned eyes, like *such* and *which* (from *soc-like* and *whelike*). Many a seemingly simple word of ours is proved by historical inquiry to be put together, no great way back, from two or more others. For we are always ready to forget the origin of the terms we use when they are once made and put to use; and then the process of phonetic change seize upon them and alter and disguise them past recognition.

Very frequently these processes act only upon one, the latter, of two members of a compound, converting it into a dependent addition to the other. Thus, our *ly* in *godly*, *manly*, *homely*, etc. is to us a mere suffix, forming adjectives from the nouns *god*, *man*, *home*; or, in other words, as *freely*, *truly*, it makes adverbs from adjectives; but in Anglo-Saxon it was an appended adjective, *lic*, *lice*, our

*like*. The *d* which makes the past tense of our "regular" verbs is similarly traceable to the verb *did*, added as an auxiliary in early German language to some verbal word. The *ai* of French *chanterai* is an auxiliary—*j'ai*, "I have." The *bam*, *bo*, and *vi* of Latin verbs are of the same origin; so is the *oa* (*ao*) of the Greek future. These are but examples of a large number of endings or suffixes which come demonstrably from independent words, at first compounded with other words, then disguised in form, and finally coming to be felt as mere modificatory appendages, and extended in use in that office. No other method of producing such elements of expression is known through all the historical epochs of language. It is true that by no means all suffixes admit of this explanation; but that is because the evidence which would constitute an explanation is no longer attainable. The facts in our language which seem to make against it—especially the instances of internal change like *man men*, *lead led*, *give gave*—are capable of easy explanation as inorganic or accidental results of phonetic change, and traceable to original external addition like the rest. In short, we have here a method of linguistic growth which is in complete accordance with the facts and tendencies of known linguistic history, and which, in the opinion of the best modern students of language, is capable of having produced the whole structure of speech. It works very slowly, indeed, as compared with wholesale borrowing, but its effects are infinitely deeper and more important.

All these methods of change are carried on, it will be observed, in the interest of convenient expression. There is new knowledge of every kind to be provided for—new facts, new classifications, abstractions, deductions; and there are, not so indispensable, but as inevitable, changes of the instrument of expression itself in its uttered form, in its apparatus of connection and relation. As a whole, the process seems a highly intricate one, but in its details it is perfectly intelligible. It is a constant name-making, a never-ending satisfaction of the individual needs of expression, as suggested by and built upon the already subsisting uses of a language, as governed in the mode of satisfaction by the existing habits of speech, and by the circumstances of the case. The idea being conceived, the mind reaches after the means of its signification, and finds this wherever it lies most ready at hand. The mind is easily content: no nicely adapted sign, essentially bodying forth the conception, is required; only a representative which shall be henceforth associated with the conception, and one having such relation to antecedent expression that it shall commend itself to the acceptance of the community. For this is an ordeal which everything in language must pass. Nothing is language until it is adopted by a community as its means of communication. Though every individual change proceeds from individual action, and has its own time and place and occasion of origination, the common action is equally a factor in its history.

It is easy to find, in the antithesis of individual action and that of the community, the explanation of dialectic variation. Every language is all the time changing; it changes by specific items, which begin with individuals and spread by communication, by imitation, through the whole mass of the community. So long as they do thus spread, the language of the community, however rapidly it may change, remains homogeneous throughout its whole territory, with the exception of those minor local and class differences which prevail within the limits of every existing tongue without disparagement to its unity, because those who speak it can all understand one another in reference to the most necessary subjects. But if the parts A and B and C, and so on, become separated from one another, so that the changes initiated in A do not spread into B and C, nor those made in B or C into the rest, then the local differences begin at once to be multiplied and deepened; mutual intelligence becomes more and more difficult, and finally impossible; and different languages are the result. All, then, that makes for unity of community represses dialectic growth. And the forces of culture are those which work most efficiently toward this result. A literature, writing, instruction, tend to check the rate of change of a language, and to efface local and class differences already existing. Ignorance and barbarism both encourage rapid alteration, and, by favoring the isolated and antagonistic position of districts and tribes, make for divarication also. The maintenance of wide-extended unity of speech, because of wide unity of other institutions, is possible only under civilized conditions.

The state of language throughout the earth is precisely what the principles here laid down would lead us to expect. The world is full of dialects, some closely and obviously akin with one another, others having resemblances discoverable upon closer examination, others apparently unrelated. If speech began to exist along with a single race or a limited number of races of human beings, and



spread with them from land to land and from continent to continent, ever altering and divaricating dialectically with every new division of a race or community, the result would finally be what we see it to be. In the long ages of barbarism the growth of dialects was the prevailing tendency; since civilization has become the overwhelming force in the history of the world, the tendency is the other way: the cultivated dialects of the leading nations are extending, and crowding out diversity, and even encouraging men to look forward to a time when one or two languages shall prevail universally.

Such being the case, it is evidently one of the first objects to be aimed at by the students of language to make a classification of all human dialects according to their relationship and its degrees: only thus can the way be prepared for the historical research of language in general. And this work has been accomplished, so far as the assemblage of materials has made it possible—provisionally, that is to say, and with full acknowledgment of the probability of amendment and improvement hereafter. And at least the main outlines of the classification we have here to review. In imitation of genealogical phraseology, the dialects regarded as demonstrably descended from a common ancestor are called a "family," each family being then divided into branches, sub-branches, etc., as may be found convenient.

*Indo-European Family.*—This is sometimes also called *Aryan*, or, by the Germans, *Indo-Germanic*. It is the family to which our own tongue belongs, with most of the other languages of Europe, and with those of South-western Asia: and it is by far the most important of all. It is divided into seven principal branches. There is (1) the *Indian*, or *Sanskritic*, an intruder into India from the N.W., probably not more than 2000 to 3000 years B. C., and gradually filling all the northern country, with a part of the southern peninsula, the Dekhan; the rest remaining in possession of the more aboriginal Dravidian tribes. Its oldest language is the Sanskrit, the earliest parts of the literature of which, the hymns of the Veda, go back probably to near 2000 B. C., the remotest date anywhere reached among Indo-European records. The language is also less altered, by changes either of form or of meaning, from the original common speech than is any other; and hence the Sanskrit takes the leading place in all researches into the oldest language-history of the whole family. The great groups of varying dialects known as Hindi, Bengali, Maharratti, are the modern representatives of the branch; and between them and the Sanskrit lie the Prakrit dialects and the Pali, the sacred language of Southern Buddhism. (2) The *Iranian* branch, occupying the great Iranian plateau between the borders of Mesopotamia and of India. It is nearly akin with the Indian, and the two are often, and very properly, combined together into a single "*Aryan*" branch; their oldest dialects are hardly more unlike than, for example, some of the Germanic languages are unlike one another. The oldest records of the branch of definite date are the cuneiform inscriptions of Darius and his successors (from about 500 B. C.); in part, probably, older is the Bible of the Zoroastrian religion, the Avesta; its language is called the Zend, or Avestan, or Old Bactrian. Of considerably later date is the problematical *Iluzvâresh*, or *Pehlevi*; and the *Parsi* but little precedes the Modern Persian, which has a great and valuable literature, beginning from about 1000 A. D. To this branch belong also the Kurdish, the Ossetic in the Caucasus, and probably the Afghan; also the Armenian, which has a literature going back to the fifth century of our era. (3) The *Greek* branch. Of this the history is too well known to require more than a word here. It has in the poems of Homer the oldest monuments of the family outside of India. What were the relations, to it and to the family, of the languages on the N., and of those on the E., in Asia Minor, is very uncertain, and will perhaps never be determined. The present Albanian, or *Skjpter*, regarded as modern representative of the ancient Illyrian, is of disputed character, but more probably Indo-European. (4) The *Italic* branch. This included a considerable number of the languages of Italy; and of some of them, especially the Oscan and the Umbrian, considerable remains are left; of others, as Volscian and Sabine, the mere fragments. All were wiped out by the Latin dialect of Rome, which also extended it all along with Roman dominion and institutions, in both directions through Southern Europe, giving rise to the modern group of the Romance languages, embracing as its principal members the Italian, French, Provençal, Spanish and Portuguese, Rumanish, and Wallachian, each in losing a great variety of dialects. The literatures of these modern languages commence between the tenth and thirteenth centuries; fragments of Latin come down from the third century B. C. (5) The *Celtic* branch. The Celtic languages formerly occupied a very broad space in Europe,

but they have been continually encroached upon by both Romance and Germanic, until now they survive only on the farthest western edges of their old territory. The Welsh, the Cornish (extinct since the end of the last century), and the Armorican of Brittany constitute the Cymric division of the extant dialects; the Gadhelic includes the Irish, the Gaelic of Scotland, and the Manx of the Isle of Man. Irish and Welsh monuments go back to the eighth and ninth centuries. (6) The *Slavonic*, or *Slavo-Lettic* branch. The seat of the Slavonic languages is in Eastern Europe. The important members of the eastern subdivision are Russian, Bulgarian, and Servian; of the western, Polish and Bohemian. The earliest Slavonic record is a Bible version made in the ninth century. The branch is a double one, in virtue of being made to include the more remotely but still specially kindred Lettish dialects—namely, the Lithuanic, Livonian, and (extinct) Old Prussian. These have no records older than the sixteenth century, but the Lithuanian especially is distinguished by the primitiveness of some of its forms. (7) The *Germanic* (or *Tentonic*) branch. This is divided into four sub-branches. The *Mæso-Gothic*, or dialect of the Goths of Mæsia, is long since extinct, and is represented only by parts of a Bible version made by Ulfilas in the fourth century. It occupies, as both oldest in time and most primitive in structure, much such a position in the branch as the Sanskrit occupies in the family. The Scandinavian sub-branch fills Denmark, Sweden, Norway, and Iceland. It has its oldest living representative in the Icelandic, and its oldest and most original monuments also come from Iceland in manuscripts of the twelfth and thirteenth centuries. The more proper German is divided into the High-German of the central and southern region, and the Low-German of the northern lowlands. The High-German begins its Old period in the eighth century, its Middle in the twelfth, and its New in the sixteenth; what we call the German language is its only cultivated dialect. A great part of the Low-German territory in Germany now acknowledges the supremacy of the literary High-German; but the Netherlandish or Dutch has an independent culture and literature, and the English is its colony, brought to Britain by the Angles and Saxons in the fifth century and later. The oldest Anglo-Saxon remains are from the seventh century.

Respecting all this great and important body of languages is to be held, in conformity with the principles laid down above, that they are descended from the tongue of a single community which lived somewhere, within narrow limits, at some remote period, and by spread and emigration broke up, over and over again, into separate parts, with the inevitable consequence of the breaking up of its speech into dialects. Where and when that original community lived it is wholly impossible to determine from any evidences as yet brought to light; certainly, language does not give, and cannot be expected ever to give, any definite information about it. The question of the time depends wholly upon the grander and now much mooted question of the antiquity of man on the earth; the historical linguist will only say that he does not know well how to compress all the events of Indo-European language-history into the brief space of 6000 years, and will welcome an extension of the period; but what extension to ask for he does not at present know. As for the place, the popular impression which fixes it about the Hindu-Kush or in Bactria has no defensible basis whatever; the facts of language admit of being reconciled with almost any theory that can be suggested. It is now prevailingly held by linguistic scholars that the European branches must have constituted a community together for some time after their common separation from the Asiatic or Aryan branch; but that proves nothing. The Slavonic and Germanic branches are also believed to be of especially near kindred; whether the Celtic branch shall be reckoned as independent, or more closely connected with the Italianic, is a disputed point, as is also the special relationship of the two classes of languages. While language is thus silent as to place and time, it gives some definite information respecting the condition of the primitive community, showing it to have been not merely nomadic, but of settled and agricultural life, with well-developed family organization, with domesticated animals, with some of the arts of life, and with knowledge of a metal or two.

The history of development of Indo-European language is better understood than that of any other family, the materials being exceptionally abundant, and having received an amount of study which has been less well upon no other. Its main features are pretty clear, though there remains abundance of obscurity in its details. The language began in a condition of monosyllabic "roots," analogous with those of which, for example, the Chinese language is even down to the present time composed, utterances which were



neither noun nor verb, nor any other "part of speech," but were as ready to turn to the uses of one as of another. They were of two classes—verbal roots, expressing material, sensible act or quality; and a small number of pronominal or demonstrative roots, indicating position and direction. That the distinction of these classes is primitive is by no means certain; but it is at any rate earlier than the growth of Indo-European structure. The first important step of growth, it seems, was the making of a predicative or assertive form—a verb; it was done by combining with verbal roots certain affixed pronominal elements, and "understanding" the copula between them; thus, *dā-mi*, "giving I," to be used henceforth only in the sense "I [am] giving" (or, "a giver;" or "giving mine"). Thus were made the three persons of a verbal form, in three numbers, singular, dual, and plural; and the addition of a preterit "augment"—tense, *a dā-mi*, "then-give I"—*i. e.*, "I gave," a reduplicated preterit or perfect *dā-dā-mi*, "give-give I"—*i. e.*, "I have given," and a future, *dā-syāmi*, probably "I am going to be giving," left to this simpler form the character of a present. More or less of an imperative, optative, and subjunctive, and of a middle or reflexive voice, also were products of the original tongue before the separation of the branches. The establishment of a verb left the remainder of linguistic material in the condition of noun, noun substantive and noun adjective; for these two parts of speech were at first not held apart. A system of inflection was by similar means (very hard to understand in their detail) created for these also, indicating case, number, and gender. Of cases there were seven, besides the vocative—namely, nominative or subject-case, accusative or to-case (also direct object), ablative or from-case, locative or in-case, instrumental or by-case, dative or for-case; and genitive, case of general relation or appurtenance. Of numbers, there were the same three as in the verb; and the distinction of gender, which, founding itself on the natural differences of sex, extends itself to all objects of thought, being only in small part governed by sex, is something very characteristic of our family; much the smaller number of human languages make any account of such a distinction. The pronouns are a class of words inflected like nouns and adjectives, but coming from pronominal instead of verbal roots. From the same roots come naturally the first adverbial words, indicators of position and direction; the other particles, prepositions, and conjunctions are yet later to arise. The interjection is no "part of speech," but rather an unanalyzed, holophrastic utterance, analogous with the undeveloped root. Thus, by combination of element with element, and the assignment of the combinations to specific uses in definite connections, this language arose from a mere indefinite intimation of intended meaning, such as our exclamations give, to orderly and distinct statement—first in single clauses, then in elaborate combinations of clauses, in periods. How much time the process occupied it is impossible to say, but it must have been a long time; and before the separation of the branches took place a height of synthetic development was reached from which, although every branch has more recent synthetic formations to show, there has been on the whole a recession, by the substitution of more "analytic" means of expression of relation, of form-words and auxiliaries—our own English being, as in other respects, the most marked and extreme example of the new tendency.

The importance to us of the study of Indo-European language lies partly in the fact that it is our own family, and that also to which belong the tongues of the founders and leading representatives of our civilization, so that the study is connected in its bearings with a variety of other inquiries in which we are especially interested. It has also been the principal foundation, and almost the initial phase, of the general science of language, because there was nowhere else in the world so large and varied a body of related linguistic phenomena, by the examination of which the general laws of linguistic life could be deduced, and methods of research worked out which might be fruitfully applied where the material was less abundant, and exhibited a less length and breadth of development. Hence, and not from any over-estimate of this language, as alone worthy of investigation, or as furnishing the norm of human speech, comes the conspicuous absorption of linguistic students thus far in Indo-European studies. At the present time the profounder comparative study of other families also is well prepared for, is becoming more and more urgent, and is engaging more and more labor; although none has yet received anything like the same degree of comprehensive and penetrating examination as the Indo-European family. We shall, accordingly, review the others much more briefly.

*The Scythian or Ural-Altaic Family.*—This group of languages, widely coterminous with the Indo-European, is often also called the Turanian, and is generally reckoned

to contain five great branches: (1) The Finno-Hungarian, chiefly European in locality, including, besides Finnish and Hungarian or Magyar, the Lappish and the dialects of a host of unimportant tribes stretching through Northern and Eastern Europe across the Ural chain. (2) The Samoyed, along the shores of Siberia, from the White Sea to the Yenisei, and up that river to the Altai Mountains, probably its original seat. (3) The Turkish, recent occupants of Asia Minor, and overlapping the border of Europe, extending over a vast tract of Central Asia, and having an important branch, the Yakut, even on the Lena, to its mouth. (4) The Mongolian, yet farther East, but nowhere reaching the ocean. (5) The Tungusic or (from the name of the principal people) Manchu, beyond in the north-eastern end of Asia, save its peninsulas and islands; the Manchus have also held China in their grasp during the past two centuries. The languages of the first or westernmost branch do not differ remarkably in their general character from the Indo-European, but have more of what is called the "agglutinative" type: that is to say, root or theme and ending are less intimately united, rather "stuck together" than fused together, the ending retaining a more independent character: this results both in a greater regularity and a greater intricacy of formation. But the two easternmost members are of a much less developed and more jejune character, verging on the stiff inexpressiveness of monosyllabism; and this, in connection with other peculiarities, linguistic and physical, casts some doubt on the coherence of the family. There is neither abundance nor antiquity of literary productiveness among the Scythian races; their main part in history has been war and devastation; the wild and curious mythic popular poetry of the Finns (the *Kalevala*) is their most original work, unless, indeed, it shall turn out to be true, as is claimed of late, that the "Accadian" people, who laid the foundation of Mesopotamian civilization, and invented the cuneiform writing which was afterwards borrowed and adopted by both Semitic and Indo-European peoples, was Scythian, of the Ugric branch. This would carry the antiquity of Scythian language back to a point fully as remote as that reached either by Indo-European or Semitic. It cannot be long now before this question is settled.

Of the various and diverse languages of the North-eastern Asiatic waters, the *Japanese* is the only one that deserves mention. It is, though highly polysyllabic, of an exceedingly simple structure, phonetically and grammatically, much like the Mongol and Manchu, and may perhaps yet be proved of one family with them. Its culture is derived from China.

The S. E. of Asia is filled with languages which have monosyllabism as their distinctive characteristic. The *Chinese* is by far the most prominent and important among them. This is a language in the highest degree remarkable for the paucity of its resources and the exceeding deftness with which they are used, so as to perform the duties of a highly cultivated speech during an unprecedentedly long period. The Chinese literary monuments go back to nearly 2000 B. C., and are of great variety, extent, and merit. The language is composed of only some 500 different words, as we should write them; but their number is raised to about 1500 by the tones of utterance, this element having been pressed into the service of intellectual distinction in the scanty monosyllabic tongues, both Chinese and Farther Indian. The means of formal distinction are in part form-words, particles and auxiliaries, and in part position in the sentence. The intelligibility of the literary language is much aided by the mode of writing, which is to a great extent indicative of meaning, instead of pronounced form. The popular dialects are numerous, and so diverse as to be like so many independent languages. Some of them are said to make a degree of approach to an agglutinative structure.

The only tie to connect the Farther Indian and the Himalayan (at least in part) with the Chinese dialects is their common monosyllabic structure. The Burmese, Siamese, etc. have literatures of no great antiquity founded on that of India, whence comes their religion (Buddhism) also; and nearly the same is the case with the Tibetan. A vast deal has still to be done to make clear the character and relations of this great and perplexing confusion of little-known and unimportant dialects.

Off this corner of Asia lies the vast and scattered array of the isles of the Pacific. They are occupied by at least three independent and wholly insular races and language-families. Australia and Tasmania are the home of one, the *Australian*. New Guinea, part of Borneo, and the more inaccessible parts of several other islands and groups, are inhabited by a black race with frizzled hair, the *Papuan* or *Negrito*; its dialects are almost entirely unknown, but are believed to be unrelated with any others. But the great islands nearest Malacca (and Malacca itself by recent im-

migration), and the shores of the others just mentioned, and the scattered groups within the limits marked by Formosa and New Zealand, by Malagascare and Easter Island, are the home of an immense and well defined family, the *Malay Polynesian*, in three branches—Malay, Melanesian, and Polynesian. Several of the dialects of the Malay branch have literary culture, derived from the mainland; that of Java and Bali, coming from India, has records going back even to the first centuries of our era. The Malay has adopted Islam, and with it the Arabic alphabet. These languages, though not monosyllabic, are nearly bare of structural development, not having even a clear distinction of noun and verb, nor anything that could fairly be called inflection. Their phonetic form is also simpler than that of any other known tongues.

The *Draavid* group of languages, of Southern India, is of an agglutinative type, somewhat resembling the Scythian, and some linguistic scholars have been overhasty to pronounce it a branch of the Scythian family. Its principal members are the Tamil, Canarese, and Telugu. They have literatures of some antiquity, founded on the Sanskrit, their culture having been derived from the Aryan races of the North.

The Caucasian region is filled with a medley of peculiar dialects, apparently akin with no others in the world, and for the most part unrelated even with one another.

The *Semitic Family*. This is the only Asiatic family remaining to be considered. Its home is in the great but barren and thinly populated peninsula of Arabia, with its border-lands—Palestine and Syria on the N. W., Mesopotamia on the N. E.—and with an outlier in Africa, across the Straits of Babelmandeb. It is usually divided into three branches—Syriac, Canaanitic, and Arabian—but the recent resurrection of the Assyrian language from the cuneiform inscriptions of Nineveh and Babylon has brought to light so peculiar a dialect as to make it better to rank the Syriac or Aramaic with the Canaanitic, leaving the Assyrian alone as third division. The members of the central branch would be, then, the Hebrew with the other related Palestinian dialects, the Phœnician with its Carthaginian colony, and the Syrian or Chaldee. The sole surviving literature of the Hebrew, written during the life of the language (it became extinct as a vernacular four centuries before Christ), is our Old Testament; its oldest parts come from near the middle of the second thousand years B. C. Neither Phœnician nor Carthage has left any literature; their language, very closely like the Hebrew, is known only from inscriptions. Of the Moabitic, a remarkable monument, from 900 B. C., was discovered a few years ago; the language was almost pure Hebrew. The Hebrew has been kept in artificial learned existence, like the Latin, and has an immense literature as such. Apart from an Aramaic passage or two in the Old Testament, the abundant Syriac literature commences in the second century with a Christian Bible version. The Assyrian literature, inscribed and impressed on alabaster and on clay tablets, is now coming rapidly to light, and furnishing and promising information of the highest interest, especially in its bearing on biblical history; its records are perhaps as old as the biblical. The Arabic proper makes its appearance only recently, possessing but few records which are older than Mohammed (seventh century); but there are in the south-western corner of the peninsula remains of a wholly independent and much older civilization, and of dialects, called Hinyaritic, very different from the classical Arabic. The Semitic dialects of Abyssinia are a colony from these, and nearly akin with them: the Ethiopic, or Geez, has a Christian literature dating from the fourth century; the Amharic, which has crowded the other out of cultivated use, does not appear until the twelfth or thirteenth. This is the ancient distribution of Semitic dialects; since the rise of Mohammedanism the Bedouin Arabic has spread itself over nearly the whole Semitic territory, extinguishing the other dialects, has taken possession of Egypt, now its main seat of literary cultivation, and of the whole northern border of Africa, and has influenced, and more or less filled with its material, the Persian, Turkish, and Hindustani, and even the widely sundered Spanish and Malay, thus winning a sway comparable to that of the Latin, though falling far short of the Latin in the importance of the derived languages to which it has given birth.

The Semitic race has played a far greater part in history than any other, save only the Indo-European, and its languages possess a corresponding degree of importance. Their range of dialectic differences is much less than that prevailing in our family; they are closely kindred forms of speech. Not, apparently, because they have been more recently separated than the Indo-European dialects, but because their structure has been especially rigid and unchanging. The Semitic structure is more peculiar and problematical than that of any other family of languages.

Its striking characteristics are its tri-consonantal roots and its internal flexion. The roots, namely, have not, like the Indo-European, each a constant vowel, which is, even if more variable than the consonants, an integral part of it; the vowel or vowels in Semitic have a formative value, are indicative of relation, not less than the vowels of *man* and *maer*, of *hand* and *hamed* and *band* and *band*. And with insignificant exceptions the radical consonants are three, no more and no less. Suffixes and prefixes—and even infixes, elements inserted within the body of the root—are not unknown, but the sphere of their application is limited, because so much of what is done in Indo-European by affixes is here accomplished by internal change of vowel. Thus, for example (in Arabic, which is by far the most primitive and transparent in its structure of all the dialects), all that we can call the root corresponding to "kill" is *q t l*; *qatala* is a third person singular, meaning "he killed," and *qatila* its passive, "he was killed," *aqatala* its causative, "he caused to kill," *qatala* its connative, "he tried to kill," *inqatala* its reflexive, "he killed himself," and so on. Then (*uqat*) is imperative, "kill!" and a second set of verbal forms (hardly to be called a tense) has this form of the root: *yaqatulu*, *tuqatulu*, *uqatulu*, and so on. The active participle is *qatil*, "killing," the intensive *iqatil*, "causing to kill," the passive *maqtul*, "killed." The infinitive or verbal noun is *qatl*, "act of killing;" and *qitl*, "enemy," and *qatl*, "murderous," are specimens of derivative words. These examples are sufficient to bring out the remarkable features of Semitic speech. We have paralleled above the internal flexion with the Germanic *abhand* of *hand* and *band* and their like; but the essential difference between the two cases is, that what in Indo-European is rather a sporadic phenomenon, and capable of easy explanation as the quasi-accidental result of phonetic change consequent upon external additions, in Semitic is the very life and soul of the language, irreducible to anything different. It is, however, the prevailing belief among linguists that this condition of Semitic language must be the result of a very peculiar history of development out of beginnings more analogous with those found in other families of speech; and attempts are constantly making to penetrate the secret of the development, but as yet without any considerable measure of success. It is very certain, meanwhile, that there can be no proof of any relationship between the Semitic and any other family until the attempts prove successful. It is a favorite subject of effort with some philologists to demonstrate the primitive unity of the Semitic and Indo-European races; and there are many indications outside of language which favor the conclusion; but thus far, at any rate, the language is an impassable barrier.

The other peculiarities of Semitic structure are of small account as compared with those already noticed. The verb tends more to conjugational distinctions, such as were illustrated above, than to distinctions of tense and mood. It marks the difference of gender in its personal inflection. The noun is almost destitute of case variation; it and the verb have the three numbers found in early Indo-European. Secondary derivation, or the forming of derivative from derivative, is almost unknown, as is also the formation of compounds. Connectives of clauses are few and simple.

Among the languages of Africa, those nearest to Asia, grouped together as the *Hamitic family*, are often claimed, but on grounds which must be pronounced thus far insufficient, to be akin with the Semitic. The family is reckoned to comprehend three branches—the Egyptian, the Libyan or Berber, and the Ethiopian; the most conspicuous members of the last are the Galla and Somali. The Egyptian of the modern period is the Coptic, which has a Christian literature beginning early in our era; it was overpowered by the Arabic, and became extinct several centuries ago. The ancient Egyptian is the language of the hieroglyphs, and has older records than any other form of human speech, reaching, in scanty measure, probably into the fourth millennium before Christ. The Egyptian is a tongue of the simplest possible structure, with deficient distinction of its parts of speech, and with very little flexion; so entirely lacking the characteristic features of Semitic that, in spite of apparent coincidences in their pronouns, the two cannot well be brought together until the riddle of Semitic structure is solved.

The extreme south of Africa is occupied by the Hottentot and Bushman dialects, which have been recently claimed, though probably without good reason, to be connected with the Hamitic family. Not them, and up to the equator, are found the branches of a well-defined family, the *South African* (or Bantu, Kafir). The marked peculiarity of its structure is its use of prefixes, instead of affixes, as principal inflectional apparatus. Those of its languages which border upon the Hottentot share with the latter (from whom they are believed to have derived the prin-



liarity) the possession of clicks, or smacking and clucking sounds, in their alphabetic system.

Between the South African languages and the Great Desert lies a perfect Babel of languages and races, into the little-understood classification and characterization of which we cannot here enter. Even the best authorities are greatly discordant in their treatment of it.

The Basque, on the border between France and Spain, by the Bay of Biscay, is the only other language of the Old World which calls for mention. It is unrelated with anything else in the world, and perhaps a relic of a family which occupied at least some part of Western Europe before the intrusion of the Indo-European peoples. It is of an intricately agglutinative structure, commonly styled polysynthetic.

The same polysynthetic structure characterizes the languages of the New World, in the main, and is the only type by which, if at all, they are to be connected together as a single family. The peculiarities of its manifestation, and the classification of the American dialects, are fully discussed in the article on the INDIAN LANGUAGES of this continent.

The classification here given is strictly a linguistic one, making no account of the ethnological division of human races. Between the two there is not a necessary accordance. Every language, as we have seen, is an institution, kept in existence, like all the other parts of our acquired and accumulated culture, by a process of teaching and learning; it does not go down by descent. Just as any individual can, if circumstances favor or require, learn as his first language or "native tongue" a dialect which is not that of his ancestors, so a community—which in this respect is only an aggregate of individuals—can do the same. And such cases have occurred, over and over again, in the history of the world. Like the useful arts, the sciences, art, religions, a language may be abandoned by a race which had produced it, or assumed by one which had no part in its production, because nature makes all men capable of speech, but prescribes to no one what speech he shall use. Yet, while a language is a traditional institution, it is the most clinging and persistent of institutions, and also the one running out into the greatest infinity of detail and possessing the most notably objective character. Words, sentences, grammatical structure, can be recorded and turned over and compared almost as if they were real substances like fossils or archeological remains. These qualities make language, beyond any other human product, of value in tracing out the relations of the different sections of the human race anterior to the epoch where trustworthy historical record begins. Its evidence yields no certainty, but only a probability. Human communities have been influencing one another since the beginning of time; and it is not possible to say absolutely of any race on earth that it has not obtained its speech somewhat as the French got their Romance, or the Normans their French, or the Irish their English. But it is only the forces of a highly-developed civilization that give a language the power to propagate itself widely beyond its natural limits—that enable a minority of a mixed community to determine the speech of the whole; the ruder the people, the greater the probability that its linguistic relations represent its ties of blood. Hence, the trustworthiness of linguistic evidence is greatest where it is most desired, among wild and primitive races, as to whom recorded history is silent. The ethnological problem is doubtless too difficult to be ever completely solved by us; the mutual encroachments and superpositions of races, with consequent mixture of blood and of speech in every degree, the dwindling and disappearance of one race, and the expansion of another to greatness, form a web so intricate that it will never be unravelled. But in the present condition of ethnology, language is the richest and most reliable source of information. There are ultimate questions which it cannot decide, and as to which zoology and biology will probably some day show a higher authority. Such, for example, is that of the unity or variety of the human race; here linguistic science can only say that there are, on the one hand, no differences between human languages which might not be the result of later divergence from a common nucleus; and that, on the other hand, there are a great many languages so unlike that they can never be proved descended from the same ancestor, since they show no correspondences which might not be the result of accident. Linguistic material is not, like physical, analyzable to its minutest elements; creation, annihilation, transmutation, are the commonest of processes within it; it yields its results only to historical methods of investigation. Thus far, it has been found possible even to unite into families only languages which had the bond of a common structure; correspondences of material, of radical elements, anterior to the growth of structure, have not been available; and although it need not be

declared impossible that they may yet be found available between certain families, it is absolutely impossible that they should be so between all. Root-comparisons, among families of unrelated structure, are in the very highest degree precarious; none yet made are to be approved as sound.

The question of the origin of language has assumed an entirely new aspect in consequence of the recent progress of linguistic science. It is clearly seen that language as a concrete possession, a stock of words and phrases used for the communication and elaboration of thought, is in no proper sense of the word a gift, a natural capacity, a faculty, but rather an accumulated acquisition, the outcome of certain faculties and tendencies which belong to man and are a characteristic part of him. To maintain the divine origin of language now is simply to hold that man was endowed by his Creator with those faculties and tendencies, with the foreseen and intended purpose that he work them out to the possession of language: as, in a different but still essentially similar way, with the capacities that have brought him to the possession of his other institutions—of regulated society, of art, of the arts of life. To hold that he was put in possession at his birth of a developed speech is analogous to holding that he was provided with houses and clothes and instruments and machines. The formal structure of language, even the more formal part of its vocabulary, we see to have been developed by degrees out of a simple body of formless roots, indicative of external, sensible acts and qualities—in the same manner, and for the same reason, that instruments and machines have been developed out of simple sticks and stones and flakes of flint, that architecture began with caves and huts, and dress with skins of animals and fig leaves. To investigate the origin of language is to inquire how these rudiments of speech were produced. The inquiry is not a part of the historical science of language, because history brings us only to the recognition of these, and to the recognition of them only in their kind, not in their concrete identity as such and such utterances. But it is an essential and prominent part of linguistic philosophy as a branch of anthropology, and can only be properly treated by one who understands the facts of later language-history, and can read their meaning.

To express himself is natural to man, and he has for that purpose a variety of instrumentalities—namely, gesture, grimace, and utterance. All are capable of being put to use, apart from anything conventional, between human beings anxious to understand one another; and all are, under determining circumstances, so put to use. That any one of them should be employed with the intent to communicate is enough to constitute an act of language-making. It is by the addition of this intent that they pass over from the condition of natural to that of conventional expression. The sphere of natural, instinctive expression is limited to the feelings or emotions of the expresser: it is purely subjective, and, so far as the action of the voice is concerned, it extends only to tones; it does not include articulations, specific combinations of vowel and consonant. There is nowhere, in the whole domain of language, anything going to show that a sound or combination of sounds is ever produced as the natural representative of an act of the intellect, a conception or a judgment. While human expression remains instinctive and emotional, it is not language, any more than that of the lower animals, with which it is analogous. But when, for instance, a cry which was at first the direct outburst of pain or pleasure or disgust or warning is repeated or imitated for the purpose of giving to another an intimation of pain, etc., then the making of language is begun. The lower animals, some of them, are able to make a beginning here; if a dog stands at a door, and scratches or barks in order to attract attention and be let in, waiting for the opener who, he knows, will answer his call, that is an act of language-making as genuine and perhaps as good as the earliest attempts of a human being would be. There is, to be sure, an essential difference between the two cases; but it lies only in this: the dog, with his limited powers, can go no further; he is incapable of a continuous progressive development; but the man sees and appreciates what is gained by his linguistic act, and tries it again, and tries others; and so, by a gradual process of accumulation, he arrives at a body of expressions which use by and by renders conventional; and by manipulation of them he comes to linguistic structure, and finally, in races more gifted or more favored by circumstances, to vocabularies and grammars like our own. Then, by a process of development showing the most striking analogies with that just described, he adds the art of writing, a mode of record of speech which continues and completes its value both to the individual and to the race.

This exposition shows the true ground on which the different relation of men and of the lower animals to language



is to be put and argued. Usually, the great and ruinous error is committed of assuming that at the beginning certain combinations of sounds must have naturally signified something to man, and then of searching anxiously for similar phenomena among the animals also. This can never lead to any valuable result. The true point for the attention of naturalists is this: What signs are to be discovered in animals below man (like that quoted above of the dog) of the power to adapt means to ends in the way of expression, with more or less of free consciousness and intelligence? That their power is extremely limited is clear enough from the fact that no race or community of animals, so far as we know or have reason to suspect, possesses any conventional language kept up by teaching and learning. It is here just as in the case of instruments: the power to use a stick or a stone as tool or weapon cannot be absolutely denied to certain animals; and men began with nothing better, but, except in man, it is not a growing and developing power. With the animals it remains a natural gift; with man it becomes by degrees an institution, and leads to the possession of ships and steam-engines and cannon. To ascribe the lack of language in animals to the want of some specific mental power is an error, like the error of ascribing its possession by man to the addition of some specific mental power, some linguistic faculty or language-sense. The lack and the possession are both alike the results and indications of a whole cast and grade of mental capacity, of combinations of faculties which show themselves abundantly also in other ways. No animal below man has any accumulated results of the exercise of his natural powers, any institutions—any civilization, in short. To make language dependent on a power of forming general ideas or concepts is least of all to be approved; for it is past all reasonable question that the lower animals do form such, in their degree and within their limits; nothing like intelligence is possible otherwise. The power of the dog in this respect is not sensibly different from that of the wholly undeveloped and speechless man; but the acquisition of language, impossible to the dog, trains and equips the power in man, and makes it capable of vastly higher and more abundant work.

The prominence in existing language everywhere of the voice as means of expression has its ground, not in any especial nearness of the organs of utterance to the movements of the soul, but only in a kind of natural selection and survival of the fittest. The voice is, for obvious reasons, the most available instrumentality, in the infinite variety and rapidity of its apprehensible combinations, in the small expenditure of muscular effort which they cost, in their power to command attention from any direction, and in the dark as well as in the light, and in the liberty afforded the hands for other work at the same time. Experience brought all this to light, even as it has brought to light the various availabilities of wood and stone and metal. That we find every part of the human race, at the very beginning of our knowledge of it, in possession of a spoken language, a more or less complete system of vocal signs for ideas and their relations, means no more than that the whole race had lived long enough to have worked out its natural gifts to their necessary and intended results. It by no means proves that there was not a time when gesture, more than utterance, was the principal means of expression, or even that for a period, of duration impossible to determine, men may have had no expression different from or higher than that of the animals next beneath them in the scale of creation. The natural (as distinguished from the conventional) means of expression still continue most important auxiliaries to language; for anything but the driest scientific statement, tone and gesture and posture and facial expression are requisite; they are the subjective means whereby the personality of the speaker is impressed upon the hearer—whereby he moves, excites, persuades. And their power is greater and their aid more indispensable the lower the grade of the language and of those who use it. In the highest elaboration of speech, and with those trained to employ and interpret it with the keenest sensibility, even the written page shows the reader the very tone and action of the writer—seems to smile or scowl or weep or exult.

Out of the leading part assumed by the voice grows the importance of onomatopoeia, or the vocal imitative principle, in the earliest history of language. The intent being to make an intelligible sign, and the voice the instrument, audible sounds are the matters most easily signified. This is just as natural and necessary as that in a written system of signs the outlines of visible objects are most easily, and therefore earliest, signified. A hieroglyphic mode of writing, intended for the eye to understand, begins with pictures of things that strike the eye, and proceeds from them, in various ways, to indicate matters of more varied and even of subjective knowledge. A system of audible signs begins in like manner with a rude, sketchy depiction, as it

may be called, of audible sounds, and arrives, by figurative transfer and by various ties of association, at the intimation of other classes of acts and qualities. The sphere of imitation is by no means restricted to the actual sounds occurring in nature, though these may well enough have been the first subjects of reproduction. What its limits are may be best seen from the range of onomatopoeic expression in existing languages. There is a figurative imitation, whereby rapid, slow, abrupt, repeated movements are capable of being signified by combinations of sounds which make through the ear upon the mind somewhat the same impressions as the movements themselves through the eye. And while this was a principal suggester of the means of mutual intelligence, it may well enough have been found even more fertile than we now regard it as being. Our recognition of the value of the imitative principle is thus founded upon our general theory of language, in combination with the fact that the same principle continues efficient, in greater or less degree, through the whole history of language; it does not depend upon our ability to trace the main mass of material in any existing language to an onomatopoeic origin. For, the intent being simply to provide by the most available means for communication between man and man, onomatopoeia would be gradually crowded out, after the provision of a certain quantity of intelligible signs, by the later and now almost exclusive method of the combination and variation of those signs; and, with that readiness to forget derivations and disguise etymologies which is a leading and most valuable feature in universal language-history, the signs of imitative origin would be hidden and disappear.

If by such methods as those here described there could be made a sufficient working provision of signs, to be developed by degrees into such languages as we now find in the world; if these methods are in harmony with the known history of language, the one stage passing into the other without a break or a change of governing principle; if, from what we know of man and of his linguistic capacities and activities, these are the methods by which a new language would be created if it were possible that a community of human beings should begin life again without any,—then this is such a solution of the problem of the origin of language as science demands.

It may be briefly pointed out, in conclusion, that there is no relation whatever between the development of language and any development of man himself out of a lower type of animal. Man was man in endowment when the production of his present speech began; its acquisition, like that of the other parts of his civilization, has only helped in the development of his powers, raising him higher and higher in the scale of manhood, and being, of all his acquisitions, the one most fundamentally important, most needful and helpful to everything else that he possesses.

The view of the history, nature, and origin of language here compendiously presented will be found worked out in much greater fulness in the writer's works, *Language and the Study of Language* (New York, 1887), *The Life and Growth of Language* (1875), and *Oriental and Linguistic Studies*, I. (1872). Other general works on the subject in English are M. Müller's *Lectures on the Science of Language*; H. Wedgwood's *Origin of Language* (London, 1866); F. W. Farrar's *Chaldee Language, Families of Language*, etc.; A. H. Sayce's *Principles of Comparative Philology* (London, 1874).

To trace the history of the study of language, from the often surprisingly acute but crude and narrow speculations of the ancients down to and through the remarkable collections, comparisons, analyses, deductions, of the great linguistic scholars (especially in Germany) of this century, constituting the vast and rich department of "comparative philology," is a task by itself, and will not here be attempted. The best authorities for it are L. Lerch, *Sprachphilosophie der Alten* (1810); H. Steinthal, *Geschichte der Sprachwissenschaft bei den Griechen und Römern* (1861); T. Benfey, *Geschichte der Sprachwissenschaft und der Orientalischen Philologie in Deutschland* (1869). J. Jolly has added a general sketch of the history to his German translation of the writer's *Language and the Study of Language* (Munich, 1874), and some interesting details are given in the first series of Müller's *Lectures*. W. D. WHITNEY.

**Language of Flowers**, a sentimental system of floral symbols by means of which it is intended that the more tender feelings and passion should be expressed. Among the Turks and Persians we are told that the language of flowers has received much attention, and is resorted to with great refinement and expression; but in other countries it is chiefly used by young persons of both sexes. The literature of the subject is extensive, but not important.

**Languedoc'**, one of the old provinces of France, bounded S. by the Mediterranean and E. by the Rhone; it



bore while a Roman province the name of *Gallia Narbonensis*; passed from the Romans to the Goths, from the Goths to the Saracens, and from the Saracens to the counts of Toulouse; in 1361 it was finally annexed to the French crown. In the Middle Ages it received the name of *Languedoc* (*langue d'oïl*), from the circumstance that its inhabitants expressed "yes" by *oï*, while in the northern part of France it was expressed by *oui*. It is now divided into the departments of Aude, Hérault, Pyrénées, Upper Garonne, Gers, Lot, Lot-et-Garonne, Tarn, and Tarn-et-Garonne.

**Languidic'**, town of France, in the county of Morbihan, has 6382 inhabitants.

**L'Anguille'**, tp. of Phillips co., Ark. Pop. 800.

**L'Anguille**, post-v. and tp. of St. Francis co., Ark., on the Memphis and Little Rock R. R., and on the L'Anguille River. Pop. 506.

**Lanier**, tp. of Preble co., O. Pop. 1634.

**Lanjuinais'** (JEAN DENIS), b. at Rennes Mar. 12, 1758; studied law; practised for some time at the bar; was appointed professor of ecclesiastical law in his native city in 1775, and became conspicuous as a man of superior talent, when in 1789 he was elected a deputy to the States General. As a member of the Convention he sided with the Girondists, and opposed all extreme measures. On June 2, 1793, he was arrested, but escaped to Rennes, and resumed his seat in the Assembly in 1795, after the fall of the Terrorists. During the Directory he was a member of the Council of Five Hundred, and of the senate during the consular rule, in which latter position he led the opposition against the monarchical tendencies of the government of Napoleon, who nevertheless made him a count on the establishment of the Empire. He voted for the deposition of the emperor in 1811, was made a peer of France by Louis XVIII., and advocated liberal principles during the Restoration, in opposition to the reigning political and ecclesiastical reaction. He was a man of great literary attainments, and after his death (Jan. 13, 1827) his son published a collected edition of his writings (4 vols., Paris, 1832), containing valuable contributions to the sciences of politics, archæology, and language.

**Lank'ester** (EDWIN), M. D., LL.D., F. R. S., b. at Melton, Suffolk, England, Apr. 23, 1814; studied medicine at University College, London, 1834-37; graduated at Heidelberg 1839; became lecturer at St. George's school of medicine 1843; secretary of the Ray Society 1844; professor of natural history at New College, London, 1850; president of the Microscopical Society 1859, and elected coroner for Central Middlesex (city of London) 1862. He acquired wide fame as a lecturer and writer upon sanitary and social science, physiology, botany, zoology, foods, microscopy, etc.; was author of many valuable reports and scientific papers, and of various books upon the above subjects, mostly designed for popular use, and since 1866 edited the *Journal of Natural Science*. D. Oct. 30, 1874.

**Lan'man** (CHARLES), b. in Monroe, Mich., June 14, 1819, the son of Charles James Lanman; received an academical education in Plainfield, Conn.; was a clerk in New York from 1835 to 1845, when for a few months he edited the *Monroe Gazette*; was associate editor in 1846 of the *Channahon Chronicle*, with E. D. Mansfield; and after making a canoe-tour of the Mississippi and through Lake Superior, returned to New York, and was associated as a writer with the *Daily Express*. In 1848 he became a correspondent of the *National Intelligencer*, travelling extensively through the U. S.; settled at Georgetown, D. C., and held at Washington the positions of librarian of the war department, librarian of copyrights in the state department and private secretary of Daniel Webster, librarian of the interior department, and librarian of the House of Representatives. In 1857 he became the American correspondent of the *Illustrated London News*, and in 1859 of the *London Athenæum*. He has published *Essays for Summer Hours*, 3 eds.; *A Summer in the Wilderness: A Tour to the River Saguenay*, republished in England; *Letters from the Alleghany Mountains: Occasional Records of a Tourist*; *Private Life of Daniel Webster*, republished in England; *Adventures in the Wilds of America*, made from previous publications, in 2 vols., and republished in England, with introductory letters from Washington Irving; *Dictionary of Congress*, 6 eds., three of them published by the general government; *Life of William Woodbridge*, edited; *Prison Life of Alfred Ely*, and two volumes of *Sermons* by Rev. Octavius Perinchief. Since 1871 he has been American secretary of the Japanese legation, and has published *The Red Book of Michigan* and *The Japanese in America*, the latter reprinted and very successful in England.

**Lanman** (CHARLES JAMES), b. at Norwich, Conn., July 5, 1795; graduated at Yale in 1814; was admitted to the bar at New London, Conn., in 1817; removed to French-

town, now Monroe, Mich., and held various public offices, such as judge of probate and U. S. receiver of public moneys (1823-32). He was one of the most prominent and public-spirited of the early citizens of Michigan; returned in 1835 to Norwich, Conn.; lost much of his property in the financial crash of 1837; was mayor of Norwich in 1838; removed to New London, Conn., in 1862. D. July 22, 1870.

**Lanman** (JAMES), b. at Norwich, Conn., June 14, 1769; graduated at Yale in 1788; was admitted to the bar in 1791; held numerous important State offices; was a U. S. Senator 1819-25; held judgeships in the State courts 1826-29; was mayor of Norwich 1831-34. He was the step-father of Park Benjamin. D. Aug. 7, 1841.

**Lanman** (JOSEPH), U. S. N., b. July 11, 1811, in Connecticut; entered the navy as a midshipman Jan. 1, 1825; became a passed midshipman in 1831, a lieutenant in 1833, a commander in 1835, a captain in 1861, a commodore in 1862, a rear-admiral in 1867. Commanded the Minnesota at the attack upon Fort Fisher, Jan. 15, 1865, and is thus commended by Rear-admiral David D. Porter in his official report of that action: "Commodore Joseph Lanman, commanding the Minnesota, was selected to lead the line, his vessel being the slowest and least manageable. I recommend him to the consideration of the department as one on whom they can place the utmost reliance, place him in any position." D. Mar. 15, 1871. FOXHALL A. PARKER.

**Lanner**. See FALCON.

**Lannes** (JEAN), b. at Lectoure, in Guienne, Apr. 11, 1769, of poor parents, and apprenticed in his fifteenth year to a dyer; in 1792 left this occupation and enlisted in the army, where he soon rose to the rank of a colonel; was nevertheless discharged in 1795, at the reorganization of the army, but in 1796 followed Napoleon to Italy as a volunteer, and very soon attracted his attention by his boundless audacity; distinguished himself in every battle by some daring feat, and was made a brigadier-general in 1797; in 1798 accompanied Napoleon to Egypt, returned with him in 1799, and rendered him great services by his faithful adherence on Nov. 9, 1799, in reward for which he was made a general of division in 1800, and commander of the consular guard; led the vanguard when in the same year the army crossed the Alps at St. Bernard, and gained a brilliant victory over the Austrians at Montebello. On the establishment of the empire he was made a marshal. He led the memorable siege of Saragossa, and compelled the city to surrender Feb. 21, 1809, and at Ratisbon he was the first who put the scaling-ladder to the ramparts. When he grew older his judgment developed rapidly with his courage, and Napoleon considered him one of his best generals, when his career was cut off suddenly in the battle of Essling, being mortally wounded, and d. a few days after in Vienna, May 31, 1809.

**Lannion'**, town of France, in the department of Côtes-du-Nord. It manufactures several kinds of coarse woollen and linen goods, and has some general trade. Pop. 6598.

**La Noue, de** (FRANÇOIS), b. in 1531, in the vicinity of Nantes, of an old noble family of Brittany; embraced the Reformed creed, and distinguished himself in the army of the prince of Condé as one of the most valiant Huguenot soldiers. At the siege of Fontenay-le Comte, in 1570, he lost his left arm, and had it replaced by one of iron, whence he received his surname, *Bras de Fer*. In 1572 he went to La Rochelle, trying to bring about a reconciliation between the city and the king. Having failed in this, and seeing that there was no other means of safety for his party than open war, he took the command of La Rochelle, and defended the city for four years with great success. After the conclusion of peace in 1578 he went to Flanders, entering the service of the Low Countries; was taken prisoner by the Spaniards, and retained at Madrid for five years, but at last exchanged in 1583 for Count Egmont. Under Henry IV. he again fought for the cause of his religion, and d. Aug. 4, 1591, from a wound he received at the siege of Lamballe. During his several imprisonments he engaged in literature, and his *Discours politiques et militaires* (Bâle, 1587) have been often republished. His correspondence was published in 1854.

**Lans'dale**, post-b. of Gwynedd tp., Montgomery co., Pa., about 25 miles N. of Philadelphia, on the North Pennsylvania R. R., at its central point and junction with the Doylestown and Stony Creek branches. It has a church, 3 hotels, 1 national bank, 2 weekly newspapers (1 German), agricultural machine-works, foundry, carriage manufactories, telegraph-office, planing-mills, a number of stores, etc.

F. WAGNER, PROP. "LANSDALE REPORTER."

**Lans'downe** (HENRY PETTY-FITZMAURICE), THIRD MARQUESS OF, b. in London, England, July 2, 1780, second son of William Petty, first earl of Shelburne (which see),

who in 1784 was created marquis of Lansdowne; educated at Westminster School and at Edinburgh under the tutorship of Dugald Stewart; graduated at Trinity College, Cambridge, in 1801, and under the name of Lord Henry Petty was chosen as a Whig in 1802 to a seat in Parliament for the borough of Calne. He distinguished himself in debate, giving his chief attention to finance; was elected member for the University of Cambridge in 1806 on the death of Pitt, and in the same year became chancellor of the exchequer in the ministry of Grenville and Fox, retiring from office in 1807. On the death of his elder brother in 1809, he succeeded to the title, and became one of the heads of the Liberal party in the House of Lords, being an early advocate of Catholic emancipation, the abolition of slavery, parliamentary reform, and free trade. On the return of the Whigs to power in 1827, he became secretary of the home department under Canning, secretary of foreign affairs under Lord Palmerston (1828), lord president of the council under Earl Grey from Nov., 1830, to Nov., 1834, under Lord Melbourne from Apr., 1835, to Sept., 1841, and under Lord John Russell from July, 1846, to Feb., 1852. For many years he had been the Liberal leader in the upper house, when he resigned that position in 1852, not intending to return to office, but in December of the same year, on the formation of the Aberdeen ministry, he consented to take a seat in the cabinet without a portfolio, and again in the first Palmerston ministry, Feb., 1855, to Feb., 1858. He was a man of cultivated taste, formed a splendid library and collection of art-treasures, was a generous patron of literature, and made Lansdowne House the centre of polite

society in England. He was a trusted adviser and friend of the queen, but refused a dukedom and the premiership. After the death of the duke of Wellington he was the patriarch of the House of Lords, and perhaps the most universally honored statesman of the realm. D. at Bedford House, Calne, Jan. 31, 1863.—His son HENRY, fourth marquis, b. in 1816, d. in July, 1866; his grandson, HENRY CHARLES KEITH FITZMAURICE, fifth marquis, b. Jan. 14, 1845, was lord of the treasury (1868-72) and under secretary of state for war (1872-74), in second Gladstone ministry.

**Lansdowne** (WILLIAM PETTY), MARQUESS OF. See SHILLBURN, EARL OF.

**L'Anse**, post v. and tp., cap. of Berrien co., Mich., on Keweenaw Bay, Lake Superior; is the N. W. terminus of the Marquette Houghton and Ontonagon R. R., and has a line of iron steamers running to the ports of the copper-region. Pop. 33.

**Lan'sing**, post v. and tp. of Allamakee co., Ia., on the Mississippi River and the Chicago Dubuque and Minnesota R. R., 84 miles N. of Dubuque, has several churches and hotels, 1 national and 1 savings bank, 3 weekly newspapers (1 German), 2 steam saw-mills, a furniture factory and flouring mill (both steam), an agricultural implement factory, a large school building, and numerous business houses, has daily ferry connection with Wisconsin, and handles annually 750,000 bushels of grain. Pop. of v. 1755; of tp. 2519.

JAMES T. MITCHELL, ED. "MIRROR AND CHRONICLE."

**Lansing**, city and tp. of Ingham co., cap. of the State



New State Capitol, Lansing, Mich.

of Michigan, is situated on Grand River, about 100 miles from its mouth, at its confluence with the Cedar, and on the Chicago and Lake Huron, the Detroit Lansing and Lake Michigan, the Lake Shore and Michigan Southern, and the Michigan Central R. Rs. It has two other less important lines of railroad, and others are projected. Lansing was laid out by the State as a capital in 1817, and was projected on a liberal scale, with avenues seven and five rods in width; is situated on high land on both sides of the river, is 84 miles W. of Detroit and 60 S. W. of Saginaw. It has 2 national and 2 private banks, a gaslight and a fire insurance company, 16 churches, 3 hotels, an opera house, 3 weekly newspapers, iron works, superior common and high schools, a female and a common college, State Agricultural College, State Reform School, State

Library of 20,000 volumes, several private literary and library associations, and a young men's lecture society. Grand River is spanned by 4 iron bridges and 1 wooden one. There is a noted mineral spring. The fine water-power has made Lansing an important manufacturing centre, and it has a large complement of mercantile houses and of professional men. The State capital is on high ground, fifty feet above the river; an appropriation of \$1,200,000 was made in 1844 for a new building. A city government was organized in 1832. Pop. of city, 5211; of tp. exclusive of city, 824.

W. S. GEORGE, ED. "STATE REPUBLICAN."

**Lansing**, post v. and tp. of Mower co., Minn., on the Milwaukee and St. Paul R. R. Iowa and Minnesota division. Pop. 773.



**Lansing**, tp. of Tompkins co., N. Y., on the E. shore of Cayuga Lake. Pop. 2874.

**Lansing** (JOHN), b. at Albany, N. Y., Jan. 30, 1754; studied law with Robt. Yates in Albany and James Duane in New York; served in the Revolutionary war as military secretary to Gen. Schuyler; was for seven years a member of the legislature, for four years mayor of Albany; member of the Old Congress 1784-88; member of the State convention for considering the U. S. Constitution, which he opposed, leaving the convention; commissioner in 1790 to settle the Vermont controversy; appointed judge of New York supreme court Sept. 28, 1790, chief-justice Feb. 15, 1798, and chancellor of the State from Oct. 21, 1801, to 1814. D. Dec. 12, 1829.

**Lansingburgh**, post-v. and tp. of Rensselaer co., N. Y., 3 miles N. of Troy, on the Hudson River, nearly opposite the confluence of the Mohawk, has 6 churches, 6 hotels, 1 weekly newspaper, established in 1798, 1 savings bank, an academy, 3 public schools, 25 brush-factories, 2 oilcloth and 2 cracker factories, 5 malt-houses, a fire and a police department, and is connected with Troy by a street railroad. It is perhaps the chief point in the U. S. for the manufacture of brushes, oilcloth, and crackers. It has considerable river trade, and is connected with Waterford by a bridge across the Hudson. Named from the founder, Abraham J. Lansing, who settled here in 1771. Pop. of v. 6372; of tp. 6894. J. G. SCOTT, Ed. "GAZETTE."

**Lansingville**, a v. of Hamden tp., Delaware co., N. Y., on the S. side of Delaware River. Pop. 110.

**Lansingville**, post-v. of Lansing tp., Tompkins co., N. Y. Pop. 67.

**Lanta'na**, a genus of mostly tropical shrubs of the order Verbenaceae. Many have stimulant and aromatic qualities. *L. pseudothaia* is highly esteemed in Brazil as a substitute for tea. A number of the species are beautiful greenhouse shrubs, notably *L. camara* and *mixta* of tropical America. The U. S. have at least two species native to the Gulf States, *L. camara* and *incuberta*. Some have square stems. The flowers are mostly showy and of changing colors.

**Lan'tern** [Lat. *lanterna*, *laterna*], a portable or fixed artificial light, enclosed in a suitable case to protect it from the action of air-currents. Ancient Rome, Greece, and Carthage employed lanterns. The lantern also appears, but not frequently, on Egyptian monuments. Thin layers of horn, oiled or waxed paper, or linen, bladder, and other translucent substances were used. Aldhelm, bishop of Sherborne in England, mentions glass lanterns in 705 A. D. The Eastern nations, and especially the Chinese, excel in the making of ornamental lanterns.—On the evening of the 15th of January the Chinese celebrate the Feast of Lanterns. Sometimes the wealthy Chinese spend thousands of dollars on a single lantern, whose sides are often of silk, and which may have a diameter of twenty-five feet. It contains usually a great number of wax candles. The origin of the lantern-festival is variously stated.

**Lan'tern-fly**, a name given to several insects of the family Fulgoridæ, some of which are reputed to emit a brilliant light from the forehead. Of these, *Fulgora cancellaria* of China and *F. lanternaria* of Guiana are the best known species, but it is doubtful whether they really emit any light. They are nearly three inches long, and are the largest of the Hemiptera. Some of the genera produce a fine white wax, utilized in the S. E. of Asia.

**Lan'thanum** [Gr. *λανθάνειν*, "to escape notice"], an elementary metal of rather rare occurrence, to which Mosander, its discoverer, in 1839 gave this name, because it had remained concealed, in combination with cerium, for thirty-six years. Mosander also found in 1842 in oxide of lanthanum another rare metal, *didymium*, which he named from the Greek *δίδυμος*, "twofold" or "twin," from its congeneric association with lanthanum and difficulty of distinction therefrom. Didymium gives rose-colored salts and solutions, while those of lanthanum, when pure, are white. These three rare and curious metals, cerium, lanthanum, and didymium, are usually found in combination in the minerals *cerite*, *allanite*, *muromontite*, *mosandrite*, etc.; but the one here under consideration, lanthanum, occurs by itself, as the beautiful mineral *lanthanite*, in at least three American localities—in the zinc ores of Saucon Valley, Lehigh co., Pa., at the Canton mine in Georgia, and at the Sandford ore-bed, Moriah, Essex co., N. Y. Lanthanite is carbonate of *lanthanous oxide*, or *lanthana*,  $\text{La}_2\text{CO}_3 \cdot 3\text{H}_2\text{O}$ , containing 55 per cent. of lanthana. It is sometimes pink in color, from the presence of its roscate twin-sister, didymia. *Lanthana* is a white oxide, like lime or magnesia, very heavy, density about 6, which absorbs carbonic acid and water from the air, and slakes with water, like lime, to a hydrate.

HENRY WURTZ.

**Lan'thopine** [Gr. *λανθάνειν*, "to escape notice," and *ὀπός*, for "opium"], a base homologous with papaverine, contained in opium. (See Watts's *Dict.*, Supplement.)

**Lanu'vium**, an ancient city of Latium, 20 miles S. E. of Rome, where now stands the hamlet Cività Lavigna. It was anciently a place of much importance, famous especially for its temple and sacred grove of Juno Sospita. It was one of the members of the Latin League, and the birthplace of the emperor Antoninus Pius. Few remains of the old town now exist.

**Lan'za** (GIOVANNI), b. in 1815 at Vignala, Piedmont; studied medicine at Turin, and practised in his native city; in 1848 was elected a member of Parliament, and espoused the policy of Cavour; in 1855 entered the cabinet of Cavour as minister of public education, and in 1858 exchanged this office with the ministry of finance; in 1859, after the Peace of Villafranca, resigned, together with the whole cabinet of Cavour, and then worked simply as a member of Parliament, of which he was elected president several times; in 1864 took charge of the ministry of the interior under La Marmora, but retired in 1865. Once more entering Parliament, and having been elected president in Sept., 1867, he opposed the financial policy of the ministry of Menabrea, and resigned his presidency when the ministry triumphed. His re-election in 1869 caused the dissolution of the ministry, and he now undertook to form a new cabinet himself. He occupied the ministry of the interior, and the other members belonged mostly to that section of the Right which had supported Menabrea's internal policy, but opposed his financial measures. Lanza endeavored to introduce the greatest possible parsimony to bring order into the internal affairs of the kingdom. Nevertheless, as the annexation of the papal states in 1870 took place while he held office, large expenses for the army and navy were necessary. The peculiar tendency of the Italian Parliament to grant the expenses, but to reject the taxes, overthrew the cabinet of Lanza in 1873. June 23 he gave in his resignation, as the Parliament would even not allow Sella's tax-bill to be discussed.

AUGUST NIEMANN.

**Lanzaro'te**, the most N. E. of the Canary Islands, comprises an area of 325 square miles, with a population of 17,500. It rises to the height of 2000 feet, and contains several active volcanoes. It is very fertile, and produces the finest grapes and wines on the Canaries, but it is much exposed to drought. Tegüise is the capital; Arrecife, the principal port.

**Lan'zi** (LUIGI), b. at Monte dell' Almo, Italy, June 14, 1732; entered the order of the Jesuits in 1749, and became, after its dissolution in 1773, assistant director of the gallery of Florence. He now devoted himself much to the study of art and archaeology, especially Etruscan language and antiquities, and his two works on these subjects, *Saggio di lingua etrusca* (3 vols., 1794) and *Storia pittorica dell' Italia* (6 vols., 1792), attracted great attention—also in foreign countries; the latter was translated into English by Thomas Roscoe. D. Mar. 30, 1810.

**Laoc'oön** [Gr. *Λαοκόων*], a Trojan patriot and priest who opposed the introduction of Sinon's wooden horse into the city of Troy, and was, with his two sons, slain by two great serpents from the sea. His myth is variously given, but the account in Virgil's *Æneid* is the best known. The death of Laocoön and his sons is the subject of a noble group now existing in the Vatican. It is described by Pliny, and was rediscovered on the Esquiline Hill in 1506. It was executed by Agesander, Athenodorus (his son), and Polydorus, Rhodian artists who probably lived in the time of Titus. The Laocoön has been made the subject of Lessing's masterly criticism. (See his *Laocoön*, translated by Ellen Frothingham, 1875.)

**Laodice'a** [Gr. *Λαοδικαία*], the name of six Greek cities built by the Seleucids, monarchs of the Syrian empire, who after the death of Alexander the Great were the chief representatives and inheritors of his Eastern conquests, five of them having been named in honor of Laodice, wife of Seleucus Nicator, and one in honor of the wife of Antiochus Theos. Of these, one in Media, one in Mesopotamia, and another on the Orontes in Phœnicia (called *Cabiosa* by Ptolemy and *ad Libanum* by Pliny), have not been identified in modern times. I. LAODICEA COMBUSTA [Gr. *Κατακαυμένη*, the "burned"], now *Ladik*, situated to the N. W. of Iconium on the highroad from Greece to the Euphrates, and variously assigned to Lycæonia, Pisidia, and Galatia, as the boundaries of those provinces were changed. Strabo derived the name from the volcanic nature of the surrounding country, but Hamilton (*Researches*, vol. ii.) asserts that there is not a particle of volcanic or igneous rock in the neighborhood, and proposes to derive the name from some conflagration. Leake (*Asia Minor*, p. 44) found at Ladik



more numerous fragments of ancient architecture and sculpture than at any other place visited by him in that country. Imperial coins of the reigns of Titus and Domitian show that it must have been a large city.—H. LYONET AND LYCUM, now *Eski-Hissar*, a city in the S. W. of Phrygia, sometimes reckoned to Caria and to Lydia, near Colossæ, 40 miles E. of Ephesus and 6 miles W. of Hierapolis, situated on the spur of a hill between the valleys of the Asopus and Caprus rivers, which here fall into the Lycus, was originally called *Diospolis* and afterwards *Thoon*, and having been rebuilt by Antiochus II. (Theos, 260 B.C.), was named from his wife *Lyonicæ*, by whom he was poisoned B.C. 246. From the Syrian monarchs it passed to the kings of Pergamum, and was annexed to the Roman empire on the death of Attalus III., 133 B.C., when it became the capital of the vast province of Greater Phrygia, and rapidly took position as one of the most populous, splendid, and wealthy cities of Asia Minor, distinguished also in literature, noted as the seat of a great medical school, and was the official residence of Cicero during his proconsulate in Asia (49-50); and very interesting accounts are to be found in the great orator's correspondence. It became the residence of great numbers of Jews; was one of the earliest seats of Christianity in Asia Minor, the church having been founded by Paul, who wrote an epistle to the Laodiceans (now lost), mentioned in the Epistle to the Ephesians. According to the superscription to 1 Timothy, Paul wrote that epistle from Laodicea, called "the chiefest city of Phrygia Pacatiana," but there is no further notice of his visit. The terrible threat conveyed by the author of Revelation to the "angel of the church of the Laodiceans," one of the seven churches of Asia (iii. 14-22), will readily occur to mind, and has rendered the term *Laodicean* a synonym for lukewarm, "neither cold nor hot." The city was nearly destroyed by earthquakes in the reign of Tiberius, but quickly restored, and was the seat of two important general councils of the Christian Church: the first, whose date is variously placed from 363 to 372, enacted sixty canons, one of which defined the books (thence called *canonical*) of Scripture; the second in 476 condemned the Eutychians. It was again overthrown by an earthquake in 194, was captured by the crusaders in 1199, by the Turks in 1255, and finally destroyed by Tamerlane in 1402. Its splendid and widely scattered ruins, including a stadium, gymnasium, aqueduct, and three theatres, have been frequently described by modern travellers. (See good account in Smith's *Diet. Geog.* ii. 122.)—III. LAODICEA AD MARE, a city of Syria, founded by Seleucus Nicator, now LATAKIA (which see).

PORTER C. BLISS.

**Laon'** [Late Lat. *Laudunum*], town of France, the ancient *Lugdunum Clavatum*, the *Bibraz* of Caesar, capital of the department of Aisne, is situated on the top of an isolated hill with steep declivities, and surrounded with a wall flanked with towers. Its Gothic cathedral, built 1114, crowning the top of the hill, adds much to the picturesqueness of its appearance. This ancient city was the scene of an ecclesiastical council in 918, was taken by the English in 1429, was memorable in the wars of Napoleon I. and in the Franco-German war of 1870, having capitulated to the Germans Sept. 9. It has a palace, often the residence of French monarchs, and a famous library. Pop. 10,268.

**La'o'na**, post tp of Winnebago co., Ill. Pop. 742.

**Laona**, post-v. of Pomfret tp., Chautauco co., N. Y., on Saw Creek, and on the Dunkirk Warren and Pittsburgh R. R. It has 2 churches and several manufacturing establishments. Pop. 218.

**La'os**, country of Farther India or Indo-China, nearly in the centre of the vast peninsula S. of China, bounded N. by the Chinese province of Yun-nan, E. by Tonquin and Anam, S. by Siam, and W. by the Shan states. Area, entirely uncertain, as well as pop., which is estimated at 1,500,000. The Shan states on the N. W. were formerly a part of Laos, but are now separate. Laos is traversed by the great Me-kong or Cambodia River, and consists chiefly of the fertile valley of this river, which is very productive of sugar, rice, tobacco, gums, betel-nuts, and other fruits, which with teak, sandal-wood, and gold-dust form the chief exports. Formerly independent, the tribes of Laos have since the eighteenth century acknowledged a nominal dependence upon Siam. The people are related to the Burmese in blood, language, religion, and customs; they are ingenious artisans, and trade with Tonquin and Siam. Cap. Chiengmai.

**La'ou-Tsze**, otherwise **Lao-Tseu**, **Lao-tsée**, or **Lao-kiun**, a Chinese moral philosopher whose teachings have many points in common with those of Sankhya, Boddha, of whom he was contemporary. Lao-tse means in Chinese "ancient sage." His family name was Li pé-yang, and he was born in the third year of the emperor Ting-uang, of the dynasty of Tschou, near Lai in the

principality of Tschou. This would be, according to Reinhold von Plänckner, at the end of the seventh century, but another account places the year of his birth about 604. Little is known of Laou-tsze except that he was state librarian and keeper of the records at the imperial court of Tschou, and that having resolved in advancing age to retire from China, probably to India, he remained for a short time on the border, Han kow, where he was persecuted by the general Yün-hi to at least leave some record of his doctrines in a book. He did so, the result being the *Laou-tse Tao-king* ("The Road to Virtue"), a small collection of aphorisms which probably contain more deep philosophy set forth in a spirited and genial form than can be found in any other work of the same size. It has within a few years been translated into the principal European languages, and extensively commented on. Laou-tsze makes all things proceed from and live in an infinite First Cause, which he calls *Tau*, and which John Chalmers thinks best to leave untranslated, because neither "Way," "Reason," nor "The Word" gives it exactly. He placed moral perfection in the individual, in independent realizing of truth, and in self-discipline, being in all respects the opposite of Confucius, who exhorted blind obedience to old customs and the doctrines of the ancient sages. Confucius is said to have taken a long journey to visit Laou-tsze. They met and interchanged their views, until Laou-tsze, probably wearied by the narrow scope of the opinions of Confucius and his frequent quotations of the ancients, sharply exclaimed, "Why talk for ever on of men who are long dead, and whose very bones are dust? Only their words remain and are heard. When the wise man meets with opportunity, he rises with it; if he does not, he lets the weeds grow, goes his way, and follows his destiny. I have heard that a shrewd merchant conceals his opulence, and the sage of perfect virtue loves to seem simple. Put away your pride and your many desires, with the endless ambition which is manifest in your manner. It is all folly; and that is all I have to say." This was a cut direct, but it was natural. Confucius followed the ancients, and aimed at establishing society upon conventional rules, while Laou-tsze, a rationalist, yet a mystic, despised glory, the world, the flesh, and as a writer in *Larousse* adds, the devil as known to Christianity. Confucius is said, on returning to his scholars, to have remarked, "Birds, I know, can fly, fish can swim, and beasts run. The running ones may be snared, the swimming hooked, and the flying snared. But I know not how the dragon rises on the wind and clouds to heaven. I have seen Laou-tsze, and he is like the dragon." Tradition states that Laou-tsze when last seen was mounted on a black ox, and rode away into the western wilderness of Thibet. Bronze figures representing him thus riding may be seen in every shop of Chinese and Japanese goods. From his disquisitions on *Tau*, the great cause and spring of life and morals, or that which with him takes the place of the Deity or the Absolute, Laou-tsze became the head of one of the great religions of China, known as the *Tauist*. He did not distinguish between spirit and matter, being, in fact, a pantheist, and, like Boddha, he seems to identify pure existence, devoid of passion and earthly emotions, with a state which is not to be separated from non-existence. His philosophy embraces much that resembles the *Identitätslehre*, a doctrine of identity, of Schelling, and still more the bold paradoxes of Hegel as to the logical sameness of "Being and Not-Being." Yet from this mysterious unknown Being of nature he deduces a vigorous and beautiful moral creed. The water that bubbled up in the spring of the valley came from he knew not where, and so it came from *nowhere*, from nothing. That spring flows on for ever—a symbol, he thought, of all existence, which continually flows from non-existence. And yet the eternal *Tau* is neither one of these nor the other, but the slumbering possibility of both. The following extracts give an idea of the style of Laou-tsze: "The reason (*Tau*) which can be reasoned is not the eternal Reason—the name which can be named is not the eternal Name." "When in the world beauty is recognized to be beautiful, straightway there is ugliness. When in the world goodness is recognized to be good, straightway there is evil. And thus in like manner existence and non-existence mutually originate each other; so also difficulty and ease, long and short, treble and bass, before and after." Laou-tsze often suggests Emerson, and the latter in his essay on *Compensation* has extended the idea of the former, that "an inevitable dualism bisects nature." "It is after wisdom has conferred its crown that there are great shams. And it is not until a nation has got into a disordered state that there are patriots" (i. e. faithful ministers).

Laou-tsze lived in a great age. "He was contemporary with Boddha in India, with Jeremiah, Habakkuk, Daniel, and Ezekiel in Judæa, with Thales, Anaximander, Pythagoras, Heraclitus, and Xenophanes in Greece, while at the



same time an immense reformation of the doctrines of Zoroaster took place in Persia." It seems impossible while studying his sentences, so full of sagacity and deep wisdom, to doubt that some of this Western influence had reached him.

The principal works on Laou-tse, in the order of merit, are as follows: *Laou-tse's Tao Te King, avec une Choussouche des Douches de la République et commentée*, von Victor von Strauss, Leipzig, 1870; *Le Livre de la Vertu et de la Vie*, traduction de M. Stanislas Julien, Paris, 1842, to which may be added *The Speculations of the Old Philosophers: Laou-tse, a Metaphysics, Polity, and Morality*, by John Chalmers, apparently in great part a translation from the text, not in London, 1898). *Le Tao te King, ou Le Livre de la Raison supérieure et de la Vertu*, par Laou-tse, traduit par G. Pauthier (only the first part of this published in *Mémoires de l'Académie des Inscriptions et des Belles-Lettres*, by Dequelines; *Mémoires sur la Vie et la Doctrine de Laou-tse*, by Abel Rémusat; the German version by Reinhold von Pfänckner (*Laou-tse, Tao-te-king*, Leipzig, 1870) is rather an extravagant paraphrase than a translation, it being difficult, or often impossible, to reconcile any of its phrases with those of the other versions. The remarks of the early Jesuits on Laou-tse are as absurd as they are contradictory, Père Couplet (1667), in common with Montucri (1808), seeing in him almost a Christian Trinitarian, while Père du Halde (1736) abuses him as an atheist and destroyer of all morals, in which opinion he was followed and outdone by the Fathers Bouvet, Fouquet, Prémare, and Aniot. A good English translation of Laou-tse's work is desirable. C. G. LELAND.

**La Pa'la**, tp. of San Diego co., Cal. Pop. 120.

**Lapat'cong**, tp. of Warren co., N. J., on the Delaware River, opposite Easton, Pa. Pop. 1150.

**La Paz**, seaport of Mexico, cap. of the territory of Lower California, on La Paz Bay, W. coast of the Gulf of California, is the seat of a declining pearl fishery; exports to San Francisco tropical fruits and hides. Pop. about 1000.

**La Paz de Ayacucho**, city of Bolivia, the capital of the department of La Paz, and one of the capitals of the republic, in lat. 16° 36' S. and lon. 68° 16' W., at an elevation of 12,226 feet, on both sides of the river Chuquapo. Well built, with an agreeable climate, and beautifully situated, its promenade or *alameda* presents a splendid view of the Illimani, and is said to be the finest in Bolivia. It was founded in 1548; is the chief commercial city of Bolivia, transacting a large foreign trade with the Peruvian ports of Arica and Ilay, with the latter of which it has been brought into close connection by the completion of the Arequipa Railway to Puno on Lake Titicaca. It has a beautiful cathedral, 14 other churches, a university, schools of law, medicine, theology, and science, and has frequently been the seat of the national government. Pop. 83,000.

**Lapeer'**, county in the E. of the southern peninsula of Michigan. Area, 630 square miles. It is undulating and fertile. Cattle, grain, and wool are staple products. Lumber and flour are leading articles of manufacture. It is traversed by the Detroit and Bay City and the Port Huron and Lake Michigan R. Rs. Cap., Lapeer. Pop. 21,345.

**Lapeer**, city and tp., cap. of Lapeer co., Mich., 60 miles N. of Detroit, at the junction of the Detroit and Bay City with Chicago and Lake Huron R. Rs. A branch of the former railroad, 6 miles long, connects with Fish Lake. Lapeer has 1 national bank, 2 weekly newspapers, 9 churches, 7 hotels, several large mills and shops, and many stores. It is in a fine farming region, and is the headquarters of a large business in pine lumber and shingles. Pop. of city, 1772; of tp. exclusive of city, 1092.

S. J. TOMLINSON, Ed., "CLARION."

**Lapeer**, post-tp. of Cortland co., N. Y. It contains the beautiful cataract called Hunt's Falls, on Fall Creek, 71 feet high. Pop. 735.

**La Pérouse**, de (JEAN FRANÇOIS DE GALAP), COUNT, b. at Guo near Albi, France, Aug. 22, 1741; entered the navy in 1756; served in the American war of independence, and was placed at the head of an exploring expedition which Louis XVI. fitted out, and which left Brest Aug. 1, 1785. Doubling Cape Horn, La Pérouse followed the American coast to Monterey, California, crossed then the Pacific, and followed the Asiatic coast from Manila to Petropaulovsk. From this place he sent his journals and charts to Paris, and in Sept., 1787, he started southward. A letter was received from him dated Botany Bay, Feb. 7, 1788, and from this place it was his intention to go to the Isle de France by way of Van Diemen's Land, but nothing more was ever heard of him. It is probable, however, according to researches made in 1791 by Admiral d'Entrecasteaux and Dumont d'Urville in 1828, that he was shipwrecked in 1788 at Vanikoro, in the New Hebrides group of islands.

**Lap'ham** (INCREASE ALLEN), LL.D., b. at Palmyra, N. Y., Mar. 7, 1811. Was a civil engineer; was employed on the Miami, Welland, and Louisville canals. Was secretary of the Ohio canal commission 1833-35, and early won a wide fame as a botanist and geologist. In 1836 he removed to Milwaukee, Wis., where he has held many public offices. In 1862 he became president of the Wisconsin Historical Society. He published valuable papers and works on the geography, geology, mineralogy, and history of Wisconsin, was a careful observer of the meteorology of the region, and prepared a memorial to Congress showing the necessity of storm-predictions for the benefit of commerce, and how they could be secured, the suggestions of which were subsequently carried out. All branches of physical science engaged his attention, and he did more than any other man in the State to develop and stimulate scientific investigation for practical ends. In 1873 he was appointed to take charge of a geological survey of the State. He organized the survey, and conducted it with great efficiency for two years, until, in consequence of a political revolution, he was superseded. He had prepared two able reports which are yet unpublished. He d. suddenly at Oconomowoc Sept. 14, 1875.

**Lapidary** [Lat. *lapidarius*, a "stonecutter," from *lapis*, a "stone," but limited to one who works in precious stones]. By some writers a distinction is observed between the engraver of gems and cameos and the lapidary, the latter being supposed to merely prepare precious stones for jewelry by cutting and polishing them. Of late years, since a great demand has sprung up for imitations of ancient Scotch jewelry and for German beads, all of agate, carnelian, and other third-class stones, the lapidary has been chiefly devoted to this class of work. The first step in polishing a stone is to slit it. This is effected by means of a circle or disk of thin sheet iron placed horizontally, and made to revolve by very simple machinery. Diamond-dust is applied to the edge of the iron plate, and sperm oil drops upon it from a can. A raised edge around the table is provided to prevent the loss of the dust. A small quantity on the disk will, if properly managed, last all day without appreciable loss. When cut, the stone is ground on horizontal wheels made of lead, brass, iron, or alloys, and sometimes of wood of different degrees of hardness. The wheels of metal are called *laps*. On these is spread emery, diamond, or corundum powder, and sometimes the powder of agates and other gems. For the last polish, wheels are used covered with cloth, leather, or hard brushes. The powders of diamond, etc. gradually imbed themselves so firmly in the lead or other soft metal of which the wheels are made that the stone yields to them. It is held either with the fingers or by wax in a hollow at the end of a stick, and pressed against the wheel. The *facets*, or flat surfaces which give brilliancy to transparent stones, are cut by a very simple contrivance. By the side of the horizontal grinding-wheel is placed an upright heavy, club-like piece of wood, resembling a long-necked, very narrow bottle reversed. Into this, in different places, a rod is stuck, at one end of which the gem is affixed with cement. The gem presses on the wheel as it revolves, and the surface is cut away. To make a new facet the rod holding the gem is simply stuck into another hole, which gives a new inclination or a new angle. The diamond-powder used is made from *bort*, or cheap coarse diamonds, and sells at from £1 to £2 per carat. The workmen acquire wonderful facility in shaping and polishing stones, and from a given pattern will produce any object required with great rapidity. Certain gems, such as the cairngorm, are very elegantly cut in Scotland, but the great mass of beads, bracelets, and inferior "Scotch" jewelry comes from Oberstein in Germany. (See GEMS.) (For further information consult the works of Dr. A. Billing, Dr. Feuchtwanger, King, and Holtzappel.) CHARLES G. LELAND.

**Lapidary**. In writing, this word is applied to a style peculiar to inscriptions, and which derives its name from *lapis*, a "stone," from being commonly applied to monuments. As it was developed at a time when Latin was principally used for such purposes, its rules are in reference to that language. It has, says Larousse, its special rules, its consecrated abbreviations, its ready-made formulas, and its conventional archaisms. It affects to be ancient and unchangeable by perpetuating words no longer in common use, and exerts itself chiefly to be concise, without neglecting great words or pompous forms. It is very difficult to write well, and in ancient forms is much more difficult to read, owing to the abbreviations, by which words are often represented by single letters. The commonest abbreviations in Latin inscriptions are the following:

A. B., <i>Abbas</i> , Baccalaureus, Bachelor of Arts.	Ab <i>the Capitulum</i> , "Year of the building of the city" (Rome), or "from the building of the city"
A. M., <i>Abbas</i> , Magister, Master of Arts.	
A. U. C., <i>Anno Urbis Condite</i> , or	COSS., <i>Consules</i> , consuls.

- (CS., *Omnia*.  
C. VII., *Calam. vir*, a magis-  
tratus.  
C. XV., *Thessalon. Viri*, very  
illustrative.  
D. M., *Thes. Mithridas*, "To the  
Mithridas."  
D. M. S., *D. M. Mithridas Sarcophagi*,  
"Aphorisms of the Mithridas."  
D. S. P., *D. S. P. Mithridas*, "At his  
own expense."  
F., *Florus*, son.  
G., *G. Florus*, brothers.  
G. D. N., *G. D. N. Mithridas*,  
"To the Mithridas, or the lady  
son of our Master."  
H., *H. Mithridas*, "Executed by the heir."  
H. M. H. N. S., *H. M. H. N. S. Mithridas*,  
"This monument does not  
follow our inheritance."  
I. O. M., *I. O. M. Mithridas*,  
"To have, the stand great-  
est."

Among the peculiarities of lapidary style is that by which a date was expressed by making the numeral letters prominent in an inscription. Of this kind is the following, which was formerly on the face of an old clock before a tavern in Paris:

"AVT Mps dV rod Charles L. bVIT  
Cest VI hasteL fVt constVIT."

By adding these capitals the date 1465 is obtained. (See CHRONOGRAM.)

CHARLES G. LELAND.

**Lapis Lazuli** [Lat. *lapis*, "stone," and Arab. *azul*, "blue"], a natural silicate of lime and alumina, with a small amount of sulphurets, crystallizing in the monoclinic system, and of a beautiful Berlin blue color. It is highly valued for the manufacture of ornamental articles, and was formerly the sole source of the rich paint ultramarine, which is now chiefly manufactured artificially.

**Lapithæ** [Λαπίθαι], in the Greek mythology, a race of Thessalians, the descendants of Lapithes, a son of Apollo, whose king was Pirithous, son of Ixion. They overcame the Centaurs in a bloody war, but were in turn humbled by Hercules, as related in Hesiod and Ovid. They were probably an early warlike race of the Pelasgian stock.

**Laplace** (CYRILLE PIERRE TRÉPONDRE), b. Nov. 7, 1793; entered the French navy early; was made captain in 1834, rear-admiral in 1841, vice-admiral in 1853, and retired in 1858. He commanded in two expeditions of circumnavigation, which he described in *Voyage autour du Monde* (4 vols., Paris, 1832-39), and *Campagne de Circumnavigation* (4 vols., 1840-48). D. Jan. 24, 1875.

**Laplace, de** (PIERRE SIMON), MARQUIS, b. at Beaumont-en-Auge, in Normandy, Mar. 23, 1749, of poor parents; he was indebted to the interest of wealthy friends for admission to the College of Caen and the military school of Beaumont. Brought to the notice of D'Alembert, who procured him the mathematical mastership of the military school at Paris, that city became his residence at the age of eighteen. Two papers on the Theory of Probabilities printed at the Academy during the ensuing five or six years are mentioned by the Académie as chosen for publication among many, with the eulogy, "This society has never known so young a person to furnish in so short a time so many important memoirs on subjects so diverse and so difficult." He was elected an associate, and in 1784 a member. His political career during the Revolution and under Napoleon has been much commented upon, but neither space nor adequate data allow its discussion here.

Laplace is styled by Prof. Forbes (1844) *Dissertation, Euclyd. B. 11*, "a sort of exemplar or type of the highest class of mathematical natural philosophers of this, or rather the immediately preceding, age;" by Mr. Airy, "the greatest mathematician of the past age;" and by Prof. Nichol, "the titanic geometer." It may be added that the present age has produced no recognized rival; that to Newton alone, as a "mathematical philosopher," is, in any age, superiority conceded. His more important investigations are—his improvements of the lunar theory; his discovery of the cause of the great inequality of Jupiter and Saturn's motions; his theory of the tides; his work on probabilities. Newton's newly discovered law of gravitation had been so successfully applied to the lunar motions as with one important exception to reconcile them to the requirements of the theory; the unexplained exception was "that the mean motion of the moon has been accelerated from century to century by a minute quantity, which, in the lapse of thousands of years, has become recognizable." The earliest authentic observations of eclipses, made at Babylon in the years 719, 720, 721, show that they occurred 14 hours *sooner* than if the present mean motion of the moon then obtained. The interval has been *longer* than it should have been

- K., *Kiblenis*, "At (or in) the Kalads."  
L., *L. Kiblenis*, a freedman.  
N., *N. Kiblenis*, a freedman.  
O., *O. Kiblenis*, "May your bones rest well."  
P. M., *P. M. Kiblenis*, the great pontiff.  
S. C., *S. C. Kiblenis*, "By a decree of the Senate."  
S. P. Q. R., *S. P. Q. R. Kiblenis*, "The Senate and the Roman people."  
S. T. T. L., *S. T. T. L. Kiblenis*, "May the earth be light on this day."  
V. F., *V. F. Kiblenis*, "He did it while alive."  
V. P., *V. P. Kiblenis*, "He erected it while yet alive."  
V. S. L., *V. S. L. Kiblenis*, "He did it to accomplish a vow."

found to be, and hence the motion *less* rapid in former centuries. As regards the moon's orbit, "the effect has been that at each lunation she approaches nearer to the earth than during the last by *one-fourth* of an inch," thus describing a spiral of almost infinitely slow convergence."

To understand the solution of this apparent anomaly as finally given by Laplace, it must be remembered that under the action of central forces the angular velocity of a satellite about its primary will be increased by an increase of the central force; that the effect of the sun's attraction on the moon and earth is, on the whole, to diminish the central force between these bodies by a minute quantity proportional to the inverse cube of the sun's distance.<sup>2</sup> The disturbing effect, therefore, of the sun's attraction is to make the moon's motions less rapid than they otherwise would be; and whatever diminishes this disturbing effect accelerates the moon's motion. Now, though the earth's mean distance from the sun has not varied, the eccentricity of its orbit has been diminishing from the earliest historic times, and with it the average inverse cube of the distance. Hence, the secular acceleration of the moon above described; which, however, as also its approximation to the earth, must cease with the attainment of minimum eccentricity by the earth's orbit, when the reverse effects will ensue. The amount of acceleration is now about 10" of longitude in a century.

A comparison of ancient observations with modern revealed an acceleration of the mean motion of Jupiter and a retardation of that of Saturn, whereas modern observations alone show a contrary effect to be in progress. The revealing after many years of study of the source of the resulting discrepancy between astronomical tables and observation is regarded as one of the proudest achievements of its author, though Mr. Airy regards his theory of the tides as furnishing a "greater claim for reputation."

Analytical expressions for celestial phenomena can, in general, be but approximations, in which terms considered insignificant, as involving the square, cube, or higher powers of minute quantities, are discarded. Laplace demonstrated that among those which had been thus neglected in the expansions of the mutual perturbations of Jupiter and Saturn were some multiplied by sines or cosines of angles rendered small by small multipliers. Mathematicians are familiar with the fact that, subjected to integration, such terms, by making the small multiplier a *divisor*, produce quantities of appreciable magnitude. The effect of this discovery and the restoration of such terms was a complete reconciling of ancient and modern observations. Thus were removed from the theory of gravity the two most formidable obstacles to its acknowledged adequacy to explain celestial phenomena—the anomaly of the lunar acceleration and the great inequalities of Jupiter and Saturn.

Tidal theories, previous to Laplace's investigations, presumed the earth to be at rest, and the waters of the ocean to be in motionless equilibrium between the forces of gravity and the solar and lunar attractions. Laplace had the boldness to attempt the solution of a problem in which account is taken of the *motions* (relatively to the earth) which the fluid particles must receive in order to produce the tides; in other words, of the forces required to produce them. Although this theory, in the writer's opinion, no more really grasps the actual tidal phenomena of the existing seas of the earth than the equilibrium theory, it *would* solve the problem did the ocean cover the whole of the earth's surface with uniform or nearly uniform depth, or did it so occupy a canal continuous between parallels of latitude around the globe; and it furnishes highly interesting and even important results.

In another paper (*Amer. Jour. of Science*, 1859), the writer remarked: "If the actual configuration of the ocean's

<sup>2</sup> The sun's attraction varies as the inverse square of the distance, but if the moon be new or full it is by the *longitudinal* only of its attractions on the earth and moon by which *longitudinal* attraction from the other, and somewhat of the mutual attraction of earth and moon neutralized. Now if  $S$  be the sun's mass, and  $D$  be its distance from the earth, and  $d$  that of the moon, this difference at time of new moon will be  $\frac{S}{D^3} - \frac{S}{d^3}$ . Since  $d$  is but  $\frac{1}{281}$  of  $D$ , this difference will reduce nearly to  $\frac{281}{D^3}$ ; and the same for full moon. But on the contrary, when

the moon is first or last quarter, and earth and moon are equidistant from the sun, it *diminishes* the *longitudinal* attraction to which only the above directions of its attraction, therefore, by *direct* only of the above expressed force. The average direct disturbance of a small fluid attracting and sustaining force of the sun is a decrease of the gravitating force between the earth and moon equal to  $\frac{S}{2D^3}$ , which

may be computed at  $\frac{1}{100}$  of the force, and by which the period of a lunation would be lengthened  $\frac{1}{100}$  of a hour. It is not, however, the *total* amount of the sun's attraction but only a small fraction of it, now a *very* small fraction, now a *very* large fraction, of the sun's attraction, of  $\frac{1}{100}$ , therefore, the present rate of diminution of eccentricity, that causes the lunar acceleration."



bed is the very basis of a dynamic theory of the tides, then a theory which is obliged to reject entirely this actual configuration, and instead of ocean-beds of limited areas, isolated from each other by dry land in those parallels where the tidal effects are the greatest, substitutes an imaginary ocean covering the whole globe, and of the same depth following each parallel of latitude, the problem can be only a mathematical one of more or less interest, from which nothing of any practical value, as to the actual phenomena of the tides, can be expected;" and Mr. Airy, who speaks of Laplace's investigation as "one of the most splendid works of the greatest mathematician of the age," in almost the same breath says, "As it is, Laplace's theory fails totally in application, from the impossibility of introducing in it the consideration of the boundaries of the sea;" and Prof. Forbes (6th Dissertation) fully sustains the writer when he says, "It is, in fact, like many other productions of the same age and school, a great display of ingenuity and mathematical skill, which hardly yields a single result worthy of confidence or agreeing with nature, except by the abandonment of its deductive rigor, or a concealed induction backward from the phenomena to be accounted for."

The doctrine of Probabilities—the subjecting to the rigor of mathematical methods subjects which *know no law* (i. e. of chance)—furnishes the most subtle and at the same time the most fascinating of problems, occupying as it were a borderland to Metaphysics, Logic, and Mathematics. The *Théorie analytique sur les Probabilités* of Laplace is regarded as quite the ablest specimen of mathematical writing of his age; but one which cannot here be discussed. (See PROBABILITIES.)

In this brief notice it would be in vain to discuss Laplace's distinctive claims to greatness as a mathematician and a philosopher. His mastery of mathematical analysis was perhaps unsurpassed, and he has contributed greatly to the development of this powerful agent of human reason, especially in its application to physical problems. He is the inventor of the most powerful calculus (since generalized and enlarged as the *Spherical Harmonic Analysis*) known generally as that of LAPLACE'S COEFFICIENTS. (See that head.) It is due, however, to *Legendre* to say that he (according to Dr. Forbes) "was the first to imagine and employ those artifices of calculation known as 'Laplace Functions.'" His longest and most systematic work, the *Mécanique Céleste*, is a compendium of the problems of physical astronomy which had been accumulating for a century, but which are treated by methods mainly original with himself. This work, though written with entire disregard to preserving the order and connection which would enable the reader to follow him, is justly considered his most imperishable monument. Dr. Bowditch, whose voluminous explanatory notes appended to his translation are almost an indispensable aid, was accustomed to remark, "Whenever I meet the words of *il est facile de voir* (i. e. it is easy to see), I am sure that hours and perhaps days of hard study will be necessary for me to discover *how* it plainly appears." It is certainly a disparagement to the work that it should be so, for I think mathematicians will admit that a little more regard to order and connection, and a slight condescension to furnish explanation or clue, would make the work more useful, certainly more easily read.

For a short time Laplace was one of Napoleon's ministers. The cause of disagreement is unknown, but his was not the character of mind best fitted for politics or diplomacy, and he was evidently out of his element. No more ineffectual or unjust characterization than that applied by Napoleon, "the infinitesimal philosopher," could have been made. No modern mathematician has exhibited greater powers of generalization; and in his *Nebular Hypothesis* we have one of the grandest conceptions of the origin of the actual *Cosmos*, as the result of continuous action of physical "laws," and one which has anticipated modern thought in relation to development. Laplace has been censured for "meanly" suppressing in the second edition, published after the emperor's fall, the dedication, "*A Napoléon le Grand*," which had been given to the first edition. Mr. Todhunter (*Hist. of the Theory of Probability*) thinks that "the fault was in the original publication, and not in the final suppression;" and that it would have been "almost a satire to have repeated it when the tyrant of Europe had become the mock sovereign of Elba or the exile of St. Helena." He has, too, on very inadequate grounds been charged with atheism. His last words (he died in Paris Mar. 5, 1827, exactly a century after Newton), so similar in sentiment to language attributed to his great predecessor, prove that, like that great philosopher, insight into the mysteries of nature deeper than other men's nourished in him not arrogance, but humility: "*Ce que nous émettons est peu de chose; ce que nous ignorons est immense.*"

J. G. BARNARD.

**Laplace's Coefficients.** The properties of these important analytical expressions were discovered by Laplace while investigating the attractions of bodies nearly spherical in figure. The total attraction of any body upon a material point is the resultant of the attraction of all its elementary particles; or, to state in different form, the total effort of the attraction in any given direction is the integral of the components in that direction of the attractions of all the elementary particles. If  $x, y, z$  be the rectangular co-ordinates of any elementary portion  $dm$  ( $=\rho dx dy dz$ ,  $\rho$  being the density) of the attracting body, and  $x', y', z'$  the co-ordinates of the attracted point, the attraction exerted by  $dm$  (varying inversely as the square of the distance) will be

$$\frac{\rho dm}{(x' - x)^2 + (y' - y)^2 + (z' - z)^2};$$

and the component of this parallel to the axis of  $x$  will be

$$\frac{\rho(x' - x) dx dy dz}{[(x' - x)^2 + (y' - y)^2 + (z' - z)^2]^{\frac{3}{2}}}; \quad (1)$$

and the component of the attraction exerted by the entire body upon the attracted particle will be the triple integral of this last expression. Now, if we put

$$V = \iiint \frac{\rho dx dy dz}{[(x' - x)^2 + (y' - y)^2 + (z' - z)^2]^{\frac{3}{2}}}, \quad (2)$$

(that is,  $V$  is the sum of the quotients of the elementary masses, each divided by its distance from the attracted particle), it will be found that (1) is simply the partial differential (with sign changed) of  $V$  taken with regard to the variable  $x'$ . Hence also  $-\frac{dV}{dy'}$  and  $-\frac{dV}{dz'}$  give the components of attraction parallel to the axes of  $y$  and  $z$ ; or, more generally,  $-\frac{dV}{ds}$  is the component of attraction parallel to any line of which  $ds$  is an element of length.

The function  $V$ , first introduced by Laplace for gravitation, is of great importance in physics, and the name of *potential* has been given to it by the English mathematician the late George Green, who (taking his clue from the use of it made by Laplace) may be said to have created the theory as we now have it. In reference to gravitation, not only does the amount of attractive force depend upon it (being, in any direction,  $-\frac{dV}{ds}$ ), but the *work* which that attraction is *potent* to do along any path is evidently the integral  $\int \frac{dV}{ds} ds$ , or,  $-V$ ; hence the name of *potential*.

A property of  $V$ , easily verified, is that the sum of the second partial differentials with respect to each of the co-ordinates of the attracted point is zero, provided it be not a part of the attracting mass. In the latter case (demonstration cannot be here given) the sum is  $-4\pi\rho'$ . Hence, the property in question is expressed by

$$\frac{d^2V}{dx'^2} + \frac{d^2V}{dy'^2} + \frac{d^2V}{dz'^2} = 0 \text{ (or } -4\pi\rho'), \quad (3)$$

$\rho'$  being the density at the attracted point of the mass. Hence, if we know the potential  $V$  with reference to any point included in its *own* mass of which the co-ordinates are  $x', y', z'$ , the variable density will be expressed by

$$-\frac{1}{4\pi} \left( \frac{d^2V}{dx'^2} + \frac{d^2V}{dy'^2} + \frac{d^2V}{dz'^2} \right).$$

The determination of  $V$  leads at once to the determination of the attraction upon any point.  $V$  is the integral of  $\rho dx dy dz$  multiplied by

$$[(x' - x)^2 + (y' - y)^2 + (z' - z)^2]^{-\frac{1}{2}}, \quad (4)$$

the reciprocal of the distance between the element  $dm$  and the attracted particle. If we transform  $x', y', z'$  into polar co-ordinates  $r', \theta', \omega'$ , and  $x, y, z$  into  $r, \theta, \omega$ , we have the usual expressions (the angle  $\theta$  being measured from the axis of  $z$ ),

$$x' = r' \sin \theta' \cos \omega'; \quad y' = r' \sin \theta' \sin \omega'; \quad z' = r' \cos \theta',$$

and corresponding ones for  $x, y, z$ .

If, with Laplace, we represent  $\cos \theta$  and  $\cos \theta'$  by  $\mu$  and  $\mu'$ , the above reciprocal will be converted into

$$\{r^2 + r'^2 - 2rr'\mu\mu' + \sqrt{1 - \mu^2}\sqrt{1 - \mu'^2} \cos(\omega - \omega')\}^{-\frac{1}{2}};$$

which may be expanded into converging series (according as  $r >$  or  $<$   $r'$ ),

$$P_0 \frac{1}{r^r} + P_1 \frac{r'}{r^{r+1}} + \dots + P_n \frac{r'^n}{r^{r+n}} + \dots, \quad (5)$$

or  $P_0 \frac{1}{r} + P_1 \frac{r'}{r^2} + \dots + P_i \frac{r'^i}{r^{i+1}} + \dots$ ,

in which  $P_0, P_1, \dots$  and  $P_i$  are rational and entire func-

tions of  $\mu, \sqrt{1 - \mu^2} \cos \omega, \sqrt{1 - \mu^2} \sin \omega$ ; any coefficient  $P_i$  is of  $i$  dimensions in these quantities and the same is true with regard to the variables  $\mu'$  and  $\omega'$ , and its numerical value has plus or minus unity for maximum and minimum.

If we style the expression (4)  $Q$ , it will be found to satisfy the condition (3) (with zero for second member).

In polar co-ordinates this condition becomes

$$(6) \quad r \frac{d^2 Q}{dr^2} - \frac{d}{d\mu} \left\{ (1 - \mu^2) \frac{dQ}{d\mu} \right\} - \frac{1}{1 - \mu^2} \frac{d^2 Q}{d\omega^2} = 0,$$

and if we substitute for  $Q$  the developments (5), it will be found that  $P_i$  satisfies the condition

$$(7) \quad \frac{d}{d\mu} \left\{ (1 - \mu^2) \frac{dP_i}{d\mu} \right\} + \frac{1}{1 - \mu^2} \frac{d^2 P_i}{d\omega^2} + i(i+1)P_i = 0,$$

The functions  $P_i$  possess remarkable properties discovered by Laplace. Hence their name, *Laplace's Coefficients*. As resulting from the developments (5), they are determinate, and hence involve only numerical quantities with  $\mu$  and  $\omega, \mu'$  and  $\omega'$ . Other expressions derived from the integration of (7), and containing, of course, but one set of variables with arbitrary constants, share in the same properties, and are designated as *Laplace's Functions* to distinguish them from the Coefficients. These properties (proofs of which cannot be here given) are the following:

1. If  $Q_i$  and  $S_i$  be two Laplace's Coefficients or Functions, then  $\int_{-1}^1 \int_0^{2\pi} Q_i S_i d\mu d\omega = 0$ , when  $i$  and  $i'$  are different integers, the sum of which be not minus unity.

2. A function  $F(\mu, \omega)$  of  $\mu, \sqrt{1 - \mu^2} \cos \omega$ , and  $\sqrt{1 - \mu^2} \sin \omega$ , which does not become infinite between the limits  $-1$  and  $+1$  of  $\mu$ , and  $0$  and  $2\pi$ , of  $\omega$ , can be expanded in a series of *Laplace's Functions* (which is equivalent to saying that any function of  $x, y, z$  can be thus expanded); that is,

$$F(\mu, \omega) = F_0 + F_1 + F_2 + \dots + F_i + \dots, \quad (8)$$

in which  $F_i$  is a Laplace Function of the order  $i$ , and is equal to

$$\frac{2i+1}{4\pi} \int_{-1}^1 \int_0^{2\pi} F(\mu', \omega') P_i d\mu' d\omega'. \quad (9)$$

That is,  $P_i$  (which contains symmetrically  $\mu$  and  $\mu'$ , and also  $\omega, \omega'$ ), by being multiplied by any function,  $F(\mu', \omega')$ , of  $\mu', \sqrt{1 - \mu'^2} \cos \omega', \sqrt{1 - \mu'^2} \sin \omega'$ , and integrated as above, is converted into the Laplace Function of  $i$  order, of the development of  $F(\mu, \omega)$ .

The general expression for these coefficients,  $P_i$ , is exceedingly complicated. We give here, as examples, expressions for  $P_1$  and  $P_2$  only.

$$P_1 = \mu\mu' + \sqrt{1 - \mu^2} \sqrt{1 - \mu'^2} \cos(\omega - \omega').$$

$$P_2 = \frac{3}{2} \left\{ \mu^2 \mu'^2 - \frac{1}{2} \mu^2 - \frac{1}{2} \mu'^2 + \frac{1}{2} (1 - \mu^2) \frac{1}{2} (1 - \mu'^2) \cos^2(\omega - \omega') \right. \\ \left. + \frac{1}{2} (1 - \mu^2) \frac{1}{2} (1 - \mu'^2) \cos 2(\omega - \omega') \right\}.$$

The Laplace Functions,  $F_i$  (the sum of which from  $i=0$  to  $i=\infty$  to the order of the given function,  $F$ , constitutes the development of the latter), may be obtained from  $F$  by the indicated process (9), involving the use of the "Laplace Coefficients"  $P_i$ ; but when the function  $F$  is rational and integral, the development is more readily made the method indicated by Laplace, having recourse to the general forms of Laplace Functions (or *Spherical harmonics*), i. e. to the general solutions of differential equation (7).

I shall not attempt to indicate the processes by which these general forms are determined, but give those of  $0, 1, 2, 3$ d orders with the general expression for a harmonic of any order  $i$ , calling  $S_i$  the general solution of (7) with regard to variables  $\mu$  and  $\omega$ :

$$S^0 = B_0^0$$

$$S^{(1)} = B_1^{(0)} \mu + (1 - \mu^2)^{\frac{1}{2}} \left\{ A_1^{(1)} \sin \omega + B_1^{(1)} \cos \omega \right\}$$

$$S^{(2)} = B_2^{(0)} \left\{ \mu^2 - \frac{1}{2} \right\} + (1 - \mu^2)^{\frac{1}{2}} \mu \left\{ A_2^{(1)} \sin \omega + B_2^{(1)} \cos \omega \right\} \\ + (1 - \mu^2) \left\{ A_2^{(2)} \sin 2\omega + B_2^{(2)} \cos 2\omega \right\}$$

$$S^{(3)} = B_3^{(0)} \left\{ \mu^3 - \frac{3}{2} \mu \right\} + (1 - \mu^2)^{\frac{1}{2}} \mu^2 \left\{ A_3^{(1)} \sin \omega \right. \\ \left. + B_3^{(1)} \cos \omega \right\} + (1 - \mu^2) \left\{ A_3^{(2)} \sin 2\omega + B_3^{(2)} \cos 2\omega \right\} \\ + (1 - \mu^2)^{\frac{3}{2}} \left\{ A_3^{(3)} \sin 3\omega + B_3^{(3)} \cos 3\omega \right\}$$

\* In relation to those peculiar quantities  $P_i$ , this equation holds for other of the two sets of variables  $\mu, \omega$ , or  $\mu', \omega'$ .

It is not unusual to style the development  $S$  as a series of "Laplace's Coefficients," but I believe it more correct to confine that designation to the quantities  $P_i$ , which appear as actual "coefficients" in the development (5). These quantities are indeed Laplace Functions or "Spherical harmonics," but of very marked peculiarity of form, being *biserial* or double *a. e.* possessing the essential properties, in each of the two sets of variables  $\mu, \omega$  and  $\mu', \omega'$ , and destitute of arbitrary constants; and through this double form, instrumental in converting  $F(\mu', \omega')$  into a Laplace Function  $F_i$  and, thus, to the development of  $F(\mu, \omega)$  in Laplace Functions, or Spherical harmonics.

$$+ B_3^{(1)} \cos \omega \left\{ (1 - \mu^2) \mu \left\{ A_3^{(2)} \sin 2\omega + B_3^{(2)} \cos 2\omega \right\} \right. \\ \left. + (1 - \mu^2)^{\frac{3}{2}} \left\{ A_3^{(3)} \sin 3\omega + B_3^{(3)} \cos 3\omega \right\} \right\}$$

and in general

$$S^{(i)} = \sum_{n=0}^{i-1} \frac{n!}{(i-n)!} (1 - \mu^2)^{\frac{n}{2}} \left\{ \mu^{i-n} \frac{(i-n)(i-n-1)}{2(i-1)} \mu^{i-n-2} + \right. \\ \left. \text{etc.} \right\} \left\{ A_i^{(n)} \sin n\omega + B_i^{(n)} \cos n\omega \right\}. \quad (10)$$

In the foregoing the capital letters, with super and sub fixes represent arbitrary constants.

To develop any rational integral function  $F$  of  $x, y, z$ , of degree  $i$ , these variables must first be transferred into polar co-ordinates.

The general Laplace Function (10) of the same order  $i$  will be subtracted from it, and the arbitrary constants determined by the condition that the remainder  $F - S_i$  shall contain no powers or products of  $\mu$  or  $\sqrt{1 - \mu^2}$  of higher than the  $i-1$  order.

This determines  $F_i$  of (8). From that remainder (of degree  $i-1$ ), the general expression (10) of next lower order  $i-1$ , is subtracted; and the constants again determined by the condition the new remainder shall contain no powers or products of  $\mu$  or  $\sqrt{1 - \mu^2}$  of higher order than  $i-2$ ; by which  $F_{i-1}$  of (8) is determined; and so on.

First invented for expressing the attraction of a body of nearly spherical figure, its first application may here be illustrated. It is well known that, except for spherical or ellipsoidal figures the integration of  $V(2)$ , is impracticable by direct process.

Transposed into the variables  $r, \mu$ , and  $\omega$ , *pidydz* becomes  $\rho^2 d\mu d\omega d\rho$ . The denominator of  $V$  develops, for an external attracted point, into the first of the series (5). If we suppose the mean radius of the body to be  $a$ , and variable radius to be  $a(1+y)$ , in which the greatest value of the variable,  $y$ , is supposed to be but a small fraction, and if we integrate  $V$  with reference to  $r$ , from  $r=a$ , to  $r=a(1+y)$ , we shall get (supposing the density  $\rho$  to be constant, and neglecting powers of  $y$  above the first),

$$(11) \quad \rho \int_{-1}^1 \int_0^{2\pi} \left\{ \rho^2 P_0 + \frac{a^4}{r^2} P_1 + \dots + \frac{a^{i+1}}{r^{i+1}} P_i + \dots \right\} y d\mu d\omega$$

for that part resulting from the stratum of small variable thickness (positive or negative)  $ay$ , by which the given body varies from true sphericity of form. This function  $y$  must, of course, be given, in terms of  $\mu, \sqrt{1 - \mu^2} \cos \omega$ , and  $\sqrt{1 - \mu^2} \sin \omega$ ; and can be developed in Laplace Functions,

$$Y_0 + Y_1 + Y_2 + \dots + Y_i + \dots$$

But by (9)  $\frac{2i+1}{4\pi} \int_{-1}^1 \int_0^{2\pi} y P_i d\mu d\omega = Y_i$ ; hence the terms of the integral (11) become, severally,

$$\frac{4\pi\rho}{(2i+1)} \frac{a^{i+1}}{r^{i+1}} Y_i;$$

and hence (since that part of  $V$  belonging to the sphere of radius  $a$  is easily found to be  $\frac{4\pi\rho a^3}{3r^2}$ ),

$$(12) \quad V = \frac{4\pi\rho a^3}{3r^2} + \frac{4\pi\rho a^3}{3r^2} \left\{ Y_0 + \frac{a}{3r} Y_1 + \dots + \frac{a^i}{(2i+1)r^{i+1}} Y_i + \dots \right\}.$$

Thus the potential  $V$  (from which can by differentiation be derived the attraction) is determined.

If, on the other hand, the body (*e. g.* the earth considered as a fluid enveloping a spherical nucleus) be such that a foreign attraction produce a slight distortion or deviation from perfect sphericity, many important problems (*e. g.* the tides) depend on the determination of this distortion. The direct effect of the foreign attraction would be determined with comparative ease; but the problem is very much complicated by the fact that this directly produced stratum of distortion itself reacts upon the particles of its own substance; which secondary action must be taken into account. The potential of that reaction, in terms of the sought quantity,  $y$ , can by aid of (12) be expressed *ad libitum*, and combined with the potential of the foreign attraction in expressing the conditions of equilibrium, and thus the actual tidal distortions determined.

The discovery of the remarkable functions of Laplace (whose own demonstration of their properties was regarded as inconclusive, or at least incomplete) was followed by a controversy among eminent mathematicians, the substance of which is given by Bowditch in his voluminous notes to book ii, chap. ii, § 1 of the *Mécanique Céleste*.

The method has since been generalized, and under the designation of *spherical harmonic analysis*, greatly developed (see Thomson and Tait, *Natural Philosophy*, where its object is defined to be "the expression of an arbitrary



periodic function of two independent variables in the proper form for a large class of physical problems involving arbitrary data over a spherical surface, and the deduction of solutions for every point of space.")

In investigations of the distribution of electricity and magnetism—of the conduction of heat, etc.—its power alone can cope with the difficulties of the problems. The most important application involving gravitation is to the theory of the Figure of the Earth, the attraction of the mass on each of its particles being that of approximately spherical layers of matter equally dense through each, but varying in density from layer to layer. Besides the works above mentioned, consult Pratt, *Figure of the Earth*; Maxwell, *Electricity and Magnetism*; J. J. Sylvester, *Notes on Spherical Harmonics*; *Phil. Mag.*, 1876, vol. ii.

A simple harmonic function is defined under the head *Harmonic Motion*. A combination of such produces a complex harmonic function. "Fourier's Theorem" (which is not only "one of the most beautiful results of modern analysis, but may be said to furnish an indispensable instrument in the treatment of nearly every recondite question in modern physics") amounts to this—viz. Any function whatever between definite values of the variable may be expressed as a complex harmonic function. The "spherical harmonic analysis" is but an extension (whence, probably, its name) of this principle to the expression of quantity arbitrarily distributed over a spherical surface.

J. G. BARNARD.

**Lapland and the Lapps.** Lapland ("the land of the Lapps") is the name generally given to an extensive territory of Northern Europe stretching along the Arctic Ocean, from the Atlantic to the White Sea. It does not form an independent political unit, but is divided between Norway, Sweden, and Russia, and inhabited, besides the Lapps, by Finns, Norwegians, Swedes, and Russians. The general aspect of the country is rather forbidding. A long, severe winter of nine months, during which the sun does not rise for two months; a short, extremely hot summer in July and August, during which the sun does not set; a spring and a fall of a couple of weeks,—such is the climate. The forests of pine and birch which cover the southern parts of the country soon cease; barley and potatoes may be raised as far as 70° N. lat., but only in a few valleys. On the large table-land nothing grows but lichens and mosses, on which the large herds of reindeer feed, which, together with hunting and fishing, afford the inhabitants their sole resources of life. The Lapps belong to the Lapponian subdivision of the Tschudic races, which are referred by the philologist Castrén to the Finnic group of the great Turanian family. This gives them the position assigned to them by Rask and Max Müller, excepting that the names "Tschudic" and "Finnic" change places in their classification. Latham gives the Lapps (or Sabme, as they call themselves; Lopari, as the Russians call them) a separate place among Ugrian peoples. (See the article FINLAND.) They entered Europe from the S., with other Finnic tribes, before its occupation by Aryans, and therefore before the European historical period. Their dwellings on the E. side of the continent extended as far S. as the lower Volga, but they were long ago driven from their old home by the steady pressure of Finns, Slaves, and others, laterally and from below, until they have been crowded into their present seat. Now and then, however, their frontier has been able to maintain itself, or even advance upon that of their neighbors. They have always been closely connected with the Finns, possibly even confounded, by early observers, both ethnically and geographically, especially in Lapland. The ancient Fenni, mentioned by Tacitus as settled in the N. of Europe, were probably the ancestors of the Lapps, not of the Finns. They have a tradition of their former occupancy of Sweden or Finland. "The Swedes and Lapps," they say, "were originally brothers. When a storm came on, the Swedes put up a board and took shelter under it, the Lapps took to a tent; and ever since the latter have lived in tents, the former in houses." The primitive wanderings of the ancient Sabme are scarcely distinguishable from those of the Finns. Their later history, too, is only incidental to that of their Aryan conquerors, who have either reduced them to the condition of serfs, or forced them into sterile and icy regions, where they could never develop an independent nationality.

The Lappish countries now are Lappmark in Sweden, Russian Lapland to the White Sea, and Finnmark, or the March of the Finns, in Upper Norway, where many of them live. The Lapps subject to Russia are—(1) those of the duchy of Finland, N.; (2) those of the government of Archangel. Lallerstedt, in *La Scandinavie*, counts in Finnmark 13,000 Lapps to 6000 Finns and 25,000 Norwegians. Friis estimated 1556 Lapps to 1749 Norwegians in 1865. Since then the Lapps seem for a long time to have increased as the Norwegians decreased; then those were sta-

tionary and the Norwegians increased up to 1835, though it should be remembered that the Lapps, having been to a great extent absorbed, are reckoned as Norwegians. But this author considers them as dying out in Finnmark. At the last census, in 1859, the population of Russian Lapland was 9134, of whom 2207 were Lapps, 1956 were Karelians, 4971 Russians. To these might be added a few Norwegian and Finn emigrants. Brace in 1863 counts 28,000 Lapps under Sweden and Russia.

The Lapps of the Russian empire, Gurowski says, have as *inorodets*—i. e. provincial natives of non-Russian stock—an organization and rights distinctly recognized by the government. But a narrow policy is exercised towards them, and less done for their improvement than in Norway, and more especially in Sweden. The Norwegians, having hitherto regarded them as hopelessly debased and ignorant, neglected them, but latterly Swedish and Norwegian missionaries have much enlightened and softened both Lapps and Finns—Stockfleth particularly, and the brothers Læstadius, Lutherans, who labored in the first half of this century.

The Lapps seem to be physically inferior to the Finns, probably because less comfortably housed, fed, and clothed, though they are wonderfully hardy, and quite as courageous. There is much intermixture of these races at the Finland frontier and at the copper-mines. Friis thinks the mixed race best able to withstand the rigorous climate of the far North. The Laplanders are wild, savage, and dull, small of stature, with large head, short neck, small gray-reddish eyes, hair dark brown, beard short, hands long, legs thin, abdomen projecting, the result of improper or insufficient food, complexion light, chin protruding, cheek-bones prominent. In disposition they are peaceable, but too slavish, and stubborn withal. They appear frank and simple, but are really knavish and treacherous. The Lapp, though he as well as the Finn lives partly upon fish and game, is a herdsman. Like the Finn, he catches the fish of the lakes, the salmon, the cod, cod-bait, herring, and other fish of the firths and outer coasts, where permitted, but his reindeer is his principal means of subsistence, and he follows him to the coast or to the interior, according to the season, in search of reindeer-moss. In winter the mountain Lapp of Finnmark hunts or fights the wolf. In the summer the reindeers go by habit or instinct to the coast, each owner marking his own herd in the ears, and hastening their transportation by the middle of May, before the roes calve, and while the snow-covered ground and ice-bound lakes render sled-travelling possible in a region without roads. The reindeer has been called the "camel of the North," but settlers cannot keep these animals, for they will not thrive if stalled or confined in pastures and not allowed to wander freely over large spaces. Latterly, steam communication between Bergen, Trondheim, and Hammerfest has given a new impulse to trade, and begun somewhat to develop the resources of the country. But from Hammerfest N. and N. E. reindeers complete the line of communication. The Lapps of Finnmark, Lapland, and Norway have enough reindeer meat and skins for themselves and the settled population, many thousands of these animals being killed every year. They also furnish the Norwegians with game, sometimes as many as 10,000 grouse in a day. The Lapp of Lapland hunts in winter the squirrel, sable, ermine, otter, and bear, and in summer seeks the fisheries of the coasts, lakes, or rivers, dwelling in huts of bark or turf. In winter he retires to more substantial quarters in the small villages, each house being a rude, low wooden structure, with two rooms—one a store-room for skins—containing no table, benches for beds, very few and simple utensils, a piece of wood for a dish, but always a picture of the Madonna. The rich Lapps have a few Russian dishes of stone or copper. They dress in skins, or warm and coarse homespun clothing, sometimes in the Russian peasant costume. Tobacco and coffee are scarcely known, but much brandy is drunk. When the reindeer-moss is exhausted in the neighborhood of a village, the inhabitants remove to another site, transporting their little Greek chapel, houses, etc. as best they can, and setting them up again with religious ceremonies.

Between 1855 and 1865 these people lost 14,944 reindeer, either by death on the fields or by confiscation, since which misfortune their owners have been lost sight of. Many, losing heart, became drunken and shiftless, and some 200 emigrated to Sweden with 20,000 reindeer. The favorite amusements of the Lapps are ball-playing, and, on the N. coast, monotonous singing, sledging, dancing or marching in a peculiar manner, and skating down hill with the skide, a snow-skate over six feet long.

The Lapps of Lapland resemble those of Scandinavia, but are much behind them in education, being unable to read and write. Their language, too, differs more and more from the Lappish of Norway and Finland, the extreme Lapps scarcely understanding each other. There is much



heathenism among them. Their Christianity, nominally Greek, consists in little more than mumbling the prayer "Lord Jesus, Son of God, have mercy upon me!" The Swedish and Norwegian Lapps are Lutherans, and of these all the adults are able to read. The Lapps formerly worshipped a deity called the Storjunker ("great noble"), to whom they sacrificed a full-grown reindeer. Tiermes was the divinity next in rank, and Bawee, or the Sun. But the god most venerated by them was Jubmel, worshipped also by other peoples akin to them, under the name Jumala, Jumara, or Num. Their rude wooden or stone idols, often only grotesque unhewn logs or blocks, stood within an enclosure of boughs, and were honored with simple rites. Like all Turanians, the Lapps believe in supernaturally wise men. Their noaids or magicians are both their oracles and physicians, the medium, in short, between the human and the divine, able to control the spirit world in a degree to make it favorable to mankind. Some ancient famous noaids were mentioned by name in the Sagas. These clever medicine-men are often selected for their office while children, on account of some marked nervous susceptibility, and trained to throw themselves into real or pretended frenzies, followed by fainting, preparing for such occasions by fasting or stimulants. In these fits or trances the noaid is supposed to be transported by his bird-familiar to heaven, earth, or the realm of the dead, at pleasure, and, being awakened by a brother magician, relates his visions to his superstitious and ignorant followers. Like all polar people and those inhabiting desolate regions, the Lapps by organization and habit are subject to nervous excitement; their old women especially start and scream at the slightest disturbance of fear or disgust, rush frantically about, striking insanely at every one near, and then faint and doze for a while. In church a contagious furor sometimes takes place, many striking each other or moving violently about and falling into fainting-fits. In their sicknesses, too, these people are liable to delirium. So that there are many noaids, who find it easy to impose upon a ready credulity by their air of mystery, their superior knowledge of formulas, song, sleight of hand, hieroglyphics on the rune-drum, and even a certain empiric skill in medicine which some of them acquire. There are those among them who profess to have the power of selling favorable winds to sailors, and this superstition is believed in by the Swedish, Norwegian, and Russian peasants, as well as by the Lapps. (For references see FINLAND.) E. TORREY.

**La Plata.** See ARGENTINE REPUBLIC.

**La Pla'ta,** county of S. W. Colorado, bordering on Utah and New Mexico. Area, about 7000 square miles. It contains the Sierra San Miguel Mountains and part of the Sierra La Plata range, is well watered, and the S. W. portion is occupied by the Ute Indian reservation. Gold-mines have been discovered here. Cap. Parrott.

**La Plata,** post-v. and tp. of Macon co., Mo., on the St. Louis-Kansas City and Northern R. R. It has 1 weekly newspaper. Pop. of v. 416; of tp. 1566.

**La Plata, Rio de.** See PLATA, RIO DE LA.

**La Pointe,** post-v. and tp., cap. of Ashland co., Wis., is a fishing-station at the S. end of Madeline Island, one of the Apostle group in Lake Superior. It was settled by French missionaries in 1680. Pop. 221.

**La Porte,** county of Indiana, bounded N. W. by Lake Michigan and N. by Michigan. Area, 450 square miles. A large portion of the soil is very fertile, but there are some barrens, and on the banks of the Kankakee there are extensive marshes. Cattle, grain, and wool are largely produced, and lumber is manufactured. The county is traversed by numerous railroads. Cap. La Porte. Pop. 27,062.

**La Porte,** post-v. of Plumas co., Cal., 20 miles S. of Quincy. It is the business-centre of a large mining region.

**La Porte,** post v. of Larimer co., Col., on both sides of Cache à la Poudre Creek, 19 miles N. W. of Greeley, in a fertile region.

**Laporte,** city of Kankakee tp., cap. of Laporte co., Ind., at the intersection of the Lake Shore and Michigan Southern with the Indianapolis Peru and Chicago R. R., 59 miles E. of Chicago and 12 miles S. of Lake Michigan, has 15 churches, 5 banks, 3 weekly newspapers, 2 hotels, Holly water-works, public library of 3000 volumes, an academy, five schools, numerous mercantile houses and manufactories, and is the seat of Indiana Medical College. Laporte is handsomely situated on a high plateau on the edge of the rich prairie of the same name, is surrounded with fine drives and promenades thickly skirted with maple and other shade trees, and is close to a chain of seven clear and beautiful lakes, which are traversed by steamers and constitute one of the attractions which annually draw hun-

dreds of summer visitors from Chicago, Indianapolis, Cincinnati, and the South. Pop. 6581.

C. G. POWELL, Ed. "HERALD."

**La Porte,** post-v. of Carlisle and Eaton tps., Lorain co., O., 4 miles S. E. of Elyria.

**Laporte,** post-b. and tp., cap. of Sullivan co., Pa., 26 miles N. E. of Muncy, on the line of the projected Sullivan and Erie and Muncy Creek R. R., has 2 churches, 2 weekly newspapers, and one of the largest tanneries in the U. S., using from 6000 to 8000 cords of bark annually. Lumbering and mining are important industries. Eaglesmere Lake, noted for its beauty, is 5 miles distant, the brooks are filled with trout, and deer abound in the forest. Pop. of b. 143; of tp. 530.

J. K. PRYOR, Ed. "SULLIVAN CO. DEMOCRAT."

**La Porte City,** post-v. of Big Creek tp., Black Hawk co., Ia., on Wolf Creek, 1 mile above its confluence with Cedar River, on the Burlington Cedar Rapids and Minnesota R. R., 15 miles N. of Vinton, Ia. S. of Waterloo, and 40 N. W. of Cedar Rapids, has 4 churches, 2 hotels, 1 weekly newspaper, a bank, a large flouring-mill, a wagon and carriage manufactory, and a fair number of business-houses. It is surrounded on all sides by a fine agricultural country, and was laid out in June, 1855, by the subscriber. Pop. about 1500.

J. WASSON, Ed. "PROGRESS."

**La Porte du Theil.** FRANÇOIS JEAN GARRIÈRE, born at Paris July 13, 1742; received a military education, and served in the campaigns of the Seven Years' war, but devoted all his leisure hours to the study of the Greek language and literature, and published in 1799 a translation of *Æschylus's Tragedies*, and in 1775 of the *Hæmæus Callimachus*. From 1776 to 1786 he resided in Rome, and having received admittance to the Vatican library, which at that time was generally closed to foreigners, he brought back to Paris a great number of historical documents illustrative of French history. Three volumes of these documents were published in 1791, containing among other things the letters of Pope Innocent III.; but the further publication was interrupted by the Revolution, and the materials were placed in the National Library. In the latter part of his life he was occupied with a translation of the *Geography of Strabo*, of which, however, only nine books were finished, when he d. May 28, 1815.

**Lap'enberg** (JOHANN MARTIN, LL.D.), b. at Hamburg July 30, 1794; studied medicine at Edinburgh and law at London, Berlin, and Göttingen, receiving the doctorate in 1816; was for a time minister resident for Hamburg at Berlin; became in 1823 keeper of the archives at Hamburg, and was in 1850 plenipotentiary in the Frankfurt conference. His best work is *Geschichte von England* (1834-37); he also wrote valuable histories of the German Hanse Towns, of Holstein, etc. His *History of England* relates to the Anglo-Saxon period, and is the standard authority for early English history. It has been translated into English, with notes and additions, by Benjamin Thorpe. The *History of England under the Normans*, commenced by Lapenberg and finished by Paul, was also translated by Thorpe. Lapenberg d. Nov. 28, 1866.

**La Prairie,** a fertile county of Quebec, Canada, on the S. side of the St. Lawrence, directly S. of Montreal. Cap. La Prairie. Pop. 11,861.

**La Prairie,** post v. of La Prairie co., Quebec, Canada, on the S. side of the St. Lawrence, 9 miles above Montreal, has an academy and a convent. Pop. 1259.

**La Prairie,** tp. of Marshall co., Ill. Pop. 1100.

**La Prairie,** tp. of Rock co., Wis. Pop. 867.

**Lapse** [Lat. *lapsus*, from *labar*, to "glide," to "fall"]. A devise of real property or a bequest of personal property is said in law to lapse when the devisee or legatee dies after the making of the will and before the death of the testator. The effect of this at common law is that in the case of a devise the property devised passes to the heir-at-law of the testator, while in the case of a legacy the property bequeathed passes to the residuary legatee, if any be named in the will, and if not to the next of kin. (See KIN, NEXT OF.) The reason why this disposition is made of the property, instead of its passing to the representatives of the deceased donee, is that a will takes effect only from the time of the testator's death, and the donee can acquire no title unless he is in being at that time. There is a distinction between a lapsed and a void devise or bequest. The gift is void when the person specified as donee is dead or incompetent to take the property at the time when the will was made. The general rule is, that the same disposition shall be made of the property included in the terms of the gift as in the case of a lapsed devise or bequest. It seems, however, to be the English rule that a void devise passes to the residuary devisee. These common law rules have



been to some extent changed by statute. By the English statute of wills (1 Viet. ch. 26) the real estate comprised in a lapsed devise shall, unless a contrary intention appears in the will, pass to the residuary devisee, if any there be, instead of to the heir-at-law. It is further provided that a devise or legacy to a child or other descendant shall not lapse if issue of the devisee or legatee survives the testator, but shall take effect as if the devisee or legatee had died immediately after the testator, unless a contrary intention appears by the will. A change similar to this second provision has also been made by statute in New York, and also in several other States of this country.

A legacy is also said in some cases to lapse even though the legatee dies subsequently to the testator. This happens when the vesting of the legacy depends upon a future contingency, and the legatee dies before the contingency occurs. Thus, if a legacy be given to one *when he attains*, or *if he attains*, the age of twenty-one, and he dies before that time, it is a lapsed legacy. (See LEGACY.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Lapwai'**, post-v. of Nez Percé co., Id., 12 miles S. E. from Lewiston. Pop., including U. S. troops, 91.

**Lap'wing** [so called from the flapping of its wings in flight], or **Pee'wit** [named from its note], the *Vanellus cristatus*, a game-bird common throughout a great part of the Old World, but unknown in America. It is referred to the plover family. Its flesh is excellent. It strives with great ingenuity to conceal its nest, which is greatly sought for the eggs, which are sold in quantities as plovers' eggs.

**Lar**, town of Persia, cap. of the province of Laristan, 60 miles from the Gulf of Persia. It is famous for its manufactures of sword-blades, muskets, and silks, and has fine bazaars. Pop. 12,000.

**Laramie**, county of Wyoming Territory, bounded N. by Montana, E. by Dakota and Nebraska, and S. by Colorado, extending N. and S. the whole length of the Territory, 4 degrees of latitude by  $\frac{1}{2}$  a degree in width, and includes the Wyoming portion of the Black Hills, belonging to the Ogallalla Sioux, where gold was found in 1874, and which were explored in the summer of 1875 by hundreds of miners. Area, about 14,000 square miles. It consists largely of the elevated Laramie Plains, well adapted to sheep-raising, and is broken by the Laramie range of mountains. The county is traversed by the North Platte, the N. and S. forks of the Big Shyenne, and by the Union Pacific R. R. Cap. Cheyenne City. Pop. 2957: in 1875, 6000.

**Laramie**, city, cap. of Albany co., Wyoming Ter., on the Union Pacific R. R., 57 miles by rail N. W. of Cheyenne, and 7122 feet above the level of the sea, laid out in Apr., 1868, when the railroad reached this point, lies in the midst of the Laramie Plains, is regularly built, chiefly of wood, with a few structures of stone, has 5 churches, 2 daily newspapers, 1 national bank, a court-house and jail, several hotels and schools, and numerous stores. The railroad company has established here extensive machine-shops. A stream of clear cold water passes through the city, and is fed by a spring at the foot of the Black Hills, a few miles E. Laramie is the second town in the Territory in point of population, which is rapidly increasing; it is noted as the first place in America where a female jury was empanelled. Pop. about 3000.

**Laramie**, a river in Wyoming Territory, formed by the union of two branches, the Big and the Little Laramie, which rise in the Medicine Bow Mountains, and flow N. E., skirting on the E. the plains of the same name. It enters the N. fork of the Platte at Fort Laramie, and is much used for floating lumber from the mountains.

**Laramie Mountains**, a range rising at the Red Buttes, near the Sweetwater River, Wyoming Ter., and extending in a curve southward to the Arkansas River, near Long's Peak in Colorado, forming a wall which closes in the Laramie Plains to the N. E. and E. Geologically, it is composed of a nucleus of red syenite, with margins of fossiliferous formation, Carboniferous, Triassic, Jurassic, Cretaceous, and in some places lignite Tertiary, the beds inclining from a central axis at different angles. This range is connected with the Big Horn Mountains and Black Hills by low anticlinals extending across the prairie, the most complete and beautiful to be found in the Rocky Mountain region. The numerous branches of the Platte rise in this range, of which the principal summit is Laramie Peak. Coal has been found in them in considerable quantities.

**Laramie Peak**, the loftiest summit of the Laramie Mountains, in Albany co., Wyoming Ter.

**Laramie Plains**, an elevated table-land in Wyoming Territory, lying in Carbon and Albany counties, S. of the

N. fork of the Platte, between the Laramie Mountains on the N. E. and the Medicine Bow spur of the Rocky Mountains on the S. W., watered by the Big and Little Laramie and Medicine Bow rivers. The tops of some of the surrounding mountains are covered with perpetual snow, and the mean altitude of the plain being above 7000 feet, the summer is always short and the winter severe. The principal cereals can be raised, but the soil is more suited to potatoes, turnips, beans, peas, and other vegetables, which have been successfully cultivated at Fort Sanders, a military post on the S. W. margin of the plains. Grazing will be an important industry, and vast beds of iron and coal of good quality have been found.

**Larash**, or **Larache**. See EL. ARAISEH.

**Larceny** [contracted from *latrocinium*, from Lat. *latrocinium*, "theft"], the wrongful or fraudulent taking and carrying away by any person of personal property belonging to another, with a felonious intent to convert it to the taker's own use, without the consent of the owner. When the property is taken directly from the house or person of the owner the offence is termed mixed or compound larceny; in other cases it is called simple larceny. Simple larceny was further distinguished at common law as grand or petit larceny, the former being the theft of goods above the value of twelve pence, the latter the theft of goods below this value. But the distinction between grand and petit larceny has been abolished in England and in many of the States of this country by statute. While in some of the States it is still retained, the value of the property upon which the distinction depends has been generally changed by legislation. In New York, for instance, the property must have a greater value than \$25 in order that the stealing of it may be grand larceny. If it be worth this amount or less, the theft is petit larceny. At common law the only importance of the distinction was that the severity of the punishment inflicted differed in degree according to the grade of the offence. Both forms of the crime were felonies. (See FELONY, CRIME.) But in those States where the distinction is retained, grand larceny is sometimes declared to be a felony, while petit larceny is made simply a misdemeanor. This is the case in New York. The taking and carrying away, which are necessary elements in the offence of larceny, are also technically termed caption and asportation. It is not requisite, in order that the crime may be complete, that the property should remain permanently in the thief's possession or be removed to any considerable distance from the position which it previously occupied. It is a sufficient asportation if every part of the thing stolen be removed from the place which that part occupied, even though the entire article is not wholly removed from its receptacle or the place where it had been put. On this ground it was adjudged larceny where a person lifted a bag which he was intending to steal partly out of the boot of a coach, but was detected before its complete removal. So if a sword be drawn partly from a scabbard, or if goods be removed from one part of a wagon to another by one who intends to commit a theft, the larceny designed is sufficiently perpetrated, though the thief had only momentary possession. But, on the other hand, if a bale of goods resting upon its side be merely lifted and set upon end, there is no complete asportation, since some small portion of the goods still retains its former position. The strictness with which the rule is adhered to that every particle of the property stolen must be taken from its former position thus results in very nice distinctions, since the determination of the question whether a certain act of attempted larceny was criminal or not criminal may turn upon the point whether an insignificant part of the goods was moved a very small distance from the place which it previously occupied. The rule is more practical of application than efficacious as a means of determining with reasonable accuracy the various degrees of moral turpitude in acts of intended theft. It is further necessary, in order that larceny may be committed, that the property should be *entirely* in the possession of the thief, though but for a moment. Thus, where goods were fastened by a string to a shop-counter, and a thief, in attempting to carry them away, removed them only as far as the string would permit, it was held that the owner was not completely deprived of his possession, and that consequently the intended larceny had not been fully perpetrated. But where a ring was snatched from a lady's ear, but fell immediately afterwards from the thief's hand into her hair, where it was subsequently found, the entire possession which the thief had had, though only instantaneous, was deemed sufficient to warrant his conviction for larceny. On account of this rule, that the briefest interval of complete possession is sufficient, immediate restitution by the thief after taking the property will not lessen nor do away with the criminality of the offence.

It is a fundamental legal principle in regard to this crime



that there can be no larceny committed without an act of trespass. Trespass, as the term is used with reference to personal property, is an injury to or violation of a person's title and possessory interest in chattels, and consists in wrongfully depriving him of possession against his will. Hence, larceny may be committed not only by taking goods away from one in whom the absolute title to them is vested, but also by taking them from any one who has a temporary ownership and an immediate right of possession. The ownership of the property may be either general or special, and the possession may be either actual or constructive. A person is said to have a general or absolute title when he has an exclusive right of permanent ownership, while one has a special title or special property in chattels when he has them in his possession, and retains them for a limited period, subject to the claims of the absolute owner. A bailee, for instance, would have a special property in goods entrusted to his charge, and a person would be guilty of larceny from him who took the goods from his possession. In all cases of simple bailment, where the absolute owner is entitled to resume possession of the goods at any time at his own option, if they are stolen by a third person while in the custody of the bailee, they may be described in the indictment against the thief as the property of either the bailor or the bailee. The former has the constructive and the latter the actual possession. A general owner may even be adjudged guilty of larceny if he takes his own goods away from the person who has the special ownership of them for the time being, with a felonious intent to charge the latter with their value. But there can be no theft from a person who has not a legal right to the possession of the goods taken. A servant is never deemed in law to have the possession of the goods committed to his charge by the master, but only the custody. He has neither the general nor the special ownership, and the possession is constructively in the master. If, therefore, the property is stolen while in the charge of the servant, the theft is committed against the master, and not against the servant. But goods in the possession of a thief are regarded in law as his property to such an extent that a person who steals them from him will be guilty of larceny. In like manner, a finder of property has a special right of ownership in it as against all the world but the true owner, and a wrongful deprivation of his possessory interest would constitute an act of larceny against him.

As larceny involves an act of trespass, it cannot be committed by any one who has himself a right of property and of immediate possession in the goods taken. If, therefore, a bailee converts to his own use the property entrusted to him during the continuance of the bailment, he is not guilty of larceny. But if the bailment has terminated when the goods are taken, as if they are taken by a carrier after they have been transported by him to the place of destination and there delivered, a trespass is committed, and the act is therefore the offence of larceny. The relation of bailor and bailee may also be terminated before the natural expiration of the time for which the contract was formed between the parties, by a wrongful act of interference with the property on the part of the bailee, who will subsequently be guilty of larceny if he appropriate the goods to his own use. If, for instance, a carrier of goods "breaks bulk," as it is termed, by wrongfully opening a box or bale or package which he has received for transportation, he ceases immediately to have any right of ownership in the goods as a bailee, and if he abstracts and carries away any portion of them he is chargeable with larceny. This rule leads to the peculiar result that if a bailee takes the entire package entrusted to him, he commits no crime, but only a breach of trust, while if he breaks it open and takes a part of the contents, he perpetrates larceny. The principle already stated, that a servant has the custody and not the possession of his master's goods, renders it an act of larceny for him to convert to his own use the property which he has received from the master. But if the property was received from some third person for delivery to the master or to be held for his use, the servant would not be guilty of larceny in appropriating it, for the reason that it had never come into the master's possession, and therefore no act of trespass could be committed against the master by permanently retaining it. This defect in the common law, which declared such an act of conversion by a servant no crime, but only a breach of trust, has been remedied by legislation in recent times, by which such acts of wrongful appropriation have been declared criminal offences, and have received the name of embezzlement. (See EMBEZZLEMENT.)

Finders of lost goods have no right to detain them from the possession of the true owner if he is known; and if they appropriate the property to their own use when they know to whom it belongs or have reasonable means of ascertaining the true owner, they are guilty of larceny. If, for instance, carriers of passengers find in their vehicles pack-

ages of goods upon which the name of the owner is marked, they cannot retain and dispose of them as their own property without committing this offence. But if articles be found, and there is no means of discovering the owner, there will be no larceny though the finder subsequently applies them to his own use. This is true even though the owner may have been discovered in the mean time.

It is a general principle that larceny must be committed against the will of the owner of the property. If the goods are taken by his consent, which has been fairly obtained, no wrongful act of any kind is committed. But if his consent be procured by fraud or stratagem, the asportation will in some cases constitute larceny. It is necessary at this point to distinguish between that fraudulent acquisition of the chattels of another which will constitute larceny, and that fraudulent taking which constitutes the criminal offence of obtaining goods by false pretences. (See CHEAT.) When the owner intends, in consequence of the fraudulent devices by which he is influenced, to part with the absolute property in the goods, retaining no interest in himself, the person who receives the goods is guilty of the crime of using false pretences. But when he intends merely to part with his possession of the property for a certain interval, instead of his entire ownership, but the person who by artifice obtains his consent takes the goods with the secret design of appropriating them to his own use, larceny is committed. The act of taking another's property is deemed to be a trespass unless the consent of the owner is given with a full comprehension on his part of the receiver's intent with reference to the transfer of ownership. In case of fraudulent larceny the possession of the goods is given willingly, but the owner is still deprived of his property in them against his will. If, for example, a person hires a horse and carriage for a limited time, but appropriates them to himself, he commits larceny, because the owner only intended to give him the use of the property and not the title. But where one obtains a payment of money by presenting a letter falsely purporting to be an order from the creditor, and appropriates the funds to himself, he is guilty of obtaining property by false pretences. If property be obtained by fraud from a servant, it will be larceny when the servant is merely entrusted with the possession of the goods for a special purpose, and has no authority to part with the property in them except to fulfil the special purpose for which they were entrusted to him. But when he has a general authority to dispose of his master's property, a person may procure a transfer of ownership from him by fraud, and will then be chargeable with false pretences.

The trespass committed in taking the property must also be accompanied by a felonious intent to deprive the owner of his entire ownership, and convert the property to the taker's own use or dispose of it for his benefit. The goods must be taken, as it is expressed in technical legal phrase, *animus furandi*—with a design of stealing. Thus, if property be taken upon a claim of title or merely by mistake, or if the intent is simply to use the articles and afterwards to return them to the true owner, no larceny is perpetrated, because the felonious intent is wanting. The wrongful purpose must also exist at the time of the taking. If the property be acquired rightfully, and with no design of misappropriation at the time it is received, a subsequent conversion of it with felonious intent by the person having it in his possession will not constitute larceny. If, for example, a person should find an article, and take it with the intention of restoring it to the owner when discovered, but should afterwards appropriate it to himself, he would be chargeable merely with an act of trespass and not of larceny. The same rule applies when property is taken at first in the commission of a trespass, but with no design of depriving the owner of it permanently. It is sometimes stated in treatises upon criminal law and in the reports that there can be no larceny unless property be taken *lueri causa*—for the sake of gain or profit to the thief. This doctrine is only sustainable at the present day by giving to the term *lueri* ("gain") a much more comprehensive meaning than it was formerly held to bear. It must be used to denote not merely pecuniary profit to the thief, but any advantage, whether pecuniary or otherwise, which he obtains by the acquisition of the property, whether this be a direct or indirect result of the taking. Thus, it has been adjudged larceny to take an article with intent to present it to a friend; or to intercept and burn a letter to suppress inquiries it may suggest concerning the thief's character; or to take and kill a horse, that his existence might not furnish evidence against a third person who had been accused of stealing him. Some cases have denied the doctrine of *lueri causa* entirely.

It is only personal property which is the subject of larceny at common law. Anything which is deemed in law to be real property, or to be of the reality, cannot there-



fore be stolen. If soil be taken from a person's land, or apples from his fruit trees, or grass and grain be cut down and carried away, no larceny is committed. Those classes of articles which, in themselves personal property, have become so attached to land as to form a part of the realty, and are denominated fixtures, are not subject to larceny. (See *FIXTURES*.) But when things which once belonged to the realty have been severed from it, and subsequently carried away with felonious intent to appropriate them to the taker's own use, the act will amount to larceny, because by reason of the severance the articles become personal property. The severance may be made either by the thief or by some third person, and it is not necessary that any particular interval of time should intervene between this and the asportation. The two acts need only be so much separated as not to constitute one transaction in order that the taking may be larceny. Otherwise, it is only an act of trespass. At common law, also, choses in action are not the subjects of larceny, since they are regarded as mere evidences of a right, without intrinsic value in themselves. (See *CHOSE IN ACTION*.) There can be no larceny, moreover, of animals *feræ naturæ* (i. e. of a wild nature), so long as they are unreclaimed or unconfined. (See *FERÆ NATURE*.) If such animals are reclaimed from their wild state by being tamed, they become the subject of this offence, provided they are fit for food, but not otherwise. Thus, pigeons, hares, deer, swans, etc. may be stolen when reclaimed, but dogs, cats, bears, foxes, squirrels, etc. cannot. If an animal is dead, it is of course subject to larceny if it be suitable for food. The same is true if an animal be confined. These common-law rules in regard to the kinds of property which may be stolen have been much changed in modern times by statute, and it is now generally provided, both in England and in this country, that choses in action and a large variety of articles which savor of the realty, but are readily detached from the land with which they are connected, may be the subjects of larceny or its equivalent. Various other important changes of the common-law principles applying to this crime have also been made by legislation, which must be ascertained by special reference to the statutes of different States. (Consult the works of Bishop, Wharton, Russell, Chitty, and Colby on *Criminal Law*. See also *ROBBERY*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Larch** [Gr. *ἀρχή*], applied to trees of the genus *Larix*, conifers with deciduous leaves. The *Larix Europæa*, called "Scotch larch" in this country, is not a native of Great Britain, though very extensively grown there. Its wood is valuable for a great variety of purposes. In Russia, "Orenburg gum," a wholly soluble and edible product, is obtained from the charred trunks of this tree, as is Briançon manna in France. The Himalaya larch is *Larix Griffithii*. (For the American larch, see *HACKMATTACK*.)

**Lar'com** (LUCY), b. at Beverly Farms, Mass., in 1826; was for a time a teacher in Illinois. She compiled *Breathings of the Better Life* (1866), and is author of *Poems* (1868). Her literary career began while she was an operative in a wool factory. She has been an editor of *Our Young Folks*, a children's periodical.

**Larcy', de** (CHARLES PAULIN ROGER DE SAUBERT), BARON, b. Aug. 20, 1805, at Vigan, in the department of Gard, France; studied law, and was admitted to the bar in 1826; became a member of the Chamber of Deputies in 1839, and being a legitimist and liberal took part with great energy in the opposition against Guizot. After the fall of the July monarchy in 1848, he accepted the Republic, and sat in the Constituent and again in the Legislative Assembly, but retired into private life after the *coup d'état*. Elected a member of the National Assembly in 1871, he was appointed minister of public works by Thiers in February of the same year, and held the position to June, 1872; voted for the preliminaries of peace, the validity of the elections of the Orleans princes, the dissolution of the national guard, and against the maintenance of the commercial treaties. His pamphlet, *La Révolution de la France*, made great sensation in 1831; in 1860 he published the first part of *Des Vicissitudes politiques de la France*.

**Lard** [Fr. *lard*, from Lat. *lardum*], the oily part of hog's fat, extracted by melting at the temperature of boiling water, extensively used for culinary purposes and for the manufacture of candles, illuminating oil, pomades, unguents, and soaps. The ordinary lard of commerce is obtained from the entire fat of the animal; the best quality is that derived from the fat which surrounds the kidneys. It is often adulterated to the extent of 25 per cent. or more by the addition of alum, lime, mutton suet, starch, potato flour, or other farinaceous substance, while water may be employed for the same purpose up to 12 per cent. The presence of water is detected by the loss of weight under moderate heat; that of starchy substances by changing to a blue

color in a solution of iodine. The composition of lard is 62 parts oleine to 38 of stearine and palmitine, the former, called *lard oil*, being used for lubricating machinery and for illumination, while the latter is chiefly employed for the manufacture of hard candles. Lard is one of the chief products of the Central States of the U. S., Chicago and Cincinnati being largely engaged in this industry, which has reached nearly 250,000,000 pounds per annum, as shown by a comparison of the statistics of several years. Lard is the chief material employed in pharmacy, in combination with vegetable balsams and oils, for the preparation of unguents and cerates, for which purpose, however, only the best quality can be advantageously used. Lard oil is exported from the U. S. in immense quantities, chiefly to France, where it is largely used for the adulteration of olive oil. Lard oil is often mixed with 25 per cent. of rosin, the latter substance forming an acid which protects the oleine from its tendency to rancidity when exposed to dampness, and also increasing its power of illumination. The melting-point of pure lard varies from 78° to 87° F.

**Lardiz'abal y Uribe** (MIGUEL), b. in the province of Tlascala, Mexico, in 1744; studied at Puebla and at the University of Valladolid in Spain; obtained high scientific employments at court, but, incurring the displeasure of the favorite Godoy, was exiled in 1785 to the Basque provinces, where he became the head of the seminary at Vergara. In 1808 he was restored to favor by Ferdinand VII., and appointed a member of the council of the Indies; retired to Cadiz before the French invasion; was elected representative for New Spain (Mexico) in the central junta (Sept.), and became a member of the regency; came into conflict with the Cortes in 1811, by whose order he was imprisoned at Alicante; was exiled from Spain in Aug., 1812, proceeding to England; returned to Spain in 1814 as councillor of state and universal minister of the Indies under the absolutist government of Ferdinand VII., exercising immense power; again fell into disfavor a year or two later, and was imprisoned in the castle of Pamplona, and passed his last years in honorable exile at the head of the seminary of Vergara, Biscay, where he d. Dec., 1823.—His brother, MANUEL, b. at Tlascala Dec. 22, 1739, was a learned magistrate at the Spanish court, and perpetual secretary of the Spanish Academy. D. about 1818.

**Lard'ner** (DIONYSIUS), LL.D., b. at Dublin Apr. 3, 1793; graduated at Dublin University 1817; remained in his college, of which he was for a time chaplain, until 1827, and received many honors, mostly for excellence in mathematics and physics; abandoned the clerical profession; became in 1828 professor of astronomy and physics in the University of London; resided 1840–45 in the U. S., and afterwards in Paris, where he d. Apr. 29, 1859. The greatest of his works was the publication of the *Cabinet Cyclopaedia* in 134 vols., 12mo (1830–44), composed of a series of treatises, partly written by himself; also produced an *Algebraic Geometry* (1823), a work on *Calculus* (1825), on the *Steam-Engine* (1828), a series of *Handbooks* upon science (1851–56), the *Museum of Science and Art* (1854), and other works.

**Lardner** (JAMES L.), U. S. N., b. Nov. 20, 1802, in Pennsylvania; entered the navy as a midshipman May 10, 1820; became a lieutenant in 1828, a commander in 1851, a captain in 1861, a commodore in 1862, a rear-admiral on the retired list in 1866; commanded the U. S. frigate *Susquehanna* at the battle of Port Royal, where he distinguished himself by his skill and bravery, Rear-admiral Dupont characterizing his "close support" of the flagship as "a very gallant thing." FOXHALL A. PARKER.

**Lardner** (NATHANIEL), D. D., b. at Hawkshurst, Kent, June 6, 1684, an English Presbyterian minister of Unitarian proclivities; studied at Utrecht and Leyden 1699–1703; was long minister of Crutched Friars, London; is chiefly remembered as author of *The Credibility of the Gospel History* (5 vols., 1727–43), first delivered as a series of lectures at the Old Jewry, and still a standard work; published also a *History of the Apostles and Evangelists* (3 vols., 1756–57), *Letter on the Logos* (1759, distinctly Socinian), *Jewish and Heathen Testimonies* (1764–67), a *History of Heretics of the First Two Centuries* (1780), etc. D. at Hawkshurst July 24, 1768.

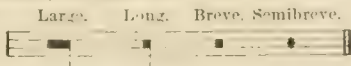
**Lare'do**, post-v., county-seat of Webb co., Tex., on the left bank of the Rio Grande, 200 miles above its mouth, at the crossing of the high-road between San Antonio, Tex., and Saltillo, Mexico, 400 miles S. W. of the former city, was founded by Spanish settlers in the latter part of the eighteenth century as a frontier town of Mexico, and suffered much then and since from Indian inroads. On the annexation of Texas to the U. S. many of the Mexican inhabitants moved across the river and founded Nuevo Laredo. The town is the American terminus of the chartered



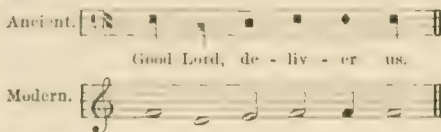
International R. R., which is to unite the U. S. with Mexico. It has a considerable trade with Mexico. Pop. 2046.

**Lares** [pl. of *lar*, Etruscan for "lord"]. In the religion of ancient Rome the Lares were tutelary spirits, public or private. The domestic Lares appear to have been originally the spirits of the departed members of the family, and were worshipped with simple but very devout services. The Lares differed from the Manes, which were spirits that were supposed to hover near the tomb. The Pontes included other domestic spirits, not ancestral. Public Lares had care of highways, ships, fields, etc. The images of the Lares were also worshipped.

**Large**, one of the characters or notes in ancient music, and the longest in point of duration. The notes formerly in use were, in the order of their respective time-values, the large, the long, the breve, and the semibreve. They were commonly written thus:



The relative duration of these notes was, theoretically considered, equivalent in proportion to 8, 4, 2, and 1, the "large" being equal in time to two longs, or four breves, or eight semibreves; the "long," to two breves or four semibreves; and the "breve," to two semibreves. It may be considered certain, however, that these ratios were not very accurately observed in the practice of music, but were regarded only as approximate measures of slowness or rapidity, subject always to such variations and irregularities as might take rise from the feelings of the performer, or (in vocal music) from the accentuation, purport, and proper expression of the words. The actual length of time represented by each of these ancient notes was also much less than would be inferred from the names of the first two, which suggest a highly prolonged duration. It will be observed that while in modern music the "breve" is the longest note in use, yet in ancient music its duration was short, as indicated by its name and by comparison with the "large" and the "long." A note such as the "large," equal in length to four breves, eight semibreves, or sixteen minims, would, of course, be impracticable if the old timetable were not essentially different from our own as a measure of rapidity. Some idea of the rate or speed of the old notation may probably be derived from the hearing of Gregorian music as still in use in the Church of Rome, where the mode and velocity of chanting, as handed down by tradition, may be taken as a sufficiently correct representation of the time-value of the ancient note. Judging by such a standard, the ancient large, long, breve, and semibreve would, at the longest, be only equivalent to our present breve, semibreve, minim, and crotchet; while this relative proportion might probably be still better represented by our semibreve, minim, crotchet, and quaver. But in the absence of any positive rule for the translation of ancient notes into their equivalents under the modern system, the most common mode followed by musicians is to render the long by a semibreve, the breve by a minim, and the semibreve by a crotchet, as in the example following:



(See NOTATION.)

WILLIAM STANTON.

**Lar'go** [It.], in music, a term denoting a slow and rather heavy movement, with a rate of progress somewhat faster than "grave" or "adagio." *Larghetto*, the diminutive, and *larghissimo*, the superlative, indicate respectively a decrease or increase of slowness, the latter being hardly distinguishable from "grave," "adagissimo," and other terms implying extreme slowness.

**La'ri**, town of Italy, in the province of Pisa, about 18 miles S. of the city of Pisa. Its old fortifications and castle are still in good condition. Pop. in 1874, 10,081.

**Laric'io**, or **Coriscan Pine** (*Pinus Laricina*), a large pine of the S. of Europe, esteemed for its timber and its resin. It grows well in the most barren sands, and, with other species, has been extensively planted in the Landes of S. W. France, thus transforming a waste of worthless land into valuable plantations, and preventing the destruction of fertile regions by the moving of sand-dunes.

**Lar'idæ** [from *Larus*, "gull," and the family termination *-idæ*], a family of birds distinguished by the sub-ognath palatine, lateral open nostrils, feet completely webbed between

the three anterior toes, hallux or posterior toe rudimentary (and free) or obsolete, and wings elongated and pointed. These are the chief and superficial distinctive characters of the family, which embraces several well-marked minor groups, distinguished by most recent authors as sub-families—viz. (1) the jagers (*Lestridinæ*), (2) the gulls (*Larinæ*), (3) the terns (*Sterninæ*), and (4) the skimmers (*Rhynchopinnæ*). These groups are very trenchantly distinguished from each other, but the first two and last two are contrasted with each other, the jagers and gulls on one hand being closely allied, and on the other the terns and shearwaters. The sub-families themselves are very homogeneous, the various members of each differing very little from each other. Representatives are found in every sea, and sometimes wander far inland. A *Monograph of the North American Laridæ* has been recently (1874) published by Dr. E. Coues in his *Birds of the North-west* (pp. 589-717). THEODORE GILL.

**Lari'got**. The name of one of the stops in an organ, otherwise known as the "nineteenth." It consists of a single rank of metal pipes, and is tuned an octave above the twelfth stop, or two octaves and a fifth (i. e. a nineteenth) above the diapasons. It occurs also as one of the ranks of the sesquialtera and mixture stops.

**Lar'imer**, county of Colorado, bounded W. by the Medicine Bow Mountains and N. by Wyoming. Area, 2000 square miles. It is watered by Cache la Poudre and Big Thompson creeks, which afford irrigation and water-power. It is a fertile region, producing grain, hay, butter, and wool extensively. Lignitic coal and silver are found. Cap. Fort Collins. Pop. 838.

**Larimer**, tp. of Somerset co., Pa. Pop. 951.

**Lar'inæ** [from *Larus*, a "gull," and the sub-family affix *-inæ*], a sub-family of Laridæ, characterized by a well-developed beak, whose upper mandible is hooked and projects downward in front of the upper, and has no cere at the base. In this are included the birds familiar to every one who has been along the shore as "gulls," but under this common designation are embraced many species. In the most recent general catalogue of birds (*Hand-list of Genera and Species of Birds*, by George Robert Gray) 76 species are enumerated under five genera—viz. *Rhodostethia*, with 1 species; *Larus*, with 18 sections and 68 species; *Xema*, with 2 sections and 2 species; *Pagophila*, with 2 species; and *Rissa*, with 3 species. Many of these, however, are undoubtedly varieties. Dr. Coues recognizes ten American species, and in addition two varieties—viz. *Larus*, with 5 sub-genera (including *Pagophila* and *Rissa*) and 7 species; *Rhodostethia*, with its single species; and *Xema*, with 2 sub-genera and species. *Larus* has a square tail, and includes the largest and most common species; *Rhodostethia* has a wedge-shaped tail; and *Croagrus* a forked tail. The species of the last two genera are inhabitants of the arctic regions, and (except *X. sabinei*) are very rare.

THEODORE GILL.

**Laris'sa**, town of European Turkey, in the province of Salonica, on the Salembria. It has extensive manufactures of cotton and silk goods, and a large trade in wine besides a very important transit-trade. Pop. 25,000.

**Laristan**, district of Persia, part of the province of Farsistan, and bordering on the Persian Gulf. It is mostly an arid sandy waste, and the guinea-worm is so frequent as to become a perpetual plague.

**La Rive, de**, the name of two celebrated Swiss physicians, father and son.—CHARLES GASPARD, b. at Geneva, Mar. 14, 1779; resided from 1794 to 1799 at Edinburgh on account of the political disturbances in his native country; returned in 1799 to Geneva, and took charge of its insane asylum; founded a museum of natural science and a botanical garden, and delivered annual courses of lectures on medicine and chemistry. D. at Geneva Mar. 18, 1834.—AUGUSTE, b. at Geneva Oct. 1, 1801; studied chemistry and natural science under his father; was professor at the Academy of Geneva, and since 1864 one of the eight foreign members of the French Academy. D. at Marseilles Nov. 27, 1873. Electricity, its theory as well as its practical application, formed the principal subject of their investigations, and both of them communicated to different scientific papers—*Bibliothèque Universelle, Annales de Chimie*, etc.—a number of valuable essays relating to this branch of natural science. The principal work of Auguste de la Rive is his *Traité d'Electricité théorique appliquée* (3 vols., Paris, 1854-58).

**Larix**. See LARCH.

**Lark** [Ang. Sax. *lārce*; Scotch, *larrack*], a popular name of several passerine birds of the group Oeniinæ, singers. The true lark is of the family Alaudidæ, of which the skylark of the Old World, *Alauda arvensis*, is the typical spirit. This most interesting bird is a great favorite, from its sweet song, which it sends forth while soaring



aloft in clear weather. It is a fine cage-bird, and is now to some extent naturalized in the U. S. by the laudable efforts of the acclimatization societies. Europe has several other species of *Alauda*. The horned skylark (*Eremophila cornuta*) is one of the most familiar birds of the great Western plains of the U. S. The shorelark (*Otocoris alpestris*) is a very sweet singer. The well-known meadow-lark of the U. S. (*Sturnella magna*) is of the oriole family. There are two varieties, the eastern and the western, which differ entirely in their song.

**Larkha'na**, town of British India, in the presidency of Bombay, in the district of Sind, 7 miles W. of the Indus. It is fortified, has a large trade in grain, and manufactures of cotton and silk goods. Pop. 9000.

**Lark'insburg**, post-v. and tp. of Clay co., Ill., on the Springfield and Illinois South-eastern R. R. Pop. 976.

**Lark'insville**, post-v. and tp. of Jackson co., Ala., on the Memphis and Charleston R. R. Pop. 2098.

**Lark'spur**, a popular name of the herbs of the genus *Delphinium* (order Ranunculaceæ), which are found in the cool regions of both continents. The U. S. has eight or ten native species, and Europe as many. They are poisonous herbs, and have a limited use in medicine. Several of these, with some Asiatic species, are favorite garden flowers.

**Lar'ned**, post-v., cap. of Pawnee co., Kan., on the Atchison Topeka and Santa Fé R. R. and the Arkansas River, is the station for Fort Larned. It has 1 weekly newspaper. Pop. about 300.

**Larned** (BENJAMIN F.), b. in Massachusetts in 1791; entered the U. S. army as ensign of the 21st Infantry in Oct., 1813; served with distinction throughout the war, and for gallant conduct in the defence of Fort Erie, where he commanded a company, was brevetted captain; retained as regimental paymaster on the reduction of the army in 1815; during the Mexican war was made deputy paymaster-general, and on the death of Gen. Towson succeeded him in 1854 as paymaster-general of the army, with the rank of colonel; from that date until his death discharged the responsible duties of his office with rare integrity. The outbreak of civil war largely increased his labors, and called for a reorganization of his department, which he thoroughly accomplished, but at the expense of his life, for his overtasked powers gave way, and he d. at his residence in Washington, D. C., Sept. 6, 1862.

**Larned** (SIMON), b. in 1754 at Thompson, Conn.; was a Revolutionary officer who settled at Pittsfield, Mass., in 1784. He was a member of Congress 1804-05; colonel 9th U. S. Infantry 1812-15, and afterwards sheriff of Berkshire co., Mass. D. at Pittsfield Nov. 9, 1817.

**Larned** (SYLVESTER), son of Col. Simon Larned, b. at Pittsfield, Mass., Aug. 31, 1796; graduated in 1813 at Middlebury College; studied theology at Princeton, and in 1817 was ordained to the Presbyterian ministry. He went to New Orleans, where he was distinguished for the rare eloquence and power of his preaching. D. of yellow fever Aug. 21, 1820. (See his *Life and Sermons*, by R. R. Gurley, 1844.)

**Larned** (WILLIAM AUGUSTUS), A. M., b. in Thompson, Conn., June 23, 1806; graduated at Yale 1826; taught in Salisbury, N. C., 1826-28; tutor and theological student at Yale 1828-31; was ordained 1834-35 pastor of a Congregational church at Millbury, Mass.; was instructor in Hebrew and Greek in a theological school at Troy, N. Y., 1835-37; professor of rhetoric and English literature in Yale College 1839-62. D. at New Haven, Conn., Feb. 3, 1862. Prepared an edition of Demosthenes *On the Crown*; editor of the *New Englander* 1854-55.

**Lar'nica**, town on the southern shore of the island of Cyprus, Turkey, in a fertile but very unhealthy plain. It has no harbor, but a good roadstead, and carries on an extensive trade, exporting silk, wool, and oil, and importing iron, paper, and colonial products. It is annually visited by 600 or 700 vessels of 50,000 tons burden. Pop. about 10,000.

**La Rochefoucauld', de** (FRANÇOIS), DUKE, prince of Marsillac, b. at Paris Dec. 15, 1613; received a military education, and served for some time in the army, but the element in which he felt perfectly at home was the court intrigue. While yet a young man he took an active part in the contest between Anne of Austria and Richelieu, which ended with his banishment from Paris. On the death of the cardinal in 1642, he immediately returned to the court, but being poorly rewarded by the queen, he sought an alliance with the leaders of the Fronde; and in order to acquire influence and become of importance he established and carried through a love-intrigue with Madame de Longueville, a sister of the prince of Condé. This time too, however, his political enterprises brought him

nothing but trouble, and after 1660 he gave up all ambitious plans and lived solely for literature and social enjoyment in intimate intercourse with Mesdames de Sablé and Sevigné, and with Boileau, Racine, and others. In 1662 appeared his *Mémoires*, and in 1665 his *Réflexions*. The latter made a great sensation, as well on account of its elegant style and acute observations—for which reasons it is still considered a classical work in France—as on account of its philosophy, by which the difference between virtue and vice is reduced to a mere conventionality, and egotism is established as the principal if not the only spring in the human will. D. at Paris, Mar. 17, 1680.—Another member of the same family, FRANÇOIS ALEXANDRE FRÉDÉRIC DE LA ROCHEFOUCAULD-LIANCOURT, b. at Paris Jan. 11, 1747; lived mostly on his estate of Liancourt; was president of the National Assembly in 1789; emigrated in 1792; lived in England and the U. S.; returned to France in 1799; was much in public life under the Restoration as an advocate of liberal measures, and d. at Paris Mar. 27, 1827. He was a very voluminous writer on different social topics, but his name is best known as that of a great practical philanthropist. He established the first model-farm in France, introduced vaccination, founded at Liancourt a school for industry and art, which developed into the celebrated École des Arts et Métiers of Châlons, brought the method of mutual instruction into use, and established the first savings bank in France.

**La Rochejacquelein', de** (HENRI DU VERGER), COUNT, b. Aug. 1772, at the château of La Durbellière, in Vendée; did not emigrate when the Revolution broke out, but joined Lescaur, became for a short time the distinguished leader in the first VENDEAN WAR (which see), and was killed Mar. 4, 1794, at the battle of Nouaillé, near Chollet. La Rochejacquelein is the noblest personification of those royalists who thought sincerely that only the return of France to the legitimist monarchy could give the country peace and happiness. He was a reactionary La Fayette, and when he was chosen as general-in-chief of the Vendéens, he said to his soldiers, "If I fall back, kill me; if I go forward, follow me; if I die, avenge me!" He took part in all the early battles fought in Vendée against the republicans, and after he had been chosen chief of all the royalist armies he defeated twice the army of the National Convention around Autrain, and occupied Le Mans, La Flèche, Laval, and other cities.—His nephew, HENRI DE LA ROCHEJACQUELEIN, the latest celebrated representative of that historical family, gave up its ultra-legitimist opinions, rallied to the imperial régime, was made a senator by Napoleon III., and d. in 1867. FÉLIX AUCAIGNE.

**La Rose**, post-v. of Marshall co., Ill., on the western division of the Chicago and Alton R. R., has 1 weekly newspaper.

**Larousse' (PIERRE)**, b. in 1816 at Toucy, department of Yonne; began to be known as partner of Boyer, a celebrated Paris publisher of books for primary education. Many of these books are used now in French schools, and were written by Larousse himself. In 1863 he conceived the idea of his universal dictionary (*Dictionnaire du XIXe siècle*), and set at work surrounding himself with the best writers. The work was published by subscription, and had an immense success, though it slowly appeared periodically in small fascicules in a pamphlet form of about fifty pages each. Larousse exhausted his strength in this stupendous work, and he d. Jan., 1875, leaving his encyclopædia at the letter M. He was a moderate but strongly-convinced republican. FÉLIX AUCAIGNE.

**Lar'ra, de** (MARIANO JOSÉ), b. at Madrid, Spain, Mar. 24, 1809; known under the pseudonym of "Figaro" as the most popular modern satirist, dramatist, and critic of his country, after a short career abounding in tumultuous adventure, d. by his own hand at Madrid Feb. 12, 1827. His works have been many times reprinted in Spain, Mexico, and South America.

**Lar'abee**, tp. of Waupacea co., Wis. Pop. 362.

**Larramen'di, de** (MANUEL), b. in Biscay about 1690; was a Jesuit, and became the principal authority upon his native language, the Basque, of which he prepared a grammar and dictionary, and maintained it to have formerly been universal in Spain. The titles of his works are *El Imposible Venido* (1719), *Antiquidad y Universalidad del Basconce en España* (1728), *Diccionario trilingüe del Castellano, Basconce y Latín* (1745). D. in Biscay about 1750.

**Larrey' (DOMINIQUE JEAN)**, BARON, a famous military surgeon, b. at Bandéan, Hautes Pyrénées, in July, 1766; studied surgery with his uncle, Oscar Larrey, a successful surgeon of Toulouse, under whose care the baron's elder brother, Charles François Hilaire Larrey, M. D. (1774-1819), an able surgeon and writer, was also trained. The younger Larrey went in 1787 to Paris; entered the navy;



returned to Paris; studied under Dessault and Sabatier; joined the army in 1792; invented the *ambulance volante* 1793, and was made surgeon-in-chief; served in Egypt, Germany, Spain, everywhere displaying the grandest courage and perfect devotion to the comfort and health of the troops, and especially to the wounded, whether friends or enemies; was made a baron on the field of Wagram 1809; was wounded at Austerlitz and Waterloo; made countless and exceedingly important improvements in operative and clinical surgery, and made important observations in general medicine. D. of pneumonia at Lyons July 25, 1842.

**Larrey** (FÉLIX HIPPOLYTE) M. D., BARON, son of the great Baron Larrey, b. Sept. 18, 1808; entered the army, and in 1832 received his degree at Paris; became professor of pathology at Val de Grâce 1841; became sanitary inspector of the army 1858; was chief surgeon in the Italian campaign 1859, and the author of several medical and surgical books and of many professional papers.

**Lartet** (ÉDOUARDE, b. at St. Guérand, France, in 1801; has been one of the most distinguished promoters in France of researches in fossil palaeontology and pre-historic anthropology, having been for many years professor of the former science in the Museum of Natural History at Paris. Among his numerous discoveries may be mentioned the mammalian remains in the Miocene deposits of Gers (1837), including entire skeletons of *Mastodon angustidens*, and affording the first proof of the existence of fossil monkeys in Europe. Subsequently he worked with Gaudry in developing the palaeontological results of excavations in the Miocene beds of Pitermi, and aided Christy in exploring the caves of Périgord, as well as in the publication of the results in the *Reliquia Aquitanica* (1867-71), a work on the pre-historic ethnology of Périgord.

**Larue**, county of Central Kentucky, bounded N. E. by Salt River. It is undulating and fertile. Cattle, tobacco, and grain are staple products. Area, 400 square miles. Cap. Hodgenville. Pop. 8235.

**Larue**, post-v. of Montgomery tp., Marion co., O., 13 miles W. of Marion, on the Scioto River and Cleveland Columbus Cincinnati and Indianapolis R. R., has 1 weekly newspaper, 2 hotels, flouring and saw mills, a factory, a union school, various stores and warehouses. Principal business, farming and lumbering.

J. A. MOUSER, M. D., FOR ED. "LARUE CITIZEN."

**Lar'va** [Lat. for "mask," so called because it was once believed to conceal a perfect insect], in the life of most insects and of many inferior invertebrate animals the condition or stage of development which follows the hatching of the egg, and which in most insects is succeeded by the pupa or chrysalis state. The larvæ of flies (Diptera) are called maggots; those of coleopterous insects are grubs; those of moths and other Lepidoptera are caterpillars. A *scud* (pl. *scudica*) is the larval condition of a trematode worm. There is really no one stage of development in the larval state, for it is usually one of most active progress. In some cases another condition, the semi-pupa, precedes the pupa form into which the larva is changed.

**Lar'will**, post-v. of Whitley co., Ind., on the Pittsburg Fort Wayne and Chicago R. R.

**Laryngitis** [from Gr. *larynx*, "larynx"], an inflammation of the mucous membrane lining the larynx. It may first be divided into acute and chronic varieties, and the chronic subdivided into simple chronic catarrh of the larynx, laryngeal phthisis, and syphilitic laryngitis. The first of these, acute laryngitis, generally commences as an inflammation of the pharynx, which is afterwards communicated to the larynx, although it does occur independently in the larynx itself. The cause is generally "a cold," or exposure to sudden changes of temperature, or it may be traumatic; and the symptoms consist of hoarseness, a sensation of tickling and dryness in the throat, and more or less cough and expectoration. With ordinary care it subsides in a couple of days without any medical interference, or at most a warm bath followed by gentle diaphoresis. In very severe cases inhalations of infusion of hops may be used every two or three hours with decided advantage, but we should be very wary about making astringent local applications with a sponge or brush. Simple chronic catarrh of the larynx is usually a sequela of the acute form, or arises by extension of a similar inflammation of the pharynx and posterior nares. The symptoms are somewhat similar to those of the acute form, though not as well marked, and in addition there is an almost constant hawking and hemming kept up by the patient to clear his throat from the continually accumulating mucus. In the treatment of this, as in that of all inflammations, the first indication is to remove all irritation, and the patient should be cautioned against swallowing large masses of food at a time, or what is a

very common practice in this country, partaking of very warm dishes, followed by large draughts of ice-water. All the food taken should be of equable medium temperature, neither too hot nor too cold, and the inhalation of hot and cold air and noxious vapors, dust, etc. should be avoided as much as possible. Besides all this, the general health should be by no means neglected, and local medication seems to be very beneficial. Standard solutions of nitrate of silver, sulphate of copper, perchloride of iron, iodine, etc. are those most commonly used; they seem to produce a better result when changed from time to time, and the application should be made by means of a camel's-hair brush from twice to five or six times weekly.

Laryngeal phthisis occurs in connection with pulmonary phthisis; the symptoms differ little from those of an ordinary laryngitis, but upon examination the cartilages are found thickened, and often there is ulceration affecting both them and the cords. Syphilitic laryngitis exists as a manifestation of that dire affection, syphilis. It is principally from the previous history of the case and an exploration of the chest that we differentiate it from laryngeal phthisis. Sometimes the destruction of tissue is appalling. In the latter two varieties the chief reliance must be placed on the constitutional treatment of the disease of which they are but symptoms; but still, local medication should not be ignored. In ulcerative laryngitis, from whatever cause, powdered iodoform seems to have the most beneficial effect.

EDWARD J. BIRMINGHAM.

**Laryngoscope** [Gr. *larynx*, "larynx," and *σκοπεῖν*, to "examine"], an instrument proposed, and in part introduced, by Mr. Liston, and employed by other eminent surgeons of his time; but greatly improved and first systematically used by the late Prof. Czermak. It is employed for examining the condition of the diseased larynx, and also for observing the action of the vocal cords during phonation. It consists of two mirrors; the larger one, concave, throws light upon the smaller, which is held in the throat of the patient and illuminates the interior of the larynx, at the same time presenting a reversed image of the glottis, vocal cords, and surrounding parts. The laryngoscope is of great value in treating local diseases of the throat.

**Lar'ynx** [Gr. *larynx*], the organ of voice, situated at the upper part of the windpipe. The lower part of it is cylindrical, and scarcely wider than the windpipe, but above it widens out and forms a triangular-shaped box, which is attached to the hyoid bone by various muscles. It is situated in front of the oesophagus, and immediately beneath the integument on the front of the neck, where it forms a projection known as the *pomum Adami*, which is very prominent in males. The larynx is composed of various cartilages, nine in number, the most important of which are the thyroid, cricoid, two arytenoid, and the epiglottis. It is moved by a number of muscles, and lined with mucous membrane, which in places is thrown into duplicatures or folds, constituting the ary-epiglottic folds, the ventricular bands, and the vocal cords.

The function of the larynx is twofold—the production of the voice, and protection to the lungs and bronchi during respiration. The manner in which the voice is produced is as follows: The vocal cords, which are stretched across the laryngeal tube, are relaxed when the voice is at rest, but as soon as there is a desire to produce a sound, they are put on the stretch, and approximated by certain muscles connected with the larynx, and at the same time the air is driven forcibly through them from the lungs. The quality of the sound is regulated by the degree of tension and approximation of the cords, and the force with which the column of air is driven through the aperture. This has nothing to do with articulation, which is produced by the lips and tongue. The movements of the larynx during respiration are as follows: At each inspiration the vocal cords are separated and the larynx freely opened, but in expiration it is partially closed by the relaxation of the vocal cords. The larynx further protects the lungs from the invasion of any foreign body. We are all acquainted with the violent coughing produced by a crumb of bread which has been drawn in by a sudden inspiration. The larynx is subject to many affections, the most common of which are laryngitis, or inflammation of its lining membrane; paralysis of some of its muscles; growths on the cords; ulcerative and laryngeal phthisis.

EDWARD J. BIRMINGHAM.

**La Salle**, county of N. Central Illinois. Area, 1152 square miles. It is level and very fertile. Cattle, grain, wool, and hay are largely produced. Bituminous coal and sandstone are obtained extensively. Carriages, harnesses, and flour are the chief manufactures. The county is traversed by the Illinois and Fox rivers and by numerous railroads. Cap. Ottawa. Pop. 60,792.



**La Salle**, county of S. W. Texas. Area, 1470 square miles. It consists of extensive and rather dry undulating prairies, watered by the Frio and Nueces and their branches. It is a great stock-range, where cattle and sheep are pastured. Pop. 69.

**La Salle**, city and tp. of La Salle co., Ill., on the N. bank of the Illinois River, at the intersection of the Illinois Central R. R. with the Chicago Rock Island and Pacific R. R., 99 miles S. W. of Chicago and 1 mile E. of Peru. It is situated at the head of navigation on the Illinois, and is connected with Chicago by the Illinois and Michigan Canal. The adjoining city of Peru is practically a suburb of La Salle, which will undoubtedly soon absorb it in the same municipal organization. Zinc-smelting establishments, four in number, one being the largest in the country, form an important feature of business: a glass-factory is in successful operation; hydraulic cement is produced upon an extensive scale; and 200,000 tons of ice are annually sent down the river to a Southern market. It has gasworks, and a street railroad connecting La Salle with Peru was completed in 1874. The canal connection between the Mississippi and the great lakes has recently been greatly improved in the vicinity of La Salle. There is a good supply of bituminous coal within the city limits, and the place offers great inducements to manufacturers. There are 3 weekly newspapers. Pop. of city, 5200; of tp. 5452.

R. C. STEVENS.

**La Salle**, post-v. and tp. of Monroe co., Mich., on the Michigan Southern R. R. (Detroit division). Pop. 1392.

**La Salle**, de (JEAN BAPTISTE, D. D., b. at Rheims, France, Apr. 30, 1651; became a cathedral canon at Rheims when seventeen years old; received the doctorate after studying at the Sulpician school, Paris; became a priest 1671; devoted himself to the instruction of the poor; founded the Brothers of the Christian Schools, an order which received papal approval in 1725. D. Apr. 7, 1719. Numerous miracles are credited to him, and in 1840 he was declared "Venerable" by Gregory XVI.

**La Salle** (RENÉ ROBERT CAVELIER), SIEUR DE, b. at Rouen, France, in 1633; became a Jesuit, but, renouncing his profession, embarked for Canada in 1666; became a fur-trader; in 1669 set out to find the N. W. passage by way of the great lakes; explored Lake Ontario, and in 1671 discovered the Ohio; went to France in 1674; was ennobled and received important grants in Canada. Returning in 1678 from another voyage to France, he explored the great lakes, and attempted to colonize their shores; descended the Illinois and the Mississippi, reaching the Gulf of Mexico Apr. 9, 1682, and named the region Louisiana. In 1683 he went to France, and, having received a commission, endeavored in 1684 to plant a colony in Louisiana, but the voyage was disturbed by dissensions, and he landed in Mar., 1685, in Matagorda Bay, Tex., and built a fort. His followers were much reduced in numbers, and having decided to go by land to Canada, he was murdered by his own men on the banks of a branch of Trinity River, Mar. 19, 1687.

**Las Animas**, county of S. E. Colorado, extending W. to the Rocky Mountains. Area, 7000 square miles. The W. part is mountainous, the E. part a grassy plain. The Cimarron and Purgatory are the principal rivers. It contains coal, iron, gypsum, fireclay, marble, and considerable timber. It has good grazing and farm lands. Grain and wool are staple products. Cap. Trinidad. Pop. 4276.

**Las Animas** (WEST), post-tp. and cap. of Bent co., Col., situated on Arkansas River at its crossing by the Arkansas Valley branch of the Kansas Pacific R. R., 2 miles above the mouth of Las Animas River; it was laid out in 1873; has a newspaper and all the usual accessories of a rising town. It is the government freighting-point for New Mexico, and has a large cattle-trade. Pop. 500.

CHARLES W. BOWMAN, ED. "LEADER."

**Las'car** [Hind. *lashkar*, an "army"], properly, an East Indian camp-follower, but the name is now applied in the East Indies to boatmen, sailors, and other low-caste menials. The lascars are able seamen, but cruel and treacherous. There is a company of gun-lascars at Hong-Kong in the British colonial service. They are Malays, and number 176 men.

**Las'caris**, the name of two celebrated Greek grammarians who took refuge in Western Europe after the final overthrow of the Greek empire by the Turks, and contributed very much to the introduction of the study of the Greek language, literature, and philosophy into Italy and France. ANDREAS JOANNES, b. about 1445, at Rhyndacus in Phrygia, whence he received the surname RHYNDACENS. He lived in Italy and France at the courts of Lorenzo de' Medici, for whom he published his celebrated *Anthologia Græca*; of Louis XII., who used him in several diplomatic

missions; and of Leo X. and Paul III. D. in Rome in 1535.—Of the life of CONSTANTINE LASCARIS very little is known. He lived mostly at the court of Francesco Sforza in Milan, where he wrote his famous *Grammatica Græca*, but he also taught in Florence and Naples. D. in 1493.

**Las Casas**, de (BARTOLOMÉ). See CASAS.

**Las Cases**, de (EMMANUEL AUGUSTIN DIEUDONNÉ MARIE JOSEPH), MARQUIS, b. at Las Cases, in Languedoc, in 1766; entered the navy; emigrated in 1791; served for some time in the army of the prince of Condé; lived later on in London, where he published his *Atlas historique* (1803); returned in 1805 to France; held several offices in the civil and military service during the empire, and accompanied Napoleon to St. Helena in 1815. A letter he wrote to Lucien Bonaparte (Nov. 27, 1816), and in which he spoke freely of the manner in which Napoleon was treated, caused him to be arrested and transferred to the Cape of Good Hope. After thirteen months' imprisonment he was liberated; resided in Belgium, and returned after the death of Napoleon to France, where, in 1824, he published his *Mémoires de Ste. Hélène*, containing a record of the remarks which Napoleon had made to him in their conversations. D. May 13, 1842.

**Las Cru'ces**, post-v. of Doña Aña co., N. M., on the Rio Grande, 3 miles above Mesilla. It has 2 weekly newspapers.

**La Sleur**, tp. of New Madrid co., Mo. Pop. 2004.

**Las'ker** (EDWARD), b. Oct. 14, 1829, at Jarocin, in the Prussian province of Posen; studied jurisprudence and mathematics; spent three years in England studying English constitution and law; and received in 1856 an office in the Prussian government. His creed, however, and his constitutional views, which he set forth in several excellent papers, prevented him from advancing in the service; in 1870 he was appointed an attorney-at-law in Berlin. Since 1865, in which year he was elected a member from Berlin to the Prussian house of deputies, Lasker has devoted himself with great energy and steadily increasing influence to his parliamentary career, regardless of his practice as an attorney and of other personal interests. Until 1868 he represented in the house of deputies a district of Berlin, and then Magdeburg; in the North German and in the German diet he represented first a district of Berlin, and then one of Saxe-Meiningen. At first, his political conviction allied him with the progressive party, but when it became evident that Bismarck's policy aimed at the establishment of a united Germany, Lasker became one of the founders of the national liberal party, which still has the majority in the Parliament. In the internal development of the empire he always stands for that which is right, for the strict fulfilment and judicious development of the law; and in pursuing this aim he pays regard to none, to no powerful party, to no powerful person, not even to the government itself, with which he agrees in other questions; as, for instance, with respect to foreign policy. On all important laws of a more recent date, especially on those concerning trade and traffic, usury, imprisonment for debt, loans with premiums, etc., he has exercised a decisive influence. What has made him most popular, however, was his attack on the ministry of commerce (Feb., 1873); he attacked directly one of the highest officials in the ministry of state, and several princes.

AUGUST NIEMANN.

**Las Pal'mas**, town on the north-eastern coast of Gran Canaria, one of the Canary Islands. It is beautifully situated at the feet of lofty hills, with a spacious and good harbor. It is also well built, with a fine old cathedral and many beautiful promenades. It has some manufactures of glass, leather, woollens, and hats. Pop. 11,400.

**Las Pi'las**, an extinct volcano in Nicaragua, forming one of the chain called Los Marrabios, extending across the plain of Leon. Nearly at its foot a new volcanic cone several hundred feet high was formed in 1850 by an eruption which lasted a month.

**Las'sa, Lhasa**, or **H'P'lassa**, the capital of Thibet, situated in lat. 29° 30' N. and lon. 91° 40' E., on a plain 9500 feet above the sea and encircled by lofty mountains. It is a very lively and well-built town, with a population estimated at 50,000, and an extensive trade in precious stones, gold, velvet, silk, and cashmere. Its principal importance, however, it derives from the Booddha-la, a temple, with adjoining palaces, monasteries, and schools, situated on the top of a hill close by the city, with which it is connected by a magnificent road. The Booddha-la, or "mountain of Booddha," is the residence of the Dalai Lama, the pope of Booddhism. Thousands of pilgrims come annually to visit it; hundreds of them stay there to complete their theological and philosophical education; and all of them leave behind them a present to the Dalai Lama. The temple and palace, which cover many acres of land, glitter with



golden domes and minarets and columns, and it is said that few places on earth contain such enormous treasures of gold and precious stones as the Booddhahs. But foreigners—that is, all who are not Booddhists—are forbidden to enter not only the Booddhahs, but also the city.

**Lassen**, county of N. California, bounded E. by Nevada. Area, 4432 square miles. It consists of arable valleys, dry sage plains, alkali flats, and rough mountains. The greater part has its drainage into lakes with no outlet. Grain and live-stock are the chief products. Cap. Susanville. Pop. 1327.

**Lassen, tp. of Tehama co., Cal.** Pop. 240.

**Lassen** (CHRISTIAN), b. at Bergen, in Norway, Oct. 22, 1800; studied at Christiania, Heidelberg, Bonn, Paris, and London; attracted great attention by his *Essai sur le Pali*, written in connection with Burnouf (Paris, 1826), and his edition of *Hitopadesa*, a collection of Indian fables, made in connection with A. W. Schlegel (Bonn, 1829); and became professor in Indian languages at the University of Bonn in 1830. By his critical editions of *Institutiones Imperii Persarum* (1837), *Anthologia Sanscrita* (1838), etc., and by his numerous linguistic, archaeological, and historical writings he became the founder of the study of Indian language, literature, and history in Europe. His principal work was his *Indische Alterthumskunde* (4 vols., Bonn, 1844-62). D. May 9, 1876.

**Lassen's Peak**, in the Sierra Nevada, Shasta co., Cal., rises 10,571 feet above the sea.

**Las'side**, tp. of Union co., Ark. Pop. 782.

**Las'so** [Sp. *lazo*, kindred to the word *lace*], or **Lariat'** [Sp. *la riata*], a long thong of ox-hide or rope of horse-hair used by Spanish-American herdsmen and hunters for catching cattle, horses, or game. A running noose at the end is dexterously cast over the neck or legs of the beast, the other end of the lasso being fastened to the saddle, from which the lasso is thrown.

**L'Assomption'**, county of Quebec, Canada, bounded on the S. by the St. Lawrence. It lies directly N. of Montreal. Cap. L'Assomption. Pop. 15,473.

**L'Assomption**, post-v. of L'Assomption co., Quebec, Canada, on L'Assomption River, is the seat of a college and convent. Pop. 1210.

**Las'tra a Sign'a**, town of Italy, in the province of Florence, on the left bank of the Arno, about 8 miles S. W. of the city of Florence. It is well built, and was a fortified town under the Florentine republic. Pop. in 1847, 10,276.

**La'sus** [Λᾶσος], son of Chabrinus or (according to Schenckewin) Charminus, a Greek dithyrambic poet and hymn-writer of Hermione in Argolis, flourished about 510 B. C. He was a contemporary and rival of Simonides, and the reputed teacher of Pindar. Of all his poems, only a fragment of a hymn to Demeter remains, which is given in Bergk's *Poeta Lyrici Graeci*. H. DRISLER.

**Las Ve'gas**, post-v., cap. of San Miguel co., N. M., 70 miles E. of Santa Fé, on the Pecos River, has 2 churches, 2 weekly newspapers, 2 hotels, a public school, 2 denominational schools, a door and sash factory, mineral hot springs, and a large number of stores. Within a few miles are 6 grist-mills and 8 saw-mills. The Atchison Topeka and Santa Fé R. R. will, when completed, pass a few miles to the N. of Las Vegas. Cattle-raising and farming are the chief industries. Pop. about 1500.

LOUIS HOMMEL, Ed. "GAZETTE."

**Latakia'ah**, or **Ladiki'yeh**, the ancient LAODICEA AD MARE (which see), town of Asiatic Turkey, in the province of Syria, on the Mediterranean. It has many mosques, among which are several beautiful ones, and a considerable trade with Egypt, especially in tobacco; yet it bears a general aspect of dilapidation and downfall. Pop. 10,000.

**Lateen' Sail** [It. *latina*, "large or broad"], a triangular sail, used mostly upon small vessels in the Mediterranean. The anterior and superior edge is fastened to a long yard which is crossed at about one-third of its length by a short mast. The yard inclines about 45° to the horizon.

**Latent Heat.** See HEAT, by PROF. W. P. TROWBRIDGE, A. M.

**Laternal Pressure of Liquids.** See HYDRODYNAMICS and HYDROSTATICS, by J. P. FRIZELL, C. E.

**Lat'ran** is the name of a place in Rome occupying the site of the estates of the ancient Roman family *Laternus*. The two principal buildings situated in the place are the church of S. Giovanni and the palace. The old Lateran palace became imperial property under Nero, who put Plautius Lateranus to death and confiscated his estates. Constantine the Great presented it to the pope, and

it was the pontifical residence until in 1309 the Holy See was transferred to Avignon. On the return of Gregory XI. to Rome in 1377, he took up his residence in the Vatican. Having been burnt down under the reign of Clement X., the Lateran palace was rebuilt in 1558 under Sixtus V., but it remained unoccupied until Innocent XII. in 1693 made it an orphan asylum. In 1843, Gregory XVI. established here the Museum Gregorianum Lateranense for antiquities, the Vatican and Capitoline museums affording no more space. The church, S. Giovanni in Laterano, was founded by Constantine the Great, overthrown by an earthquake in 896, rebuilt by Sergius III. 904-11, burnt down in 1308, restored by Clement V., and subsequently much altered and modernized by Martin V., 1430, Pius IV., 1560, Borromini, 1650, and Galileo, 1734. For centuries it was the principal church in Christendom—*Omnium urbis et orbis ecclesiarum mater et caput*. Five great oecumenical councils were held in its vaults. The popes are still crowned here, and from the balcony of its front façade the Holy Father blesses the people on Ascension Day.

**Lat'ran Councils**—thus called because they were held in the church of St. John Lateran in Rome—comprise, besides six minor, five great oecumenical councils—namely, (1) that convened by Calixtus II., and opened Mar. 18, 1123, by which the long strife between the popes and the German emperors concerning investiture was ended on the following terms: "The emperor surrenders to God, to Sts. Peter and Paul, and to the Catholic Church all right of investiture by ring and staff. . . . The pope agrees that the election of German prelates shall be had in the presence of the emperor, provided it is without violence or simony." (2) That convened by Innocent II., and opened Apr. 20, 1139, by which the anti-pope, Anacletus II., and all who had received office under him, were deposed. (3) That convened by Alexander III., and opened Mar. 2, 1179, by which it was established that henceforth "the election of the popes shall be confined to the college of cardinals, and two-thirds of the votes shall be required to make a lawful election, instead of a majority only, as heretofore." (4) That convened by Innocent III., and opened Nov. 11, 1215, by which a crusade was determined upon for the liberation of Palestine from the infidels, the heresy of the Waldenses was condemned, and the doctrine of transubstantiation established as an article of faith. (5) That convened by Julius II., and opened May 3, 1512, by which the acts of the Council of Pisa were annulled, and the concordat concluded in 1516 between Francis I. and Leo X., who succeeded Julius II., and closed the council in 1517, was substituted for the Pragmatic Sanction of Bourges.

**Lat'er'za** [Lat. *Fratruertium*], town of S. Italy, in the province of Lecce, about 35 miles S. W. of Taranto. Pop. in 1874, 5318.

**La'tes** [properly *lato* or *latus*, Gr. *λάτος*], a genus of large Percidae, of which is *Lates niloticus*, the famous fish from which Latopolis in Egypt took its name. This fish is the largest in that stream. It is three feet long and of fine flavor. *L. nobilis* is an excellent food-fish of the tidal parts of the Ganges.

**La'tex** [Lat. for "juice"], the thick, milky juice of certain plants, as the milk-weed, celandine, etc. It is distinct from the true sap, and is contained in a set of tubes called "laticiferous vessels." Many important products, such as opium and caoutchouc, are the dried latex of some one or more species of plants. In some plants the latex exhibits the phenomenon called cytolysis.

**Lath**, a thin strip of board used to nail upon the uprights of house-walls. Upon the laths the plaster is laid by the trowel. Laths are now sawed out complete by machinery. Formerly, a wide and thin board was split into laths. Laths are generally made of small sticks; any kind of wood which will not warp will serve for laths.

**La'tham** (JOHN), b. at Eltham, Kent, England, June 27, 1740; studied medicine and natural history; established himself in 1763 as a physician at Dartford; aided Sir A. Lever in forming his museum, and was one of the founders of the Royal Society and of the Linnean Society. Besides papers on medicine and natural history, he was the author of a *General Synopsis of Birds* (8 vols., 1781-1801) and of an *Index Ornithologicus* (1791), both which were combined in a new edition under the title *A General History of Birds* (10 vols., 1821-24). D. at Romsey Feb. 4, 1837.

**Latham** (MILTON S.), b. at Columbus, O., May 23, 1827; graduated at Jefferson College, Pa., in 1845; became a lawyer of Alabama, and was clerk of the courts in Russell co. 1848-50; clerk of the recorder's court, San Francisco, Cal.; a district attorney 1850-51; a member of Congress from California 1851-52; collector of the port of San



Francisco 1855-57; governor of California 1860; U. S. Senator 1861-67.

**Latham** (ROBERT GORDON), M. D., F. R. S., b. at Billingsborough, Lincolnshire, Eng.; was educated at Eton and Cambridge, where he became a fellow of King's College and received degrees in arts and in medicine; became a lecturer at Middlesex Hospital; published *Norway and the Norwegians* (1834); translations from the Swedish, etc.; became in 1841 professor of English literature in University College, London; published a work on *The English Language* (1841), a series of English grammars (1843-50), *History of the English Language* (1849), *Handbook of the English Language* (1851), a translation of Sydenham's *Works* (1848-49), *Natural History of Man* (1850), *Man and his Migrations* (1851), a series of works on ethnology (1850-59), *Comparative Philology* (1862), a thoroughly revised edition of Johnson's *Dictionary*, in 36 numbers (1857-70), and other works.

**Lathe** [Fr. *tour*; Ger. *Drehbank*], a machine for shaping materials by the process called turning. It has a great variety of forms, as the "foot-lathe," the "engine-lathe," the "lathe for turning irregular forms," or as classified by reference to the art to which the tool is peculiarly adapted. In the lathe the material to be shaped is sustained by two "centres," between which it is given a motion of revolution, while a turning-tool, held by the hand of the workman or by a tool-holder attached to and moved by a "slide-rest," cuts away the exterior, and gives the mass the shape required in the finished piece.

The lathe was known in very early times. Its invention is claimed by Diodorus Siculus for Talus, the grandson of Dædalus; Pliny ascribes it to Theodore of Samos (740 B. C.), and states that Phidias and Pericles were very expert in its use. Cicero called the workmen using the lathe "*vascularii*." Phidias is supposed to have been the first to adapt the machine to turning wood. It had previously been used in turning vases and other forms in clay; and the potter's wheel, which is a kind of lathe, was in use among the ancients. It is mentioned in the Bible as used by the Hebrews. Very rude lathes were used in Europe at a period which antedates history, and they are still met with in some parts of the country. Turned objects in wood were exhibited at the international exhibition at Vienna in 1873, made by the peasantry of Galicia, among the Carpathian forests, on these old lathes. Fig. 1 represents this tool. The workman goes into the forest, selects two trees growing side by side, and close by a young maple or beech. Two maple cones inserted in the trees serve as centres, and the block to be turned is fixed between them, the end being first trimmed to cylindrical shape to take the "bight" of the rope, one end of which is attached to the end of the sapling, and the other to the treadle seen below. The cross-bar, *d*, is a rest to support the turning-tool. The treadle being worked by the foot, the piece revolves, and the turning is readily performed.

Lathes were adapted to other than cylindrical forms of revolution in comparatively modern times. Leonardo da Vinci, Jacques Besson, Salomon de Caus, and Jerome Cardan produced modifications and improvements, having for their object the production of oval and other geometrical figures. The engine-lathe, with its slide-rest, was the invention of Joseph Bramah, an English mechanic, in 1794. The lathe for turning irregular forms was invented by an ingenious American mechanic, Thomas Blanchard, about 1820, and was by him applied to turning gun-stocks and shoe-lasts.

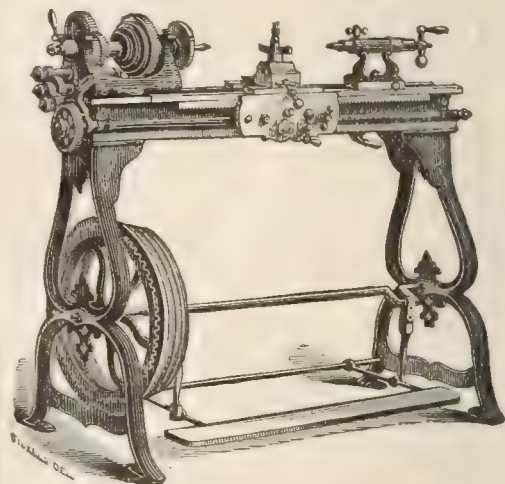
The metal-worker's engine-lathe has been variously modified by many inventors. The most efficient and perfect machines of this class are built by the leading manufacturers of machine tools in the U. S. This is the most generally useful and most indispensable tool of the whole collection of the metal-worker, and it is hardly less important in wood-working.

The art of turning is often made an independent industry. It employs large numbers of workmen, and some of the finest illustrations of manual dexterity and of artistic skill are produced by the use of this tool. (See TURNING.) The lathe is usually so constructed that the work may be placed between two conical pointed "centres," one of which is stationary, and the other of which revolves, driven by the foot or by other power, and communicates its

motion to the work. While the piece is thus rotating about the line joining the centres, the cutting edge of the tool is brought against the exterior or the projecting portions, and it is gradually worked into the required shape. When the axis remains constant in position, the tool being moved inward and outward, or laterally as required, the surface becomes that of a solid of revolution, composed, usually, of cylindrical combined with spherical, spheroidal, or other geometrical forms. The axis is sometimes changed in position during the operation of turning, as in the "rose-engine," by which oval and many intricate combinations of regular figures are produced. Hand-turning is usually adopted in working wood and ivory. The tool is carried in the hand of the operator, a rest being provided to support it beneath while it is moved in the horizontal plane by the turner. In the engine-lathe used for working metal the tool is secured in a tool-post erected upon a slide-rest, which latter is moved horizontally by suitable mechanism, worked either by hand or by the automatic "feed-motion" of the lathe. In the "chuck-lathe" the work is carried in a chuck mounted on the end of the rotating spindle, which in the first described or centre lathe carries the live or rotating centre. The chuck grasps the work firmly, and thus enables the dead centre to be dispensed with when turning short pieces.

The foot lathe is driven by the foot of the workman, operating a treadle beneath. When the tool is larger, and is driven by steam or water power, it is called a power-lathe. Nearly every trade uses some form of lathe, which by some peculiarity of detail is especially fitted for its work. The forms of the lathe are therefore numerous, while the variety of attachments is enormous.

FIG. 2.

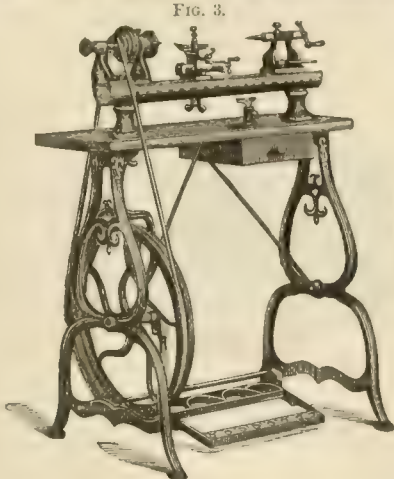


Screw-cutting engine lathe, with foot motion.

Fig. 2 represents a very complete foot-lathe, as made by Chase & Co. of New York City for general work. A horizontal shaft, extending beneath the bed of the lathe from end to end, carries a pulley balance-wheel, which by means of a belt not shown drives the spindle which runs in bearings in the "head" of the lathe at the left. This driving-shaft is turned by a treadle which is worked by the foot of the turner. The slide-rest, seen at the middle of the lathe between the two heads, is moved either by hand, or automatically, by a small shaft running from end to end of the lathe, and partly concealed by that portion of the slide-rest which carries the handle for attaching and detaching it. The tool is shown in its place in the tool-holder, which is mounted upon and carried by the slide-rest. The back centre is shown at the right, and the back-head, in which it is carried, is adjustable in position at any distance from the fixed head, and is clamped by the nut and handle seen beneath it. The centre is moved backward and forward by the handle at the right, which turns a screw within the shell, and when in adjustment it is clamped by a smaller set-screw or clamp, seen above it. The train of gearing at the end of the lathe adjacent to the driving-head is used to determine the relative motion of the tool and the work, when it is desired to secure an exact velocity-ratio, as in cutting screws. The gearing seen behind the driving-spindle takes its motion from the pinion on that spindle at the left, and, turning with the belt-cone, transmits it, with a reduced velocity-ratio, to the gear on the driving-spindle at the right. This gear drives the live spindle to which it is keyed. With this arrangement the driving-pulley and its attached pinion turn loosely on the driving-spindle.

A rapid motion of the driving-wheel is thus converted into a slow, strong movement of the live centre, and the lathe is thus adapted to turning metals. Throwing the back-gearing out of gear, the largest gear can be clamped to the belt-cone, and the driving-spindle then partakes of the rapid motion of the latter, turning with the higher velocity required in working wood and other soft materials.

Both the back-gearing and the screw-cutting attachment are usually dispensed with in lathes intended for turning wood only. Fig. 2 represents a large foot-lathe, capable



Jeweller's lathe.

of taking pieces 10 inches in diameter and 40 inches long. A more usual size turns pieces 6 or 8 inches in diameter

and about 2 feet long. The jeweller's lathe, shown in Fig. 3, illustrates this style.

The finest fitting and the best workmanship is expended upon the head-stock of the lathe. Fig. 4 is a sectional drawing of this part of the tool, as made at the Free Institute of Industrial Science at Worcester, Mass. It represents the best of practice. This lathe resembles in general structure that shown in Fig. 2. The foot-motion is omitted, this being a power-lathe. It is 8 feet in length, "swings"—i. e. it can turn a piece of the diameter of—16 inches, and weighs 1500 pounds. The spindle A, A is of hardened cast steel, ground perfectly cylindrical, *after having been hardened*, to avoid danger of change of form in the process of hardening, to secure absolute truth in size and shape, and to obtain perfect smoothness and the desired hardness. The box, B, carrying this spindle is subjected to all the strain thrown upon the latter, whether by the weight of the piece or by the force exerted by the tool. Here it is made of a single piece of steel, fitted approximately to finished size, hardened, and finally ground to exact form and to fit. The spindle-bearing, C, C, where it turns in the box, is conical, and capable of adjustment longitudinally to take up the looseness occasioned by the wear which takes place even with hardened steel journals running in hardened steel bearings. End-play is prevented by the nut, D, D, and the set screw, E, E, which hold the spindle snugly in a position such that it may turn freely without either side or end play. The back end of the spindle is carried in the journal, F, its box being held by the cap-screw, G, G. The cone-pulley, H, H, turns loosely on the spindle when the back-gear is in action, and is clamped by the sliding-block, I, and screw, J, when the spindle and the cone are to move together, the cone driving the gear, K, K, directly, and the latter carrying the spindle, to which it is secured by keys. The pinion, L, L, on the cone-pulley, drives the back-gear. A spindle, M, M, carried on the rear plate of the head-stock, N, N, carries the feed-cone pulley, O. The belt-cone, H, H, and the back gearing are given broad bearings.

FIG. 4.



Head-stock, 16-inch engine lathe, made at Free Institute of Industrial Science, Worcester, Mass.

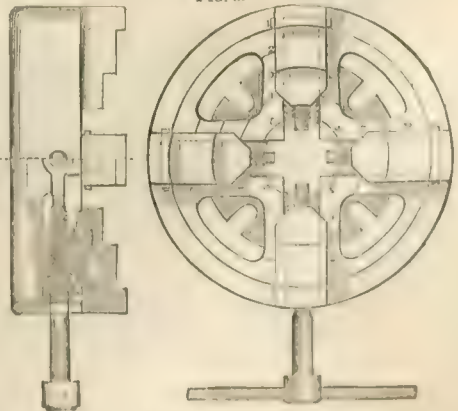
A good lathe must be capable of turning a truly cylindrical surface, and of producing a perfectly plane face upon the end of the cylinder, or of any piece secured in the lathe in such manner that the face to be finished shall lie in the transverse plane. These requirements are attained by skilful design and careful fitting. Lathes used in screw-cutting are driven by an arrangement of belting which permits them to be turned in either direction at pleasure. As the reversal of motion usually occurs very suddenly, "friction-pulleys," which are not affected by shocks, are generally used. Lathes for turning metals are driven at speeds much less than those adopted in working wood. These speeds are:

Material	Feet per minute.
Iron, chilled white cast	5
" soft gray	15
Steel	15
Iron, wrought	20
Brass and bronze	50-60
Wood	1500-1600

Pieces to be turned are frequently of such shape that it is more convenient to bolt them upon a "face-plate" than to hold them between centres. Disks, pulleys, wheels, and similar pieces are thus held. The face plate is a strong disk of metal of convenient size, having a hub on the rear face, bored and having a screw thread cut inside it to fit the thread cut on the end of the spindle P, Fig. 4. The dead centre and poppet-head are drawn back entirely out of

the way when using it. Pieces carried between the centres are connected with the face-plate by a "dog," a clamp hav-

FIG. 5.



Judson lathe chuck

ing a projecting arm which enters a slot cut in the face plate, and are thus driven. Pieces for which the face plate is used

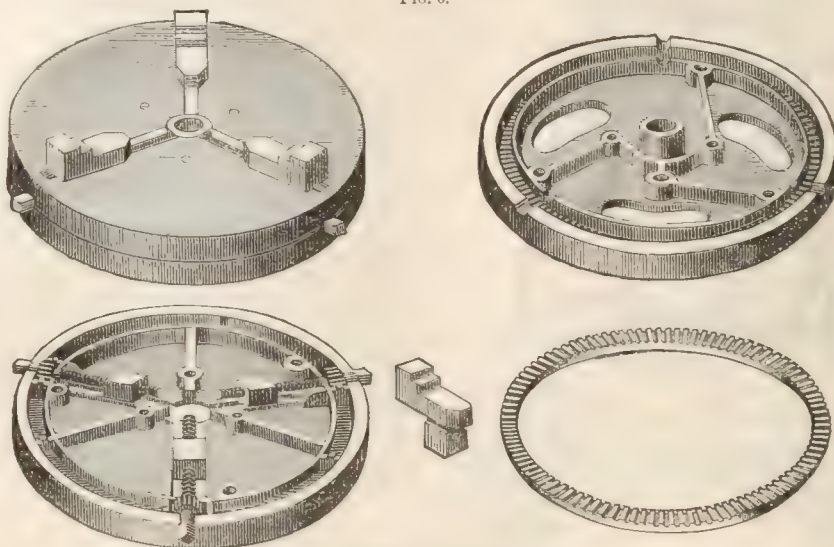


may be sometimes more conveniently held by a "chuck." This consists of a face plate carrying on its face a set of projecting pieces, movable in radial lines by means of screws, cams, or other mechanism, either together or independently. The piece to be turned is placed between these jaws, and they are forced together, seizing the work firmly, and compelling it to turn with the face-plate.

Fig. 5 represents the Judson chuck in elevation and in part section. The jaws are forced together or separated by the screws shown, which screws are turned by a wrench, shown in use on the lower one. Circles 1, 1, 2, 2, 2, scored on the face, enable the workman to secure a symmetrical adjustment when it is desired. The jaws being

independently adjustable, unsymmetrical pieces may be chucked readily and accurately. The wedge-shaped lug which connects the nut of each screw with its jaw causes the same force which drives the jaw against the work to press the former more firmly against the face-plate, thus holding the work firmly and snugly. The shell of this apparatus is usually of iron; the jaws should be of steel; the screws are of wrought iron. A "scroll chuck" has a similar form, but the jaws are moved simultaneously by a spiral feather on the face of a disk within the casing. These chucks, if accurately made, always place the piece symmetrically on the axis, but they cannot be used for unsymmetrical work.

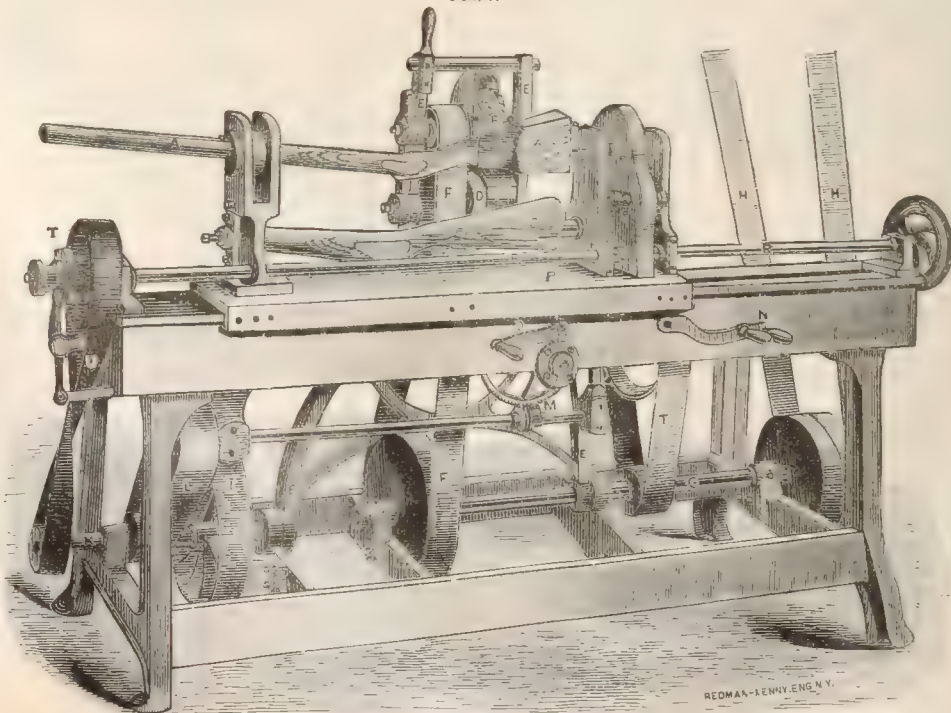
FIG. 6.



Horton's chuck.

The Horton chuck, Fig. 6, combines the distinguishing features of both the forms just described. The jaws are moved by a set of geared screws turned by a circular rack, of wrought iron, sliding in the circular groove cut in the

FIG. 7.



The lathe for turning irregular forms.

A, gun-stock; B, cutter-head; C, former; D, guide-wheel; E, E, E, E, swinging frame holding cutter-head and guide-wheel; F, F, cutter-head belt; G, driving-shaft; H, driving-belt; I, belt to first counter-shaft; J, belt from first counter to second counter-shaft; K, L, belt to feed-shaft; M, feed-motion; N, shipper for feed-motion; O, hand-feed; P, sliding table; R, R, R, R, shaft and connecting gears for revolving the stock A and former C; S, hand-wheel; T, clutch on revolving shaft R; U, revolving stop-belt.

REDMAN &amp; SONS, ENG'N'Y.

back-plate. The front and back plates are nicely fitted together, so that no dust or dirt can get inside. Taking out the rack, the jaws are movable independently. The face of the jaw has a slightly raised portion, and a groove is cut at the corner where it meets the "bite," to allow of accurate regrinding.

Fig. 7 represents the lathe for turning irregular forms originally invented by Blanchard, and as now used at the U. S. arsenal at Springfield, Mass., of which drawings are kindly furnished by the commanding officer.

In this beautiful machine the pattern or former, C, is mounted between centres parallel with the piece to be made its duplicate, and is revolved at precisely the same rate of speed. A cutter-head, B, carrying several knives and driven by the belt, F, swings in the frame, B, E, E, on the centres at the base. A guide-wheel, D, bearing against the former, C, throws the frame and cutter-head in and out as the guide-wheel and the gun-stock revolve synchronously, making the latter a fac simile of the pattern. A slow, uniform motion is given the frame in the longitudinal direction, thus shaping the piece from end to end. Many modifications of this copying tool are now made for special uses.

In the "rose-engine lathe" the spindle carrying the work is movable, and is vibrated by a guide-wheel or pattern-wheel turned at a fixed rate of speed, and having an outline which is determined by the shape of the design to be cut. Several wheels being used in succession, intricate and beautiful geometrical combinations are obtained. (See Holtzapfel's *Mechanical Manipulations: The Lathe and its Uses; Manuel du Tourneur.*) R. H. THURSTON.

**La'throp**, post-v. of San Joaquin co., Cal., on the Central Pacific R. R., 9 miles S. of Stockton.

**Lathrop**, post-v. and tp. of Clinton co., Mo. It has 1 weekly newspaper. Pop. of v. 523; of tp. 1782.

**Lathrop**, post-tp. of Susquehanna co., Pa. Pop. 983.

**Lathrop** (JOHN), D. D., b. in Norwich, Conn., May 17, 1740; graduated at Princeton in 1763; taught for a time in the Indian school, afterwards Dartmouth College; was (1768-1816) a Congregationalist minister of Boston, first over the Old North, and then over the Second church. His degree of D. D. was conferred first by Harvard, and then by Edinburgh University. D. Jan. 4, 1816.—His son, JOHN (b. Jan. 13, 1772; d. Jan. 30, 1820), was a famous wit, poet, and orator of the early years of the republic.

**Lathrop** (JOHN HERMAN), LL.D., b. at Sherburne, N. Y., Jan. 22, 1799; graduated at Yale in 1819, and was a tutor there 1822-26; became a lawyer in 1826, and afterwards taught in Norwich, Vt., and Gardiner, Me.; professor of mathematics and natural philosophy in Hamilton College 1829-35; of law, history, etc., 1835-40; president of the University of Missouri 1840-49; chancellor of the University of Wisconsin 1849-59; president of Indiana University 1859-60; professor of English literature in the University of Columbia, Mo., 1860-62, and its president 1865-66. D. at Columbia, Mo., Aug. 2, 1866.

**Lathrop** (JOSEPH), D. D., b. at Norwich, Conn., Oct. 20, 1731; graduated at Yale College in 1754; became pastor of the Congregational church in West Springfield in 1756, and retained that position sixty-four years, until his death, Dec. 31, 1820. His published works in 7 vols. (1796-1801) are composed almost entirely of sermons, several of which, entitled *Wolves in Sheep's Clothing*, elicited by troubles in his parish, had a wide celebrity. The last volume contains an autobiography.

**Latia'no**, town of Southern Italy, in the province of Lecce, about 14 miles S. of Brindisi. Pop. in 1871, 5953.

**Latil'idæ** [from *Latilus*, a typical genus, and the termination *-idæ*], a family of fishes of the order Teleostei and sub-order Acanthopteri, distinguished by sub-jugal ventral fins, each of which has a spine and five branching rays; a more or less elongated body (the vertebral column having more than ten abdominal and fourteen caudal vertebrae), covered with scales, and with the lateral line submedian along the tail; an elongated dorsal fin, of which the spinous portion is shorter than the soft; and a compressed head, with a snout truncated or moderately produced. These are the principal diagnostic characters of a group of fishes which have been variously placed by different naturalists, Cuvier having referred some forms to the Percidae, and others to the Labridæ; and Günther having referred all to the family Trachinidæ, except *Malacanthus*, for which he framed a peculiar family—*Malacanthidæ*. It embraces not many genera, but combinable under several groups of genera, or possibly sub-families—viz. **LATILI**, with three genera, *Latilus*, *Cambobotulus*, and *Prodactilus*; **MALACANTHI**, with the *Malacanthus*; and **PSIPIPTERI**, with the genus *Pisipiquia*. All the genera are tropical, the *Pisipiquidæ* being peculiar to America, and the others tropicopolitan.

THEODORE GILL.

**Lat'imer** (HUGH), D. D., b. at Threaston, Leicestershire, England, in 1491, was the son of a thrifty yeoman; was educated at Clare Hall, Cambridge, where he was chosen a fellow 1509; passed a bachelor 1510, and a master 1514; was cross-bearer to the university, and in 1516 became Greek professor; was ordained a priest at Lincoln; became a Protestant by reason of the labors of Bilney; was dismissed from the university as a heretic by Wolsey 1527; became chaplain to Henry VIII. 1530; became rector of West Kingston, Wilts, 1531; was excommunicated, but absolved on his submission, 1532; chaplain to Anne Boleyn 1534; became bishop of Worcester 1535; resigned his office 1539, not being able to accept the Six Articles (31 Hen. VIII. c. 11), and was imprisoned in the keeping of the bishop of Chichester; was afterwards silenced by authority and shut up in the Tower 1546-47; declined his former bishopric 1548; was preacher to Edward VI. 1549-50; imprisoned in the Tower by proclamation of Queen Mary 1553; transferred to the Bocardo of Oxford, with Ridley, 1554; tried and condemned by order of Cardinal Pole 1555; and burned at the stake with Ridley in the ditch near Balliol College Oct. 16, 1555. Latimer was one of the most influential and fearless of the English Reformers, and his admirable *Sermons* (4 vols., London, 1845) are models of forcible and witty speech. (See his *Life*, by Rev. R. Demaus, 1869.)

**Latimer** (JAMES ELIJAH), A. M., S. T. D., b. Oct. 7, 1826, at Hartford, Conn.; graduated in 1848 at the Wesleyan University; entered the Methodist Episcopal ministry; was for many years an instructor in the seminars of his Church, and held pastorates in the State of New York 1861-69; became in 1870 professor of systematic theology in Boston University.

**Lat'imore**, post-tp. of Adams co., Pa. Pop. 1230.

**Lat'in Church**, a name applied to the Roman Catholic, the Occidental, or Western Church. It is antithetical to Greek Catholic, as the title of the Oriental or Eastern Church. After the separation of the Greek Church from the Roman (ninth to eleventh century) the Catholics of the West were called Latins, because of their retention of the Latin language in the church service. In association with this distinction we speak of the Latin Fathers after (not before) the separation, the Latin ritual, the Latin clergy. A Greek latinized is a convert from the Greek to the Roman Church. (See Aschbach, *Abh. K. L.* 1830, iv. 12; Bergier, *Théologie, in Encyclop. Méthodique* (1789), ii. 408; Mühlman, *Latin Christianity* (1844).) C. P. KRAUTH.

**Lat'ini**, in the government of ancient Rome, were inferior citizens of a class superior to the Peregrini. The term originally designated the people of Latium; these after the Social war attained an inferior kind of citizenship, the nature of which is not clearly known. The *jus Latii*, *Latinitas*, or *Latium* (Latin privilege) was afterwards extended to many cities, towns, and colonies in foreign parts, and the Latini and their descendants, even though living at Rome, possessed only the Latin and not the full Roman citizenship.

**Latini** BRUNETTO, b. at Florence in 1270; belonged to the party of the Guelphs; was exiled in 1264; lived for several years in Paris; returned after the overthrow of the Ghibellines to Florence, where he d. in 1294. He is better known as the teacher and friend of Dante than on account of his own writings, the most remarkable of which is his *Libro de trezoro*, written in French, translated into Italian in 1474, and containing a compendium of the whole wisdom of his time.

**Latin Language**. Latin is a member of that great family of languages called Indo-European, and also, but less properly, Indo-Germanic or Aryan. This family embraces the Sanskrit, Persian, Lithuanian, Greek with its modern representative Romic, Latin and its modifications the Romance tongues, Celtic, German, and English. These languages, for the most part, present striking resemblances in words, in inflections, and in general grammatical structure. The Sanskrit is the oldest of them all, and throws more or less light on the obscurities of all the rest. The Sanskrit has prevailing usages which pass away in its descendants, as the ending *-mi* of the first person present indicative, which appears in a limited number of words in Greek, in a modified form in two in Latin (*sum* and *inquam*), in only one in English (*am*), further modified in the German *bin*, and utterly disappearing in other tongues; it has a dual as well as singular and plural for its nouns, pronouns, adjectives, and verbs; which the Greek possessed, but was little inclined to use, which the Latin retained only in *duo* and *ambo*, and confused in *res* and *res*, and which the English and German have retained in only one word, *brethren*; it had both augment and reduplication, in which the Greek nearly followed it, while the Latin retained only



reduplication, and that in certain verbs, the German augment in the past participle of simples, the last faint trace of which appears in some old forms in English, as *yelept*; it had eight cases, which kept certain relations distinct which were afterwards confused, as the genitive, dative, and ablative, which last was lost in Greek, and in Latin also was mostly lost as a separate form, and in use became very complicated and irregular; in making its reduplicative syllable it illustrates, with one exception only, the order of the development of the Latin vowels, *a, o, u, e, i*; and in its words, as will be seen below, it is sometimes more closely allied to the Celtic or Germanic than to the Greek or the Latin. In former times it was customary to regard the Latin language as descended, and that very directly, from the Greek, and real or fancied connections were traced out between nearly all the Latin and Greek words. Others, who discovered in the Latin language words and forms which occur in the German and the Celtic, were led to believe that the Latin was largely derived from the Celtic. But in resolving such a question there are very great difficulties. How are we to know whether the Celtic or the Latin form is the older? We may generally receive the statements of the Romans themselves as to the origin of certain words which they discussed, but as we have no monuments of Celtic earlier than the seventh century of our era, how is modern research to decide whether the Celtic word is an old collateral form of the Latin, or was actually carried by the Romans in their conquests and deposited among the strange people? Was the Celtic *tir*, for instance, an original word with this people, or only the barbaric form of the Roman *terra*? While in some cases one of these views might be correct, and in other cases the other, we can only assert with confidence that the Latin belongs to the same family as the above, but more closely resembling the Greek in its oldest elements than any other member, and afterwards, in historic times, following the development of the Greek, adopting words from it with no change of form, or only such as convenience or regard for analogy required, imitating its construction, as in modern times English and French have imitated each other, and first translating and then imitating its literature, as Early English dealt with French and with Italian.

To show how far this resemblance extended in some of the most ancient forms, and with what remarkable exceptions, we subjoin four comparative tables of groups of words, putting the Latin words in italics only when they are identical with the Greek or closely allied to it, and enclosing in parentheses such words as are more remotely connected in the group, or changed in meaning, or both:

#### I. The names of the human body and its parts:

English.	Latin.	Greek.
body,	corpus;	σῶμα.
skin,	( <i>cutis</i> ; G. <i>Haut</i> )	( <i>χρυσ</i> (σκούτος or <i>κρυτος</i> hide).
bone; G. <i>Bein</i> (= leg,	<i>os</i> ,	ὀστέον; St. <i>asthi</i> .
hair; G. <i>Haar</i> ,	crinis,	θρίξ.
head; G. <i>Kopf</i> ,	caput; G. <i>Kopf</i> ,	κεφαλή.
back,	dorsum,	ῥωτόν.
neck,	(collum; G. <i>Hals</i> );	αἰχμή.
	(Goth. <i>hals</i> ),	( <i>ῥωτός</i> ; Goth. <i>amsa</i> ;
shoulder,	humerus, <i>am-rus</i> ,	St. <i>amsa</i> .
arm; G. <i>Arm</i> ,	brachium,	βραχίον.
breast; G. <i>Brust</i> ,	pectus,	στήθος.
heart; G. <i>Herz</i> ; St.	<i>cor</i> (coron),	καρδία κρᾶδια, κῆρ.
<i>hrid</i> ,	facies,	πρῶστωτον.
face,	frons,	ὀφθαλμός.
brow; St. <i>hru</i> ,	oculus,	ὄψις ὤψος; Goth. <i>anso</i> .
eye; Goth. <i>aug</i> ; G.	(nasus; St. <i>nas</i> );	ῥίς.
<i>Aug</i> ; St. <i>akshi</i> ,	(G. <i>Nase</i> ,	
nose,		
mouth; Goth. <i>munth</i> ;	<i>os</i> ,	στόμα.
G. <i>Mund</i> ,	(lingua; archaic)	γλῶσσα.
tongue; Goth. <i>tungu</i> ;	( lingua,	ὀδὸς ὀδόντος.
G. <i>Zunge</i> ,	<i>dens</i> <i>dents</i> ; G. <i>Zahn</i> ,	λείκος.
tooth; St. <i>dat</i> <i>danta</i> ,	labium,	
lip; G. <i>Lippe</i> ,	manus; arch. <i>hir</i> ,	χειρ.
hand; G. <i>Hand</i> ; Goth.	<i>manus</i> ,	πῦμα.
<i>hand</i> ,	<i>manu</i> ; Goth. <i>alein</i> ,	ὠκεῖν.
first; G. <i>Ferst</i> ,	<i>digitus</i> ; Fr. <i>doigt</i> ,	δάκτυλος.
elbow; G. <i>Ellenbogen</i> ,		
finger; G. <i>Finger</i> ;		
toe; G. <i>Zeh</i> ,		
nail; G. <i>Nagel</i> ; St.	<i>unguis</i> ,	ὄνυξ ὀνυχός.
<i>nagla</i> ,	crus,	σκελός.
leg,		
knee; Goth. <i>Kniu</i> ; G.	<i>genu</i> ,	γόνυ. St. <i>genu</i> .
<i>Knie</i> ,		
foot; Goth. <i>fotus</i> ; G.	<i>pes</i> <i>pedis</i> ,	πούς ποδός; St. <i>pod</i> .
<i>Fuss</i> ,		

#### II. The names of the Deity and of human relations:

God; G. *Gott*; Goth. *Gud* or *Guð*, Deus, *Divus*; St. *deva*; Θεός, (Ζεύς) Διός.

English.	Latin.	Greek.
man; G. <i>Mann</i> ;	{ homo hominis;	{ ἄνθρωπος.
Goth. <i>man</i> ,	{ Goth. <i>guma</i> ,	{ μήτηρ; St. <i>nri</i>
	{ vir; A.-S. <i>wer</i> ;	
	{ Celt. <i>fiar</i> ,	
father; Goth. <i>fadar</i> ;		
G. <i>vater</i> ,	<i>pater</i> ,	πατήρ; St. <i>pitri</i> .
mother; G. <i>Mutter</i> ,	<i>mater</i> ,	μήτηρ; St. <i>matvi</i> .
son; G. <i>Sohn</i> ; Goth.	filius,	νιός.
<i>Sunus</i> ; St. <i>sunu</i> ,		
daughter; Goth.	filia,	θυγατήρ.
<i>dauhlar</i> ; G. <i>Dach-</i>		
<i>ter</i> ; St. <i>dahiti</i> ,		
brother; Goth. <i>bro-</i>	frater,	{ ἀδελφός (φράτηρ =
<i>thar</i> ; G. <i>Bruder</i> ;	St. <i>bratari</i> ,	{ clansman).
sister; Goth. <i>swistar</i> ;	soror,	ἀδελφή.
G. <i>Schwester</i> ; St.		
<i>searst</i> ,		
uncle; G. <i>Onkel</i> ,	{ patruus,	{ θείος.
aunt; G. <i>Tante</i> ; Fr.	{ avunculus,	{
<i>tante</i> ,	{ amita,	{
	{ matertera,	{
nephew; G. <i>Neffe</i> ,	{ nepos,	{ in their
niece; G. <i>Nichte</i> ,	{ neptis,	{ later
		{ meaning,
boy (G. <i>Bube</i> , pro-	{ puer,	{ (St. <i>patru</i>
vine.),	{ puella,	{ = son),
girl,		
maid; G. <i>Magd</i> ; Goth.	virgo,	παρθένος.
<i>magaths</i> ,		

#### III. Pronouns:

I; G. <i>ich</i> ; Goth. <i>ik</i> ,	ego; C. <i>me</i> , <i>mi</i> ,	ἐγώ, ἐγών; St. <i>aham</i> .
me; G. <i>nich</i> ; Goth.		
<i>mik</i> ,	<i>me</i> ,	ἐμέ, μέ; St. <i>moi</i> .
thou; Goth. <i>thu</i> ; G. <i>du</i> , <i>tu</i> ,		σύ, τυ, τυνη; St. <i>ti-am</i> .
thee; G. <i>dich</i> ; Goth.		
<i>thuk</i> ,	<i>te</i> ,	σέ, τέ; St. <i>ti-a</i> .
we; Goth. <i>weis</i> ; G.	<i>nos</i> ; C. <i>ni</i> ,	{ ἡμεῖς <i>wa</i> , dual;
<i>wir</i> ,		{ St. <i>nur</i> .
ye; St. <i>yuyam</i> ; G.	<i>vos</i> ; Goth. <i>jus</i> ,	{ ἡμεῖς <i>schwa</i> , dual);
<i>thr</i> ,		{ St. <i>iam</i> .
he, she; G. <i>er</i> , <i>si</i> ;		
Goth. <i>sah</i> , <i>is</i> , <i>so</i> ,	<i>hic</i> , <i>sui</i> (reflex.),	(i obs.) ὅν.
it; G. <i>es</i> ; that; Goth.		
<i>thattu</i> ,	<i>id</i> .	
who, what (G. <i>wer</i> ,		
<i>was</i> ),	<i>qui</i> , <i>quod</i> ,	ὅς, ὃ; St. <i>yah</i> .
who? what? G. <i>wer?</i>		
<i>was</i> ? Goth. <i>was</i> ? <i>wa?</i>	<i>quis</i> ? <i>quid</i> ?	τίς; τί; St. <i>kah</i> .
whether? (obs.), Goth.	<i>ut</i> ?	πότερος; St. <i>katara</i> .

#### IV. Cardinal numbers:

Gothic.	German.	English.	Latin.	Greek.	Sanskrit	Etruscan (from Corsen).
<i>ains</i> , <i>cin</i> ,		one,	<i>unus</i> ,	εἰς ἐνός,	{ <i>eka</i> { (Hob.) { <i>ekadul</i>	{ <i>eka</i> or <i>un-</i>
<i>twai</i> , <i>zwei</i> ,		two,	<i>duo</i> ,	δύο,	<i>dui</i> ,	<i>teis</i> .
<i>threeis</i> , <i>drei</i> ,		three,	<i>tres</i> ,	τρεῖς,	<i>tri</i> ,	<i>tri-</i>
<i>fidvor</i> , <i>vier</i> ,		four,	<i>quatuor</i> ,	τετταρες,	<i>chatur</i> ,	<i>chuar-</i>
<i>fimf</i> , <i>fünf</i> ,		five,	<i>quinque</i> ,	πεντε,	<i>pañchan</i> ,	<i>cin</i> -or <i>crin-</i>
<i>sächs</i> , <i>sechs</i> ,		six,	<i>sex</i> ,	ἕξ,	<i>shash</i> ,	<i>sex</i> -or <i>sax-</i>
<i>sibun</i> , <i>sieben</i> ,		seven,	<i>septem</i> ,	ἑπτά,	<i>saptan</i> ,	<i>seth</i> -or <i>schth-</i>
<i>ahtan</i> , <i>acht</i> ,		eight,	<i>octo</i> ,	ὀκτώ,	<i>ashlan</i> ,	<i>ahlar</i> - <i>ahlar-</i>
<i>ninan</i> , <i>nina</i> ,		nine,	<i>novem</i> ,	ἐννέα,	<i>navan</i> ,	<i>nu-</i>
<i>tiuhun</i> , <i>zehn</i> ,		ten,	<i>decem</i> ,	δέκα,	<i>disun</i> ,	<i>tecu-</i>
<i>ainlif</i> , <i>elf</i> or <i>elf</i> ,		eleven,	<i>undecim</i> ,	ένδεκα,	<i>ekadasi</i> ,	<i>tesu-eka</i> .
<i>twalif</i> , <i>zwölf</i> ,		twelve,	<i>duodecim</i> ,	δώδεκα,	<i>disawid</i> ,	<i>tesu-teis</i> .

Interesting facts may be gathered from these tables, and from similar ones which our space does not allow us to introduce here; as that a generic word in one language may become specific in another; as Gr. *θήρ*, Eng. *deer*; G. *Hund*, Eng. *hound*; Lat. *digitus*, Fr. *doigt*, Eng. *toe*; that in some instances the English or the Greek and the German retain an old form lost to the Latin; as Gr. *ὄρφος*, *rouf*; Gr. *πάτος*, *path*; G. *Pfad*; that in some cases, where the word is generally preserved, the modern form may be nearer to the Sanskrit than to the classical form; as Gr. *ὄνομα*; Lat. *nomen*; G. *Name*; Eng. *name*; St. *naman*; Gr. *ήδης*; Lat. *suavis*; Eng. *sweet*; St. *swadu*; and that there are interesting cases of change of meaning; as Gr. *πόντος* = sea; Eng. *pond*; Lat. *mare* = sea; Eng. *mere*, a lake; Heb. *eleph* = an ox; Gr. *ἐλεphas* = an elephant; Gr. *κάπρος* = a wild-boar, which seems to be the Lat. *aper*, a goat, as well as *aper*, a wild-boar; and that pronouns and numerals are the least variable elements in language.

Certain languages of Italy, the Oscan, Umbrian, Celtic, Messapian, and Etruscan, have affinities to the old Latin more or less close, and probably in this order, and these languages have substantially the same alphabet with it.

The remains of the Sabine and Oscan belong to a period when the Sabines had mixed themselves up with the conquered Ausonians, and had learned their language; of this we have certain specimens, therefore properly called Sabello-Oscan. The most important of these are the *Bantine Table*, the *Cippus Abellanus*, and the *Tablet of Aquane*. The Bantine Table, now in the Museo Borbonico, is a bronze tablet found in 1793 at Oppido, on the borders of Lucania, and called *Tabula Bantina* from the name *Bantia* in the inscription, which seems to refer to the neighboring

city of *Bantia* in Apulia. The Cippus Abellanus, a stone tablet, was moved from Avella Vecchia to the modern village till in 1745 it was noticed and removed to the museum of Nola. The bronze tablet of Agnone was so called from the place near which it was found in 1848. Among these remains we find the following: *ausai* = are, *amoi* = matri (comp. Heb. *im*, out — at, ante; inter, com = cum (præp.), *dehassio* = dictari, *dioeri* = Jovi, *dionpisi* = lymphis, *etlud* = extra, *estud* = esto, *horto* = hortum, *ist* = est, *keis* = civis, *ligatais* = legati, *likital* = liceto, *mais* = magis (comp. Fr. *mais* and It. *mai*), *nap* = nec, neque, *ni* = ne, *patrei* = patri, *pon* = cum (i. e., quum), *pos* = que, *præ*, *præter* = præter, *sachtham* = sacrum, *senatis* = senatus, *seai* = si, *terom* = terra, *viam* = viam.

The relics of Umbrian are contained on seven tables in a state of perfect preservation. They were discovered in 1444 in a subterranean chamber at La Schieggia, near the ancient city of *Iguvium*, now *Gubbio* or *Ugubio*, and hence styled the *Iguvine* or *Ugubine* Tables. *Iguvium* lay at the foot of the Apennines, near the Via Flaminia, and is known to have been an old Umbrian town; this circumstance is the foundation of the belief that these tables are specimens of the Umbrian tongue. They relate chiefly to matters of religion, and are written, some in Umbrian or in Etruscan, and others in Roman characters. Lepsius infers that the former were written not later than A. V. C. 400, and the latter cir. A. V. C. 550. The Umbrian, being subjected to disturbing causes not unlike those which at a later period affected the Latin, exhibits some of the characteristics of the Romance tongues. We find the ending -o for -um; *a* and *d* final are constantly dropped; there is a tendency to substitute liquids for mutes; and *o* is softened to *u*. Examples of Umbrian words are: *ager* = ager, *akta* = actutum, *alba* = albus, *ander* = inter, *asa* = ara, *avvis* = avibus, *benes* = venies, *diam* = dicere, *est* = est, *esta* = esto, *fur* = fur, *futo* = futum, *ferine* = ferina, *fetu* = facito, *frater* = frater, *pater* = pater, *ife* = ibi, *krastur* = quæstor, *manu* = manus, *mentu* = magister (comp. It. *maestro*), *mais* = magis, *nap* = nec, neque, *namen* and *nome* = nomen, *numen* = numerus, *ore* = ore, *pir* = pîp, *fice*, *puplus* = populus, *res* = res, *sakre* = sacrum, *seut* = sunt, *sif* = sues, *sema* = cena, *tafle* = tabula (comp. Fr. *table*), *tra* = trans, *wikum* = cum ore (with this *kum* enclitic comp. *meum*, etc.; It. *meco*, etc.).

While the relation of the Celtic to the early Latin is very obscure, yet there is reason to believe that the relation was important in earlier, as we know it to have been in later, times. The Celts had preceded all other races in the westward movement: they are mentioned even by Herodotus as living beyond the Pillars of Hercules, and they had filled the Transalpine plain probably soon after the time of the Tarquins. There must have been a substratum of Celts in Italy at a very early period; for ancient authorities assert their connection with the Umbrians, and this fact is indicated by the name of their country, *Umbria*, and of their chief river, *Umbro*, compared with *Humber*, *Cynari*, and the like. The Celts are known also to have occupied the neighboring Liguria. A great authority, Schleicher, is of the opinion that the Celtic and the Latin were more closely connected in pre-historic times than the Latin and the Greek. We subjoin a comparative list of a few out of the many Celtic words connected with the Latin; and though, as we have said above, the priority of the one to the other cannot be made out, they present an element sometimes only obscurely related to the Greek, and sometimes quite independent of it: *ailh* = alius, *ar* = ad (cf. *ar* in *arbitr*, *arcesso*, etc.), *artha* = arum, *ar* = area, *arm* or *are* = arma, *caint* = cantus, *caveri* = cantor, *car* = amicus (comp. *carus*), *caus* = casus, *claidib* = gladius, *era* = error, *eust* = eutis, *dant* or *dent* = dentes, *din* = deus, *di* or *dia* = dies, *fuith* = vates, *fuor* or *vir* = vir, *fin* = finis, *forch* = furen, *gare* = gravis, *laten* = latro, *leha* = lex legis, *loch* or *loit* = lac lacus, *loch* = lacus, *ore* or *ni* = ego, *me* = monadh = mons montis, *mor* or *muir* = more, *nead* = nidus, *ni* = nos, *nuth* or *noel* = nulus, *numair* = numbir, *ober* = operari, *oi* = ovis, *ors* = ursus, *our*, *our*, or *or* = aurum, *ubh* = ovum, *patu* = patris, *pon* = quando, *plom* = plumbum, *por* = puer, *rig* or *rey* = rex regis, *roith* = rota, *sace* = sacer, *stain* = stannum, *taish* = taurus, *te* or *ti* = tu, *te*, *tir* = terra, *tra* = trans, *teg* = duo.

The Messapians or Iapygians were settled in the S. of Italy. Scanty fragments of their dialect are found pretty frequently in the Terra d'Otranto; they are in Greek letters, and almost always written from left to right. This dialect seems to have preserved the Luthuanian elements with little change; and subjected to no influences but that of the Greek colonists, into whose idiom it was rapidly absorbed, it may be regarded as a pure remnant of the old Italian. Some Messapian words that have come down to us with their meanings are: *panis* = panis, *Βραειδος* (whence *Brundisium*) = cervus (comp. Lith. *brėdis* = elk), *Βαυρια* = domus (comp.

Gr. *baion* = to build, and Eng. *lower*); and among the words in the inscriptions we find *INΘI* = inde, and *ΜΟΡΚΟΖ* = Marcus.

The Etruscans were called, by the Greeks, *Tyrrheni* and *Turseni*; by the Romans, *Tusci* and *Etrusci*; and by themselves, *Raséna* or *Rasenna*. According to Herodotus, the Tyrrheni were originally Lydians, who during a grievous famine sought a new home, and under Tyrrhenus came to the country of the Umbrians (*Ουββακοί*), which was thence called after him *Tyrrænia*. All that modern research is as yet able to say of their origin is, that they were a foreign people that came by sea, and that they were akin to nations of Greece and Asia Minor. Their language, which has been preserved in a great number of inscriptions on monuments and fictile vessels, has exercised the ingenuity of scholars with small results as yet. The longest of these inscriptions is one of forty-six lines from Perugia. Their alphabet is the medium through which the Oscans and Umbrians seem to have derived their characters. The inscriptions are written in almost all cases from right to left, according to the Semitic and the most ancient Greek custom. Various theories on the origin of the Etruscan language have been propounded. Dr. Donaldson has attempted to prove its Scandinavian or Low German character; Padre Tarquini and others, its Semitic affinities; but at present all that can be asserted with confidence is the Pelasgic or old Greek character of the language. What was wanting to enable scholars to form a certain or highly probable judgment was a critical examination of all the remains of the language; and this the learned Corsen has happily now furnished us in his great work *Ueber die Sprache der Etrusker* (Leipsic, 1871-75). We give the following specimens of Etruscan words: *achr* = ager, *āpos*, *antes* = ventus, *āpos*, *ank* = ac, atrium, atrium, *av* = avum, *āiv*, *baltra* = balteus, belt, *cana* = cantor, *capra* = capra, *cassis* = cassis; *car* = mors (comp. *καρ*), *clan* = filius vel filia (comp. Gael. *clann*), *clauans* = equus (comp. the Homeric *ἵππδαρος*), *emi* = sum (comp. St. *ami* and Gr. *εἰμι*), *hister* = histrio, *itus* = idus, *lar* = dominus (comp. *lar*), *malu* = malus, *napos* = nepos, spend-thrift (Festus 9, 14), *usil* = sol (Sabine, *ausil*), *veas* = pîp, Umbr. *pir*; and the following proper names: *Alpnae* = Albinus, *Apia* = Apollo, *Caiia* = Caius, *Menra* = Minerva, *Herle* = Heracles, *Tite* = Titus, *Vipia* = Vibia.

*The Alphabet.*—The Semitic alphabet had originally 16 characters; the Oscan and the Umbrian had 20 each; the Etruscan 19; and the old Latin, 21. The Etruscan letters seem to be a modification of the Greek, with some new characters. The Italian alphabets from the first contained *Y*, *Z*, *Φ*, *X*, which were invented, or at least newly applied, by the Greeks. But beside this Greek alphabet borrowed from the earliest Hellenic settlers, there was a later set of Greek characters, which the Latin derived from the Greeks of Cumæ, probably under the Tarquins, when there were special relations between Rome and Cumæ. But the Romans, showing in this their practical tendency, suppressed letters for which they had no sounds, as *Θ*, *Φ*, *X* (*ch*); they mostly dropped *K* as unnecessary, altered the shape of *C* for convenience, added *Y* and restored *Z*. For some time *C* represented both the medial (*k*) and the tenuis guttural (*g*), and then *G* was introduced by the freedman Sp. Carvilius (cir. A. V. C. 523), though Gaius and Grævus were to the last indicated by the abbreviations *C* and *CN*. In Cicero's time the number of letters was 21 (*De Deorum Nominibus*, 2, 23), but before his death *Y* (*y*) was introduced to transcribe Greek words, and *Z* was restored, and classical Latin confined itself to the use of the following 23 letters: A B C D E F G H I K L M N O P Q R S T V X Y Z, *J* and *U* being more modern devices to discriminate between the powers of *I* and *V* respectively as vowels and as consonants. The Greeks retained the names of the old Phœnician hieroglyphics, but the Romans dropped them, and named the signs, much as we do, by their sounds.

*The Old Latin.*—We have some interesting remains of the old Latin, considered as contemporary and akin to the old Italian dialects, such as it was before Greek civilization and culture had begun seriously to work upon it. For the earlier centuries we have only a few brief inscriptions of religious and legal import. As we approach the Punic wars the inscriptions become more numerous and complete, but we are here near the time when the Latin language began to be modified or to lose its proper characteristics under the pressure of Greek influence, and to be transformed into the idiom of the Augustan age.

One of the most important and ancient specimens of the genuine Roman language is the *Carmen Fatutius Arvalium*, the Song of the Arval Brothers, discovered on marble tablets in 1777, while workmen were digging out the foundations of the sacristy of St. Peter's at Rome. These tablets are probably not older than A. V. C. 330 (n. c. 219), but there is every reason to believe that the song itself is the



same that was sung in the earliest ages of Rome. Every word of this ancient hymn can be made out with a high degree of certainty. We here find *uos* (acc.) = *nos*, with which we may compare the *ὑμῶς*; *Lares* = *Lares*; *sinas* for *sinas*; *advocavit* for *ad vos capite*, which may be illustrated by the usage of comedy in after times; *berber* for *verber* or *verbera*; and *solus* for *solis*, with which we may compare *σέλας*, *ἥλιος*. Two relics of a similar character have been preserved by Cato. Further discoveries relating to the *Frates Arvales* were made in 1866 at the fourth milestone of the Via Portuensis, consisting of 72 lines containing the acts of the order (A. v. c. 754). Several fragments of the Salian Hymns also have been handed down by Varro. Fragments of the oldest Roman laws have been preserved by Varro, Pliny, and Festus, but the most copious as well as the most important are the remains of the *Duodecim Tabule*, the Twelve Tables. These were engraved on tablets of bronze, and publicly set up in the Comitium. A. v. c. 394 (b. c. 449); and it may be added here that the Romans had no other body of codified law till the time of Justinian, in the sixth century after Christ. Beside the tablets just mentioned, they have been preserved chiefly by Cicero, Varro, Livy, Pliny, Festus, Aul. Gellius, Varus, and Ulpian. The *Epitaphs of the Scipios* (A. v. c. 456-588) are very important and interesting specimens of early Latin. They are examples of a custom introduced from Greece, are the earliest dated inscriptions of any considerable length, and are very useful in settling points of archaic quantity. In these documents, *m* in the accusative and *d* in the ablative singular are generally wanting, but each occurs once; *s* in the nominative is sometimes added, sometimes omitted; and *consul* is written both *consol* and *cosol*. Some words are spelt indifferently with *o* and *u*, but the use of *r* between two vowels, for the earlier *s*, is invariable. The inscription of the *Columna Rostrata*, contained on a bronze tablet found at the foot of the Capitol in 1565, commemorates the naval victory of C. Duilius, A. v. c. 494 (b. c. 260). This preserves many archaic forms, such as *d* in the ablative, *C* for *G*, and single instead of double consonants. Ritschl, however, suspects that this inscription suffered a restoration, and that with forms that did not belong to the period of the victory. To these may be added the *Senatus Consultum de Bacchanalibus*, belonging to A. v. c. 568 (b. c. 186), and found in Calabria in 1640; and the *Lex Thoria de Agris*, or Agrarian Law of Sp. Thorius, passed, according to Rudorff, A. v. c. 613 (b. c. 111), which presents a specimen of the formal written language of the age immediately preceding that of Cicero.

CHARLES SHORT.

**Latin Literature.** The literature of Rome is less original and complete than that of Greece, with which it stands most closely connected, but it can hardly be said to be less important. For Roman law everywhere underlies the constitutions of Europe; the language of Rome is the parent of several of her chief tongues; her literature has always been the chief study of the schools; she has given to Christianity its nomenclature; and from her great power of assimilation and adaptation she has preserved to us whatever was most valuable of the Greeks, and probably of all other nations with which she came in contact.

The literary life of the Romans may be divided into three periods: (1) The Archaic Period, beginning A. v. c. 514 (b. c. 240), when Livius Andronicus exhibited the first regular drama in Latin at Rome; (2) the Middle Period, the Ciceronian and the Augustan age, which begins A. v. c. 671 (b. c. 83); (3) The Imperial Age, beginning A. d. 14.

**The Archaic Period.**—The earliest literature proper of the Romans, as of other nations, was poetic, and the earliest author Livius Andronicus, A. v. c. 470-550. He translated the *Odyssey* of Homer into Saturnians, and also rendered from the Greek tragedies, imitating the easier Greek metres. Cn. Nevius began to exhibit plays A. v. c. 519, and with more originality than Andronicus. T. Maccius Plautus (c. A. v. c. 500-570) was a prolific writer of comedy. Of the plays ascribed to him, twenty-one were considered certainly genuine, of which we have twenty, more or less complete, and nineteen others were probably genuine. He borrowed his plots from the Greeks, but worked them up and with great ability. His measures are skilfully handled, and sometimes with harmonious effect; his diction is of great importance in the history of Latin. His plays long maintained their popularity, and have been extensively studied and imitated in modern times. Q. Ennius (A. v. c. 515-585) had a higher social and political position than the literary men that preceded him, and was the first to attain the full privileges of a Roman citizen. Cicero was very fond of him, and largely quoted him in his writings, and Horace styles him *Pater Ennius* as the founder of Latin poetry. His greatest work was the *Annales*, or history of his nation, from the arrival of *Æneas* in Italy down to the poet's own time. He also wrote tragedies, mostly after

Euripides, and *Satura*—that is, probably, miscellaneous poems in various measures. We possess them only in fragments. M. Pacuvius (c. A. v. c. 534-622), the nephew of Ennius, was a painter and a poet. There are extant fragments of his tragedies imitated from Sophocles; we have the titles of twelve of his plays. To this period belong Statius Cæcilius, an able imitator of the Greek New Comedy, and Lucius Lavinius, the rival of Terence, against whom all the Terentian Prologues are directed except that of the *Hecyra*. P. Terentius (A. v. c. 569-595) at an early age came from Carthage to Rome, where he was a slave of the senator Terentius, by whom he was educated and set free. He was intimate with Scipio Africanus the Younger, and hence the rumor that Scipio was the author or elaborator of the plays of Terence. We have of him six comedies, and probably these are all that he wrote. They were great favorites with the ancients, as they have been with the moderns. He has not the versatility of Plautus, neither has he his extravagance; his verse is not so varied, but it is more melodious; his language is truly Roman, and his phrases often reappear in the best works of the best period of the literature. His plays also have often been imitated in the modern drama. Roman prose, like English, was reached by an intermediate step, the earliest Roman historians employing the Greek language. These were Q. Fabius Pictor (c. A. v. c. 525) and L. Cincius Alimentus. M. Porcius Cato (A. v. c. 520-605) was the first real Latin prose-writer. His writings were numerous and various. He wrote *Origines* in seven books, an account of the Italian tribes, and published instructions on agriculture, health, and eloquence, but only his *De Re Rustica* has been preserved entire. There were orators of this period, as Fabius Maximus, M. Cornelius Cethegus, the Gracchi, and others; and also jurists, as Sextus Ælius, who wrote the first Roman treatise on law. L. Attius or Accius (A. v. c. 584-c. 650) wrote tragedies after the Greek, and dealt also with pure Roman subjects. He wrote other works, and resembled Ennius in the varied character of his writings, but he was more polished and accurate in style. L. Afranius (b. c. A. v. c. 605) wrote *Fabula Togata*, of which we have the titles. He combined the popular manner of Plautus with the elegance of Terence. C. Lucilius (c. A. v. c. 606-651) was the father of satire proper (*Hor. S. ii. 1* and *10*). His writings of this class were numerous, of which we now have upwards of 800 fragments, very valuable in the study of early Latin. An important literary work of Sulla's time, and one much copied and used in the Middle Ages, has come down to us in the *Rhetorica ad Herennium*, a complete manual adapted from Greek sources. It is by an unknown hand.

**The Middle Period.**—This is the Golden Age of Latin literature, and may be subdivided into two periods, in the first of which, the Ciceronian, prose culminated; and in the second, the Augustan, poetry was pre-eminent.

**The Ciceronian Age.**—M. Terentius Varro (A. v. c. 638-727), styled by Quintilian *vir Romanorum eruditissimus*, of ancient family and senatorial rank, was an extensive writer, versatile in matter and in form. The total number of his works was seventy-nine, of which four were written in verse. His prose writings embraced literature, eloquence, history, jurisprudence, grammar, philosophy, geography, husbandry, and other subjects. M. Tullius Cicero (A. v. c. 648-711) was born near Arpinum in Latium; his father was a Roman knight. He was endowed with great talents, had iron industry, was kind and generous in his disposition, and cherished the loftiest aims. His tone of mind qualified him to become the interpreter and transplanter of Grecian culture and refinement. He was a true patriot and full of good intentions, but was without calmness and that courage which might have carried him safely through all the dangers and distractions which beset him. Cicero possessed, to a marvellous degree, that Roman power of appropriating and assimilating foreign ideas to which we have adverted. He thus enriched Roman literature by introducing into it several new departments not previously attempted. He became the creator of a standard prose so refined and so suited to the genius of the Latin language that it was never afterwards surpassed. The real business of Cicero's life appears in his legal and political speeches, and here his ability shows to the greatest advantage; the knowledge and experience gained in this career were turned to the highest account in the rhetorical treatises which he composed toward the end of his life. His later compositions also included political science, ethics, the philosophy of religion, and theoretic philosophy. Beside all this, his extensive personal connections and his social disposition led to a voluminous correspondence. Of his speeches, fifty-seven have come down to us; we have twenty in fragments, and we know of thirty-three more delivered by him, making in all 110. Of these, the most famous are those against Catiline, for Milo, against Verres, and the second against



Antony (*Tac., Dial. de Or.*, 37; *Juv., Sat.* 10, 125 *seq.*). In the case of Verres, Cicero prosecuted, and Hortensius, his great rival, defended; and Cicero by his success became head of the bar, *rex judiciorum*. The extant rhetorical works of Cicero are—*Rhetorica*, or *De Inventione*, an immature work; *De Oratore*, written A. v. c. 699, composed, after the manner of Plato, in a dialogue, and between the two greatest orators of the preceding period, L. Crassus and M. Antonius, and several others; this work is one of the most elaborate productions of Cicero, varied in its contents and grand and eloquent in style; *De Claris Oratoribus*, or *Orator*, a history of Roman eloquence; *Orator ad M. Brutum*, Cicero's last word on rhetoric, giving his ideal of an orator; *Partiones Oratorie*, a sort of catechism of rhetoric; *Topica ad C. Trebatianum*, an explanation of Aristotle's *Topica*, written down from memory during a sea-voyage—a marvellous feat; *De Optimo Genere Oratorum*, forming the introduction to his translation of Demosthenes' and Aeschines' speeches for and against Ctesiphon, which translation is lost. The four collections of letters that have come down to us, if we count in ninety addressed to Cicero, contain altogether 864, and are a treasure of contemporaneous history, and on some matters the sole authority extant. They consist of—*Ad Familiares*, 16 books (A. v. c. 691-711); *Ad Atticum*, 12 books (A. v. c. 686-711); *Ad Quintum Fratrem*, 3 books (A. v. c. 691-700); *Ad M. Brutum*, 2 books (questioned by Markland, *Lond.*, 1715; defended by C. F. Hermann, Götting, 1844). Cicero studied philosophy originally to perfect himself as an orator, and in his later years wrote on the subject partly as a matter of ambition, and partly as a solace amid his troubles and in the thoughtfulness of declining life. Admirable as the matter sometimes is, and important as it sometimes is from the circumstance that it is our only means of knowing the system or view in question, the form is scarcely less admirable or important. Being the first Roman writer who treated philosophical subjects in a clear and elegant manner, he created the philosophical style in Latin. The following is a list of his extant works in this department: *De Republica*, 6 books, of which scarcely a third has reached us; *De Legibus*, probably in 6 books originally, of which we now possess only three and some fragments; *Paradoxa*, an exposition of six striking maxims of the Stoics; *Consolatio*, on his daughter's death, of which only fragments exist; *Hortensius*, on the praise of philosophy, now fragmentary; *De Finibus Bonorum et Malorum*, in 5 books, a compilation on the doctrines of the Greek sects concerning the Supreme Good and Evil, perhaps the most carefully elaborated of all his philosophical works; *Academica*, or doctrines of the Academy, originally in 2 books, afterwards rewritten in 4 books; we have now the second book of the 1st ed., and of the 2d ed. the first part of the first and some fragments; *Tusculanae Disputationes*, in 5 books, on certain metaphysical and moral points; *Timaeus*, a free rendering of Plato's dialogue of this name; *De Deorum Natura*, in 3 books, mainly excerpts from the Greek philosophers on this subject; *Cato Major*, or praise of old age, containing materials drawn from Plato, Xenophon, and others, with a careful delineation of Cato's character, finished in style and important in matter; *De Divinatione*, in 2 books, a supplement to *De Deorum Natura*; *De Fato*, now in mutilated form, attacking the views of the Stoics and defending those of the Academics; *Laelius*, or praise of friendship, largely drawn from Greek sources, composed in a highly interesting manner; *De Gloria*, in 2 books, read by Petrarch, but since lost; *De Officiis*, in 3 books, addressed to his son to form his morals, hastily written and practical, containing some just and profound views and enlivened by illustrations from Roman history. In the department of jurisprudence he wrote *De Jure Civili*. He made some attempts in history, as *Commentarius Consularis Scipionis Africanus*, which are lost. In poetry this great prose-writer, like our Jeremy Taylor, was little more than a versifier, and only subjected himself to the ridicule of the great poets, as Juvenal (*Sat.* 10, 124 *seq.*) and Martial (2, 89, 3 *seq.*). Cicero's freedman and friend, Tiro, survived him, and published his orations and letters. C. Julius Caesar (A. v. c. 634-710) had the most varied talents; he was second as an orator only to Cicero—was a historian, a grammarian, a great statesman and general. Of his literary works the most important has come down to us, *Commentarii de Bello Gallico*, in 7 books, and *De Bello Civili*, in 3 books; and after his death the last year in Gaul and the Alexandrine, African, and Spanish wars were narrated by his friends, the first two by A. Hirtius, and the last two by some unknown hand. Caesar's style is a model of simplicity, precision, and directness, with little rhetorical ornament. Cornelius Nepos (A. v. c. 660-730), the friend of Cicero and Atticus, and also of Catullus, was a somewhat voluminous writer of history and biography, but only a portion of his *De Viris Illustribus* is extant. His style is graceful, but deviates in some points from classic

usage. T. Lucretius Carus (A. v. c. 650-699, in his *De Rerum Natura*, in 6 books, treated of physics, of metaphysics, and the Epicurean ethics, in imitation of Empedocles and Ennius. This work is important as being the fullest exponent of the doctrines of Epicurus, and though written in an archaic style, it was composed with great mastery of thought and expression. He received little attention in his own age, but the Augustan poets admired and copied him. He has been fortunate in his treatment in modern times, having been edited by the great Lachmann (Berlin, 1850-66) and by a consummate English scholar, Mr. Munro (Camb., 1860-73). C. Sallustius Crispus (A. v. c. 667-720) devoted the last years of his life to history. Of his works we have *Bellum Catilinarianum* and *Bellum Jugurthinum* complete; of his *Historie*, in 5 books, we have only fragments. He was the first Roman historian who wrote according to fixed rules. Like his great model, Thucydides, he was sententious and concise, sometimes even to obscurity. He deviated from the usages of his time, perhaps largely through hatred of Cicero, and affected archaic diction. C. Valerius Catullus (A. v. c. 667-700), called by Teuffel the greatest lyric poet in Latin, and by Niebuhr the greatest poet Rome ever possessed, except perhaps some few of the earlier ones, followed at first the track of the Alexandrine poets, but afterwards developed rich lyrical talent which was ripened by love and a bitter experience of life. The 116 pieces that have come down to us refer to such a variety of topics, are composed in so many different styles and metres, that it is hardly possible to classify them. Some are strictly lyrical, one is a legendary heroic, four may be called elegies, and several epigrams. His genius adorned whatever it touched, but it is every way to be a matter of profound regret that many of his poems are defiled by gross coarseness and sensuality. P. Vergilius Maro (A. v. c. 684-735), by way of eminence the Roman poet, was alike distinguished for ability, learning, delicacy, and amiability. His extant poems are, ten *Elegie* or bucolics, imitations and partly translations of Theocritus; *Georgica*, in 4 books, in which he partly availed himself of his own experience in youth and partly drew on the Greek writers, especially on Xenophon and Hesiod, and partly on the Roman writers *De Rebus Rusticis*; the masterly diction of this work makes it the most perfect Roman poem as a work of art; the *Æneid*, in 12 books, on which Vergil spent the last ten years of his life, and dying regarded as in an unfinished state. In this poem, which has taken its place among the great epics of the world, Vergil partly availed himself of Greek models, and partly relied on his extensive studies in Italian legends, history, and localities. Beside these undoubtedly genuine works, we have several *Carmina Minora*, perhaps wrongly attributed to him. As to the form of his name, the inscriptions of the time of the Republic and of the first centuries of the Christian era are in favor of *Vergilius*; the earliest dated instance of the use of the form *Virgilius* belongs to the fifth century after Christ. Q. Horatius Flaccus (A. v. c. 680-716) has shared with Vergil the greatest popularity among all the Roman poets. The branch of poetry he first cultivated was satire; of this we have two books or eighteen pieces; his *Epodon Liber*, of about the same date, a sort of satire of a more special character, contains seventeen pieces. He afterwards resolved to transplant Alcæus and Sappho into Roman soil, and the result is the three first books of the *Carmina* or odes, to which he added a fourth after an interval of about six years. These are the most elaborate of all his works. The *Epistole*, 23 in number in 2 books, are of the same general character as the *Satire*, but being written in the maturity of his learning and ability, have higher qualities and are in a more perfect form; the third of the second book, the *Ars Poetica*, treating of æsthetic questions in the Greek style, is the most famous of the *Epistole*. Albius Tibullus (A. v. c. 700-735) followed the Alexandrine poets in his choice of amatory subjects; his representations are natural and his style very simple. We have four books of *Elegie* under his name, of which the third is by an imitator of Tibullus; Lygdamus is his real or fictitious designation. Sextus Propertius (A. v. c. 705-730) was also an elegiac poet, and a disciple of the Alexandrines, learned and often obscure, but lively and original. He has left five books of *Elegie*. P. Ovidius Naso (A. v. c. 711-770), the most prolific of the great poets of Rome, was carefully bred as a plebeian, but from external bent turned off into the path of poetry. The following are his works now extant: *Heroides*, 21 letters in elegiac verse, feigned to have been written by ladies or chiefs in the heroic age; *Libra* A. v. c. 19, elegies, chiefly amatory pieces; *Tristia*, a collection of elegiac poems in elegiac verse; *Remedia Amoris*, of the same character and form; *Metamorphoses*, a collection of the most remarkable fables of classic mythology, in dactylic hexameter; *Festorum Liber* A. v. c. 1, an exposition in elegiacs of the festival and



the Roman calendar; *Tristium Libri V.* and *De Ponto Libri IV.*, the former consisting of 50 elegies and the latter of 46, describing his sufferings on his way to exile and while he was in exile; *Ibis*, a poem in elegiacs written against an enemy whose name is concealed; *Halcyonion*, a fragment in hexameters on fishes. Ovid had a most fertile mind, possessed great mastery of form, and treated his subjects with inimitable ease and grace, and had been as refined as Vergil, he would have rivalled him in fame. T. Livius of Patavium (A. v. c. 695-770) was the most important prose-writer of the Augustan age. He wrote on philosophy and on rhetoric, but his great work was his *Ab Urbe Condita Libri*, or history of Rome from the foundation of the city to A. v. c. 745, in 142 books, of which only 35 are extant, being the first decade and books 21-45; but we have a summary, *Periochæ*, of most of the lost portion. For his matter he drew especially on Polybius and the later annalists; but his manner, eminently natural and lively, of relating events and of depicting moods and characters, was his own. His diction was wanting in strict classical Latinity, and its provincial characteristics were designated as *patavinitas* (Quint. 15, 55). Justinus, who, with Florus, probably lived in the age of the Antonines, abridged the *Universal History* of Trogas, a work in 44 books, written in the age of Livy. Vitruvius Pollio composed (c. A. v. c. 740) *De Architectura Libri X.*, and dedicated it to Augustus.

The Imperial Age, the Silver Age of Roman Literature. The First Century, A. D. 14-117.—M. Velleius Paterculus (A. D. 30) treated the history of the Empire in his abridgment of Roman history in two books. His words are classical, but his style is affected and pompous. To the same period belongs Valerius Maximus, whose *Factorum et Dictorum Memorabilium Libri IX.*, addressed to Tiberius, is a compilation made without taste or discrimination. A. Cornelius Celsus, of the time of Nero, wrote on various practical matters, and composed an encyclopædia, of which the eight books treating of medicine alone have reached us. Phædrus, partly under Tiberius and partly under his successor, published his book of *Æsopæan Fables* in good iambic senarii, and in good literary style. L. Annaeus Seneca (c. A. v. c. 750-A. D. 65), the most brilliant figure of his time, in genius and culture may be compared with Ovid. His works were on a great variety of subjects, but composed with an aim to brilliancy rather than accuracy. Many of them are known only in fragments or by quotations. Among those extant may be mentioned *Epistulæ ad Lucilium*, *Apocolocyptosis*, a satire upon Claudius, and *De Beneficiis*. We have also as attributed to Seneca certain epigrams and tragedies. The latter, eight in number, agree in the main with one another and with the prose works of Seneca. Q. Curtius Rufus, under Claudius, wrote *Historiæ Alexandri Magni*, in 10 books, the two first of which are lost. He is rather a rhetorician than a historian, and in his style somewhat resembles Seneca. Contemporary with Seneca was Columella of Gades, who wrote *De Re Rustica*, in 12 books. Under Caligula or Claudius, Pomponius Mela wrote his *De Chronographia*, in 3 books, the earliest geography we possess. A. Persius Flaccus (A. D. 34-62) wrote some compositions that have been lost, and six satires, which are mostly reflections on tenets of the Stoics, with extensive employment of Horatian words and phrases. M. Annaeus Lucanus, a friend of Persius and nephew of Seneca (A. D. 39-65), wrote on various subjects in prose and verse. We have his *Pharsalia*, in 10 books, an unfinished epic on the civil war between Pompey and Cæsar. It is historically accurate, but the style is artificial and pathetic, possessing great beauties and great defects. In Nero's time arose that ethical novel which we have under the name of Petronius Arbiter. Originally a large work, it is now a heap of fragments, the largest of which is the *Cena Trimalchionis*. C. Plinius Secundus, Pliny the Elder (A. D. 23-79), an officer and inspector of finance, was also a person of great and diverse literary activity. Of his works there is extant only his *Naturalis Historia*, in 37 books, a sort of encyclopædia of natural science. It was compiled from a great number of authors, and is admirable for its extent, but bears marks of haste, and is composed in an uneven style. It long enjoyed great authority. The only poet of the time of Vespasian that has come down to us is Valerius Flaccus, whose *Argonautica*, in 10 books, is an imitation of Apollonius of Rhodes. The style is pretentious and the phraseology mostly derived from Vergil. Under Domitian wrote C. Silius Italicus (A. D. 25-101), originally a politician, then a literary man. He wrote the *Punica*, a poem in 17 books, deriving his matter from Livy and Polybius, and in style imitating Homer and Vergil. At the same period (c. A. D. 45-96) lived P. Papinius Statius. His earliest and largest work was the *Thebais*, in 12 books, drawing on Antimachus for material and following Vergil in form; he left his *Achilleis* unfinished; his *Silvæ*, in 5 books are very interesting, forming valuable sketches of

the time. Mostly under Domitian also lived M. Valerius Martialis (c. A. D. 42-102); we have by him fifteen books of epigrams, turning on the social life of Rome in those days, with all its grossness and servility. Martial appears in these writings almost equal to Ovid in ease and elegance of poetic form, but sinks quite below him in moral degradation. M. Fabius Quintilianus (c. A. D. 35-95) holds a high place among the prose-writers of this period. Educated at first for the bar, he afterwards became the most distinguished teacher of eloquence in Rome. He composed a work on the causes of the decay of oratory, which is lost; we happily still possess his great work *Institutio Oratoria*, in 12 books, on the complete training of the orator. This work is very valuable for its matter, and treats the subject in an interesting and judicious manner. Quintilian was sensitive to the faults of the diction of his period, and continually reverts to the earlier and better usage, never wearying of praising and recommending Cicero; but Quintilian's own style seems artificial and ungraceful to the admirers of that consummate writer. Sextus Julius Frontinus (c. A. D. 40-103), a distinguished engineer, has left records of his experience and studies; we have extant *Strategemata*, a work on tactics, and *De Aquis Urbis Romæ*, in 2 books, written in a concise and refined style. The most eminent poet of the time of Trajan is D. Junius Juvenalis (c. A. D. 47-130), who turned from the study of oratory and the pursuits of war to the study of poetry. We have by him sixteen satires, the last of which betray the infirmities and faults of age. The earlier satires depict the vices of Roman society in a manner always interesting, and sometimes horribly vivid. His style is concise, energetic, and always suited to his theme, only he indulges now and then in a flash of sarcastic wit even in his most grave passages. Among the prose-writers of the time of Trajan, the first place has been conceded to C. Cornelius Tacitus (c. A. D. 54-119). His extant works are *Dialogus de Oratoribus*, composed with a fullness and grace not found in Tacitus's other writings; *Agriicola*, a valuable biography of his father-in-law, reminding us by its manner now of Sallust, now of Cicero; *Germania*, written in a sympathetic spirit and with a high rhetorical coloring; *Historiæ*, a narrative chiefly of the Flavian dynasty (A. D. 69-96), originally in fourteen books, of which only the four first and the first half of the fifth have come down; *Annales*, or *Ab Excessu Divi Augusti*, in 16 books, a history of A. D. 14-68, of which we now have only the first and the last third. His style is very peculiar; it is concise often to harshness, audacious in its irregularities, and withal of a poetic coloring; it is commonly sententious, but on special occasions grand and sonorous, and then reminds us of the best periods rounded by the hand of Cicero. C. Plinius Cæcilius Secundus, Pliny the Younger, nephew and adopted son of Pliny the Elder (A. D. 62-113), was a fluent, smooth, and interesting writer. We have of him the speech in which he returned thanks to Trajan for the consulate, commonly called *Panegyricus*; *Epistulæ*, composed with a view to publication, in 9 books; and *Epistulæ Plinii et Trajani*, in an unfinished state.

The limit assigned to this article allows us to add scarcely more than the chief names of the rest of the Imperial Period.

Of the second century of our era are Suetonius, the author of the *Lives of the Twelve Cæsars*; Florus, who wrote an abridgment of Roman history; Terentius Scaurus, the grammarian; the historian Appian, who wrote in Greek; the jurists Ulpian and Gaius; the critic Aulus Gellius, author of the *Noctes Atticæ*; Appuleius, author of the *Metamorphoses*; Minucius Felix, whose *Octavius* is the earliest extant work of Christian Latin literature; Tertullian, a defender of Christianity; Acron and Porphyrius, the classic commentators; the *Versio Vetus* of the Bible, afterwards revised and called the *Vulgata*. In the third century we find the jurists Ulpian and Julius Paulus; Cyprian, bishop of Carthage, chiefly an apologist; Nonius the lexicographer; Terentianus Maurus, a writer on metres; Arnobius, a Christian apologist, and Lactantius his pupil, the most elegant of all the Christian Latinists. To the fourth century belong the grammarians Victorinus and Donatus; Eutropius the historian; the theologian Hilary; the poet Ausonius; Damasus, one of the earliest writers of Christian hymns; Ammianus the historian; the grammarian Servius; St. Ambrose, whose hymns approach classical perfection; St. Jerome, the translator of the Bible and reviser of the earlier version; Prudentius, the greatest of the Christian poets; Claudian, the last classic poet; and St. Augustine, the theologian, the greatest of the Latin Fathers. This period, the period of decay, cannot well go beyond the time of the philosopher Boethius, c. A. D. 500, and certainly not beyond the age of Justinian, under whom the great *Corpus Juris* was drawn up, in the middle of the sixth century.

CHARLES SHORT.



**Latînus**, a king of Latium, was, according to the common tradition, a son of Faunus and the nymph Marica, and the father of Lavinia, whom he gave in marriage to Æneas. But besides this there were many other different traditions concerning his descent and history.

**Lat'itude**, on the earth, is the distance of a place from the equator measured on the meridian passing through the place, and expressed in denominations of circular measure. To the ancient geographers the largest dimension of the known world was that which lay in the direction E. and W. Hence distances measured E. or W. from a meridian assumed as an axis of reference were called longitudes (Lat. *longitudo*, "length"), and those measured in the transverse direction, latitudes: Lat. *latitudo*, "breadth". Geographical latitude is the angle made by the vertical (or perpendicular to the horizon) at the place and the plane of the equator; but as the earth is not truly spherical, this vertical is not usually coincident in direction with the radius drawn to the place from the earth's centre. The angle made by this radius with the plane of the equator is called the geocentric latitude. Geographical latitude is also the angle made by the horizon of the place (which is the plane touching the earth at the place) and the horizon or tangent plane of that point of the equator in which the meridian of the place cuts it; and as this last plane is necessarily parallel to the earth's axis, it follows that the latitude of a place is equal to the angle which its horizon makes with the earth's axis, and that the elevation of the pole above the horizon is equal to the latitude of the place. Hence, if there were a star situated truly in the pole of the celestial sphere, the latitude of any place at which such star could be seen could be determined by the simple observation of that star, correction having been made for the effects of refraction, aberration, and nutation. As the star called the pole-star is not truly in the pole, when it is observed for latitude further and more important correction is necessary for its position at the time of observation relatively to the true pole. A meridian observation of any star or other celestial body, whose declination (distance from the equinoctial or celestial equator) at the time of observation is known, affords an easy means of determining latitude. Meridian observations of stars passing near the zenith furnish the most satisfactory results, being hardly perceptibly affected by refraction. Observations of celestial bodies out of the meridian may also, with proper auxiliary data, be used for ascertaining latitudes, the varying conditions presenting several distinct problems in spherical astronomy.

Latitude in the heavens is the distance, in angular measure, of any celestial object from the ecliptic, or plane of the earth's orbit, measured on a secondary (that is, a circle perpendicular) to the ecliptic. The latitude is geocentric if given as it would seem if observed from the centre of the earth, and heliocentric if given in like manner as if observed from the centre of the sun.

F. A. P. BARNARD.

**Latitudinarians**, a former Broad-Church party in the Church of England. Their chief seat was Cambridge, and the reign of Queen Anne was their most flourishing period. The Latitudinarians attempted to unite the Puritan and Presbyterian elements with the national Church. They were strongly Protestant and Low Church in their feelings, and generally Arminian or indifferent in doctrine. Burnet, Whiston, Tillotson, Chillingworth, Cudworth, More, Gale, and Wilkins were among their greatest names. The modern Broad-Church party is also called Latitudinarian.

**La'tium**, during the Roman empire the most fertile and most densely peopled province of Italy. Its undulating plain, rising from the Mediterranean to the Apennines, produced the choicest wines, and contained, besides Rome, the capital of the empire, many populous and flourishing towns; as, for instance, Alba Longa, Tusculum, Ardea, Lavinium, Antium, and Corioli. By neglect the water-courses and the whole draining system of the plain fell into disorder, and thus the whole coast-district between Antium and Terracina was transformed into an unproductive and pestiferous swamp, known as the Pontine Marshes.

**Latona** [Gr. *Leto*], in Grecian mythology, the mother of Apollo and Diana (Artemis) by Jupiter (Zeus). Pursued by a serpent sent by Juno (Hera), she fled from place to place, until at last she found rest on the floating island of Delos, which Jupiter fixed firmly for her, and where she bore him two children. Although the myths relating to her were much enlarged by later writers, no special worship was ever instituted for her, and she had no temples of her own.

**Latour d'Auvergne**, de THÉOPHILE MALE CORBIET, b. at Carhaix, Brittany, Nov. 23, 1743; educated at the college of Quimper; entered military service in 1767; served for some time in the Spanish army, and distinguished himself in 1782 at the siege of Port Mahon; was a captain at the outbreak of the Revolution; fought with brilliant success in the republican armies of the Alps and the Pyrenees,

and became the commander (although still retaining the simple title of captain) of a vanguard of 8000 men, composed of all the companies of grenadiers, which soon became famous as "the infernal column," and more than once decided the battle by its irresistible impetuosity. In 1795 he retired from service on account of ill-health, and making a sea-voyage he was taken by an English cruiser and held as a prisoner of war till 1797. He re-entered the army as a substitute for the last son of one of his friends; fought under Massena in Switzerland, and then at the head of his own company in Germany, where he fell at Oberhausen, Bavaria, June 27, 1800. His indomitable courage, his noble pride, and the generosity and simplicity of his character made him the idol of the soldiers. After his death his heart was embalmed and carried in a silver vase by his company, and his name continued to be called at roll till 1814, the oldest sergeant answering, "Died on the field of honor." He had a passion—not unsuccessful—for linguistic studies, and published in 1792 *Novelles Recherches sur la Langue, l'Origine et les Antiquités des Bretons*, which was reprinted in 1802 under the title *Origines Gauloises*.

**La Trappe**, a retired valley in the department of Orne (Normandy), France, 8 miles N. of Mortagne, where in 1140 a Cistercian abbey was founded under very severe rules, from which originated the celebrated religious order known as the TRAPPISTS (which see).

**Latreille** (PIERRE ANDRÉ), b. at Brives, in the department of Corrèze, France, Nov. 29, 1762; studied first theology, and was ordained priest in 1786, but devoted himself afterwards to the study of entomology; became superintendent of the entomological division of the Museum of Natural History at Paris in 1798, member of the Academy of Sciences in 1814, and professor of zoology after the death of Lamarck in 1829, and d. Feb. 6, 1833. The most prominent of his numerous and voluminous writings are—*Histoire naturelle des Crustacées et des Insectes* (14 vols., 1802–05), *Général Crustacorum et Insectorum* (4 vols., 1806–09), *Cours d'Entomologie* (1831). He also wrote parts of Buffon's *Natural History* and the entomological part of Cuvier's *Règne animal*.

**La'tro** (M. PORCUS), of Spanish birth, flourished in Rome in the time of Augustus. He is highly spoken of by Quintilian, and also by the elder Seneca, who had known him from boyhood, and who has given in his *Controverse* interesting details of his personal and professional character, and specimens of his declamations. Among his pupils was the poet Ovid. He d. B. C. 4, having taken his own life, according to Jerome, while suffering from a severe fever. His writings have perished; for the *Declamatio in C. Sallustium Crispum* and the *Declamatio in Ciceronem* have been ascribed to him without sufficient reason. (See Bähr's *Gesch. d. Röm. Lit.*, vol. ii. p. 488; Lindner, *De M. Porcio Latrone Commentatio*, Breslau, 1855.)

H. DRISLER.

**Latrobe**, post-b. of Westmoreland co., Pa., 41 miles E. of Pittsburg, on the Loyalhanna Creek, at the junction of the Ligonier Valley and Pennsylvania Central R. Rs., has 1 weekly newspaper, 7 churches, 2 hotels, 2 banks, 1 college, and 1 convent (St. Vincent and St. Xavier), 3 large coal and coke companies, a paper mill, 2 planing mills, several large flouring-mills, carworks and machine-shops, and the usual number of stores and shops. Pop. 1127.

CHARLES B. FINK, Ed. "ADVANCE."

**Latrobe** (BENJAMIN HENRY), b. in Yorkshire, England, May 1, 1767; was educated at the University of Leipzig; served in the Prussian army (1785); returned to England; studied architecture; became surveyor of public offices of London (1788); came to the U. S. in 1796, built the bank of Pennsylvania, the Schuylkill waterworks, the cathedral and exchange at Baltimore, completed the Capitol of the U. S., and rebuilt it after its destruction in 1814; built steamboats at Pittsburg in the same year, and d. at New Orleans in Sept., 1820.

**Latrobe** (BENJAMIN H.), b. in Philadelphia, Pa., Dec. 19, 1806; graduated at St. Mary's College, Baltimore, 1823; studied law, and was admitted to the bar; after practising his profession in New Jersey and Baltimore for a few years, abandoned it to become a civil engineer, and in 1830 was appointed assistant to Jonathan Knight, then chief engineer of the Baltimore and Ohio R. R. Co., as such locating the Washington branch of that road and that between Point of Rocks and Harper's Ferry, and many other important divisions; was chief engineer of the Baltimore and Port Deposit R. R., locating and completing it; succeeded Mr. Knight on his retirement in 1842, and finished the road to Wheeling, Va.; has been chief engineer and president of various railroad companies, besides consulting engineer for various State governments, and is frequently consulted



by the general government on important works of internal improvement.

**Latrobe** (CHARLES JOSEPH), b. in England early in the nineteenth century; author of several works of travel of high merit, among which are *The Alpenstock, or Sketches of Swiss Scenery and Manners* (1829), *The Rambler in North America in 1832-33* (1835), and *The Rambler in Mexico in 1834* (1836). Mr. Latrobe accompanied Washington Irving in his "tour on the prairies."

**Lat'ten** [Fr. *laiton*], a kind of sheet bronze used in the Middle Ages for making church ornaments, monumental brasses, and the like. In later times *latten* denotes simply sheet brass or other sheet metal.

**Latter-Day Saints.** See MORMONISM.

**Latimore** (SAMUEL ALLAN), PH. D., LL.D., b. May 31, 1828, at Liberty, Ind.; graduated in 1850 from Asbury University, Greencastle; became professor of Greek at the same university in 1852, of natural science at Genesee College, Lima, N. Y., in 1860, and of chemistry at the University of Rochester, N. Y., in 1867.

**Lat'ty**, tp. of Paulding co., O. Pop. 294.

**Latude', de** (HENRI MASERS), b. Mar. 23, 1725, near Montagnac, in the department of Hérault, France; received a military education, and went in 1748 to Paris to study mathematics. Anxious to make himself conspicuous somehow, he obtained an audience with Madame de Pompadour, and told her that a conspiracy had been formed against her life, and that a box containing a subtle poison would be sent to her through the post. The box came, but its contents were found to be ashes only, and it was discovered that Latude himself had sent the box. He was thrown in the Bastille, and as he escaped, but was caught again, his term of punishment was prolonged. Three times he escaped, and three times he was caught again, and thus it happened that he was kept in prison for thirty-five years as a punishment for a mere foolishness. In 1784, Madame Legros, who incidentally became acquainted with his history, procured his liberation, a pension was given him, and the whole unfortunate affair—for it was hardly anything more—was forgotten. But when the Revolution broke out the case was brought before the public with all its details, and used as a means of exciting the revolutionary hatred against the old régime—a purpose for which the story was eminently well suited. Latude published his *Mémoires* in 1789; his advocate Thierry, *Le Despotisme dévoilé* (3 vols., 1791-92), and in 1793 a court awarded him 60,000 livres in damages, to be paid by the heirs of Madame de Pompadour. Thus, the French people made a similar mistake to that which the mistress of Louis XV. had made. She took Latude for a criminal; they made him a hero; both forgot that he was a fool. A later world has been more just; it pities him. D. Jan. 1, 1805.

**Lau'ban**, town of Prussia, in the province of Silesia, on the Queiss. It has a bell-foundry, several breweries, and manufactures of cotton and linen goods, cloth, and tobacco. Pop. 6610.

**Lau'be** (HEINRICH), b. at Sprottan, in Silesia, Sept. 18, 1806; studied since 1826 theology at Halle and Breslau, and settled in 1832 in Leipzig, devoting himself exclusively to literary pursuits. He travelled much in Germany, France, and Italy; was often persecuted, and several times imprisoned, for his participation in the revolutionary movements of his time; sat in the German Parliament of 1848; was director of the Burg theatre of Vienna from 1849 to 1867, and of the theatre of Leipzig in 1868-69. His writings are partly historical—*Das neue Jahrhundert* (2 vols., 1833), *Modernen Charakteristiken* (2 vols., 1835), *Geschichte der Deutschen Literatur* (4 vols., 1840), *Das erste Deutsche Parlament* (3 vols., 1849), *Das Burgtheater* (1863), etc.; partly travelling sketches and novels—*Französische Lustschlösser* (3 vols., 1840), *Das junge Europa* (4 vols., 1833-37), *Der deutsche Krieg* (9 vols., 1863-66), etc.; partly dramas—*Monaldeschi* (1845), *Die Carlschüler* (1850), *Graf Essex* (1856), etc. He is a man of enterprise, of practical ability, and of some talent, but he has no genius, and his studies were superficial. As a writer of fancy his mastery of all the technicalities of art often enabled him to produce striking effects, but he never made a lasting impression. As a historical writer his mental vivacity and varied personal experience make him very entertaining, but he never instructs. CLEMENS PETERSEN.

**Laud** (WILLIAM), b. at Reading, Berkshire, Oct. 7, 1573, was the son of a rich clothier; entered St. John's College, Oxford, in 1589; became a fellow in 1593; took his degree as master of arts in 1598; and was ordained a priest in 1601. From 1601 to 1621, in which latter year he was consecrated bishop of St. David's, he held several minor positions. In 1607 he was appointed vicar of Stanford, Northamptonshire; in 1609 rector of West Tilbury, Essexshire; in 1611 president of St. John's College, Oxford; and in

1615 archdeacon of Huntingdon. In all these positions he plainly showed his character, and by degrees he attracted the attention of James I. He was a learned man and a liberal supporter of learning; an exemplary clergyman, energetic, dignified, and benevolent to the poor; but he hated the Puritans, and the fearlessness and consistency with which he resisted, and, later on, even persecuted them, made the hatred reciprocal. He was a churchman, rather than a theologian. His religion had a color of sacerdotalism. He understood the Church better as a worldly institution than as a spiritual necessity, and its rites and ceremonies were to him of paramount importance. In 1617 he accompanied King James to Scotland, and an attempt was made to introduce episcopacy into the government of the Scotch Church, but it failed. After the accession of Charles I., Laud was removed to the see of Bath and Wells in 1626, and in 1628 to that of London. In 1624 he was made a member of the court of high commission, in 1627 a privy councillor, and after the assassination of Buckingham he actually became prime minister. In 1630 he was chosen chancellor of the University of Oxford, and in 1633 he was made archbishop of Canterbury. These powerful and influential positions he used with more passion than prudence, and more energy than justice, to carry through his ecclesiastical views. The Puritans were everywhere and in every way repressed. People who would not conform to the Established Church were fined, imprisoned, branded on the forehead, and exiled; in some cases they even had their ears cut off and their noses slit open. His spies were everywhere. The smallest congregations of Separatists were broken up, and even the devotion of private families did not escape his control. But if the exertions were great, the purpose was rather small. Besides these harsh and tyrannical measures in order to compel people to conform to the Established Church, that which the archbishop did to perfect the institution itself was rather of a petty character—regulations with respect to the proper place of the altar, the due manner in which the altar ought to be railed in, "Sunday sports," etc. The result was a deep and implacable hatred. In 1635 a new attempt was made to introduce the episcopacy into the Scotch Church, and this time it led to the Scotch rebellion, which ushered in the English revolution. When in 1640 the Long Parliament met, the archbishop was impeached for high treason, and by order of the Commons brought to the Tower. There he remained three years, exposed to many indignities. At last his trial came on, and although he defended himself admirably, and was not found guilty by the Lords, the Commons sentenced him to death and gave order to his execution, which took place June 10, 1644. A complete edition of his works was published in London 1857-60; his *Diary* and his letters are of great historical interest. CLEMENS PETERSEN.

**Lau'danine** [from *ladanum*], a base homologous with morphine and codeine, contained in opium. (See *Watts's Dict., Supplement*.)

**Lau'danum** [probably from *Ladanum* or LABDANUM (which see)], the tincture of opium, made by soaking the dried and powdered drug in alcohol. It is a valuable opiate, though of variable strength. It ought never to be given to young children as a domestic remedy. It has a more stimulant and astringent effect than morphine, and frequently causes headache.

**Lau'da Si'on Salvato'rem** ("Praise the Saviour of Zion"), a sequence sung in the Roman Catholic churches on Corpus Christi Sunday. It is a rhymed Latin hymn by Thomas Aquinas, in twelve stanzas—nine having six lines each, two having eight lines each, and one, the twelfth, having ten lines.

**Lau'der** (ROBERT SCOTT), R. S. A., b. at Silver Mills, near Edinburgh, Scotland, in 1803; studied painting at Edinburgh and London under the patronage of David Roberts and Sir Walter Scott; spent five years in Italy; resided from 1838 to 1849 in London, and for the remainder of his life in Edinburgh, where he d. Apr. 21, 1869. He was a genre painter of great merit, his best works being scenes from Scott's novels. His *Christ teaching Humility* was purchased by the Scottish Association for the Encouragement of Art, and presented to the Scottish National Gallery at Edinburgh.

**Lauder** (SIR THOMAS DICK), BART., b. near Edinburgh, Scotland, in 1784, only son of Sir Andrew Lauder, sixth baronet of Fountainhall, Haddingtonshire; was a contributor to *Blackwood's Magazine* from its commencement, and so successfully rivalled Sir Walter Scott in his peculiar department of historical fiction that several of his tales were attributed to the author of *Waverley*. Among them were *Lochandhu* (1825), *The Wolfe of Badenoch* (1827), *Highland Rambles, with Long Tales to Shorten the Way* (1837), and *Legendary Tales of the Highlands* (1841). He was an active member of scientific and antiquarian societies, edited

several works on natural history, and was a contributor to the *Edinburgh Encyclopedia*. D. near Edinburgh May 29, 1848.

**Lauder** (WILLIAM), b. in Scotland early in the eighteenth century; educated at Edinburgh University; published in 1739 a collection of modern Latin verse; and becoming a teacher of Latin in London, contributed to the *Gentleman's Magazine* in 1747 a series of articles attempting to prove that Milton had in his *Paradise Lost* borrowed largely from modern Latin poems by Grotius, Masenius, and others. These essays were reprinted in a volume in 1751, with a preface by Dr. Samuel Johnson, but it was soon ascertained that the work was an imposture, the parallel passages quoted being either forged or taken from a Latin translation of the *Paradise Lost*. Lauder confessed his offence, and went to Barbadoes, where he d. in 1771.

**Lauderdale**, county of N. W. Alabama, bounded N. by Tennessee and S. by the Tennessee River. The W. end touches Mississippi. Area, 650 square miles. It is generally very fertile. The N. part is a rolling plateau. Cotton, pork, and corn are the chief products. Cap. Florence. Pop. 15,091.

**Lauderdale**, county of Mississippi, bounded E. by Alabama. Area, 720 square miles. It is generally level and extremely fertile. Corn and cotton are staple products. It is traversed by the Mobile and Ohio and the Vicksburg and Meridian R. Rs. Cap. Meridian. Pop. 13,462.

**Lauderdale**, county of W. Tennessee, having the Mississippi River on its western boundary, which separates it from Arkansas, the Forked Deer Creek partly on the N., and the Big Hatchie River on the S. Area, 350 square miles. The surface is level and the soil fertile. Corn, cotton, and wheat are the chief productions. Cap. Ripley. Pop. 10,828.

**Lauderdale**, post-v. of Lauderdale co., Miss., on the Mobile and Ohio R. R., 19 miles N. of Meridian, has a church, a semi-monthly newspaper, an orphan's home, and a large business in shipping cotton. One mile S. E. are the Lauderdale Springs, a favorite watering-place. Pop. 250. WM. H. HOGAN, MANAGER "ORPHANS' HOME BANNER."

**Lauderdale** Col. JAMES J., b. in Virginia about 1780; removed early in the present century to West Tennessee; bore a distinguished part in the Creek war under Gens. Coffee and Jackson, and was killed while fighting with great gallantry at the first battle of New Orleans Dec. 23, 1814. Several counties and towns in the Southern States were named for him.

**Lauderdale** (JAMES MAITLAND), EIGHTH EARL OF, b. in Scotland in 1739; entered Parliament in 1780; was one of the managers of the impeachment of Warren Hastings in 1788; succeeded to the title in 1789, and was elected one of the sixteen representative peers of Scotland; favored the French Revolution; visited France, and formed an intimacy with Brissot and the leading Girondists; energetically opposed all the war-measures of Pitt; resigned his seat as representative peer; became a citizen of London, and ran unsuccessfully for sheriff; wrote much upon finance and Indian affairs, and on the accession of the Whigs in 1806 became a baron of the United Kingdom, privy councillor and chancellor of Scotland. In Aug., 1807, he was charged with an unsuccessful mission to France to treat for peace; resigned the chancellorship the same year; continued in the House of Peers to oppose the war-policy; in 1816 endeavored to obtain the release of Napoleon from St. Helena by act of Parliament. He published in 1804 a very popular work, *An Inquiry into the Nature and Origin of Public Wealth*, and in 1809 a treatise on the system of government for India. D. Sept. 13, 1839.

**Lauderdale** (JOHN MAITLAND), DEAR OF, b. at Lethington, Scotland, May 16, 1616; educated as a rigorous Covenantor; was commissioner to treat with Charles I. in his prison in the Isle of Wight, and obtained the signature of the treaty known as the "Engagement" (Dec. 26, 1647), by which the king was again recognized in Scotland; was the chief favorite of Charles II. during his brief rule in Scotland (1649-51); was taken prisoner at the battle of Worcester (Sept., 1651), and remained nine years in the Tower and other prisons; was made secretary of state and high-commissioner in Scotland by Charles II. in 1660; received in rapid succession all the highest posts in Scotland, of which kingdom he was the virtual ruler for many years; was created duke of Lauderdale in 1673; raised to the English peerage in 1674 as Earl Guilford, and sworn of the privy council, forming a member of the celebrated *Cabal* ministry. He was a flatterer of Charles, and has been painted in the darkest colors by Macaulay in his *History of England*. D. at Tunbridge Aug. 24, 1684.

**Lau'don**, von (GUDON ERNST), BARON, b. at Trotzen, Livonia, Oct. 10, 1716, of a Scottish family, and entered in

his fifteenth year the Russian military service, but was dismissed after the Peace of Belgrade, 1739, with the rank of a lieutenant. He now offered his services to Frederick II. of Prussia, but was not accepted, because the king disliked his face. He then went to Vienna, was employed as a captain, and fought in the Bavarian and in the second Silesian war, not without distinction, but without promotion. After the peace he was removed to a regiment stationed on the Turkish frontier, and here he was nearly forgotten. In the first year, however, of the Seven Years' war he distinguished himself as colonel of a regiment of Lithuanians so much that in 1757 he was made a general. His commission came to him through the hands of the Prussians, accompanied by a congratulatory letter from Frederick II. At Kunersdorf Aug. 12, 1759, he decided the battle and turned the victory which the Prussians had gained over the Russians into a complete rout of the Prussian army. Having been made a field-marshal and placed at the head of an independent corps of 30,000 men, he defeated the Prussians once more at Landshut (June 29, 1760), and took Schweidnitz (Oct. 1, 1761). After the Peace of Hubertsburg he lived in retirement on his estates, engaged in studies, until Joseph II. placed him at the command of the whole Austrian army in the war against the Turks. The campaign was a most brilliant one; the Turks were repeatedly defeated and Belgrade was taken. In the Bavarian war of succession he commanded the Austrian army, and succeeded in placing the Prussian armies in a very difficult position when peace was concluded. The Austrian empire gave him the title of generalissimo, which none but Eugène had ever had, and overladen him with dotations and honors. D. suddenly at Neutitschein July 14, 1790.

**Laudonnière**, de (RENÉ GOLLAIN), b. in France early in the sixteenth century; was sent by Admiral Coligny along with Jean Ribault to found a colony in Florida; sailed from Dieppe Feb. 15, 1562, and left the colonists at Port Royal; returned with three ships to their relief in 1564; found the settlement abandoned; entered the river St. John's, called by him the river May, and built Fort Caroline. In the surprise and massacre perpetrated there by the Spaniards under Menendez (Sept. 20, 1565) Laudonnière escaped with but a few followers; arrived in France in Jan., 1566; was coldly received by the court, and spent the remainder of his life in obscurity. He published in 1586 an account of his adventures, *Histoire notable de la Floride, contenant les trois voyages faits en icelle par des capitaines et des pilotes français*. (See also T. Irving's *Conquest of Florida*.)

**Lau'enburg**, duchy of Northern Germany, bounded by Holstein, Mecklenburg, Hamburg, and Hanover. Area, 454 square miles. Pop. 49,546. Cap. Ratzeburg, the only other towns being Lauenburg and Mölln. Important in the Middle Ages, Lauenburg has during the present century become of so little value as to have several times served as a make weight in treaties. It was taken by France from Hanover 1803, incorporated with the French empire 1810, regained by Hanover 1813, ceded to Prussia 1815, and transferred to Denmark the same year. In 1864, after the Danish war, it was ceded to Austria and Prussia, and by the convention of Gastein (1865) it was acquired by the king of Prussia for the sum of 1,875,000 thalers, paid from his own pocket, whereupon he became its duke, and has conducted the administration separately from that of Prussia.

**Lauenburg**, town of Prussia, in the province of Pomerania, on the Leba, has manufactures of linen and woollen fabrics and valuable fisheries. Pop. 6530.

**Laugh'ery**, tp. of Ripley co., Ind. Pop. 1874.

**Laughing Gas**. See NITROGEN.

**Laugh'ter** [Ang. Sax. *læchtor*, from *læchdon*, to "laugh"] consists of convulsive, and to a certain extent involuntary, actions of the muscles of respiration, by means of which the air, being expelled from the chest in a series of jerks, produces a succession of short, abrupt sounds, variously modified according to individual peculiarities: at the same time the angles of the mouth are drawn backward and upward; the upper lip is elevated; the nostrils are expanded; the lower eyelid is slightly raised, and the external angles of the orbital openings thrown into wrinkles by the contraction of the lower part of the orbicular palpebrarum muscles, while the eyes assume a peculiarly bright appearance. If the action be sufficiently intense or prolonged, tears are shed through the compression exerted on the lacrimal sacs; the brows are elevated, and other muscles of the body may participate to such an extent that the head, trunk, and limbs are thrown into movements, and even the contents of the bowels and bladder may be evacuated by the expulsive efforts of the abdominal muscles overcoming the normal contractility of the sphincters.



This remarkable category of actions, which in its entirety we call *laughter*, may be originated in various ways. In children and weak-minded persons, and in certain animals, it is, as Darwin asserts, the expression of pure pleasure, but in the normally constituted adult the most intense pleasure unmodified by other emotions does not appear to be capable of exciting laughter. At the same time, it must be admitted that, no matter how induced, laughter is always indicative of a certain amount of high spirits and self-satisfaction, combined sometimes with a sense of superiority. The exciting causes of laughter are, as a whole, not thoroughly understood, and have been the subject of very diverse opinions from physiological and psychological writers, none of which appears to be entirely correct or to include all the emotional or other excitations. Thus, Hobbes asserts that "laughter is a sudden glory arising from sudden conception of some eminency in ourselves by comparison with the infirmity of others, or of our own formerly." But this explanation by no means covers the ground, for we very frequently laugh at matters that in no way concern ourselves, as, for instance, at a humorous remark made by another, or at some striking incongruity of action in an individual which cannot by any means be connected with our own being. As Bain remarks, Hobbes's definition will only apply to the laugh of victory, ridicule, derision, or contempt against persons whom we ourselves have humiliated. Bain has very well shown that mere incongruity is not of itself always sufficient to excite laughter, although such is the generally received opinion. There are many incongruities which, as he says, may produce anything but a laugh. A little reflection will enable any one to call up hundreds of such without there being developed the slightest disposition to laughter. It would seem, however, that the incongruous in certain forms is capable of causing laughter. Thus, upon one occasion the writer witnessed the fact of a whole congregation of devout worshippers thrown into paroxysms of the most intense laughter by the attempt of a dog which had entered the church to pass through the chancel-railing to reach his master, the officiating clergyman. When half through he stuck fast, and by no effort could he either advance or retreat. His cries drowned the voice of the minister, and he was finally with difficulty extricated by the senior warden and the sexton, and carried howling out of the church. In this instance the incongruity was of the most marked character, and there was in addition the sudden revulsion of feeling which so frequently excites laughter. To use the language of Herbert Spencer—who lays great stress on this sudden interruption of the course of one emotion by the instantaneous development of another—the channels through which the discharge was about to take place were closed, and a new channel opened. In another instance which came under the writer's notice the incongruity and revulsion were still more evident—more even than in the case given by Spencer of the tame kid snuffing at a pair of devoted lovers in the most highly wrought part of a sensational drama. Two lovers on the stage had reached the culmination of their fate, and were dying in each other's arms. The interest of the audience was worked up to the highest pitch: many were in tears, and then the curtain slowly descended. But the dead lovers had fallen too far to the front, and when the curtain reached the stage they were between it and the footlights. In an instant the idea of the ludicrous was aroused, and amidst peals and shrieks of the most convulsive laughter from the audience the two actors had to get up and walk abjectly from the presence of the crowd.

True wit does not excite laughter, for the reason that in true wit there is the very reverse of incongruity; but the attempt at wit, being incongruous, does give rise to the idea of the ludicrous, and laughter is produced. This is well shown in the following lines from the signboard of an inn kept by one Littlejohn:

"Ye who love old wine and good,  
Come in and drink with Robin Hood:  
If Robin Hood is not at home,  
Come in and drink with Little John."

There is nothing incongruous in this; it is witty, but though it causes pleasure and may excite a smile, it does not cause laughter. In the course of time, however, the inn came into the possession of Jacob Snodgrass, who, ignorant of the relation between Robin Hood and Little John, but knowing the persuasive power of the old sign, and wishing to continue it as far as truth would allow, left it intact with the exception of erasing the name of Little John and substituting that of Jacob Snodgrass. Nobody had ever laughed at the old sign, but every one laughed at this, for the incongruity between Robin Hood and Jacob Snodgrass was so palpable that the impulse to laugh was irresistible.

The incongruous, to be capable of exciting laughter,

must be of such a character as to produce no other strong emotion. If this latter occurs, the sense of the ludicrous is overwhelmed by the more powerful feeling which the event occasions. Thus, if in the instance cited of the dog sticking fast in the chancel-railing the struggles of the animal to get free had ignited some lucifer matches accidentally near him, the emotion of fear would have arisen in the minds of the congregation, would have overwhelmed all idea of the ludicrous, and cries of fright, not laughter, would have been the result.

The theory of Dumont is, when analyzed, not materially different from that which ascribes laughter to a perception of incongruity. According to this author, we laugh when the mind is concerned with facts of such a nature as to cause us to think at one and the same time that a thing is and is not. In other words, when we are forced to affirm and deny the same thing—when, in short, the understanding is obliged to conceive simultaneously two contradictory relations of one thing or circumstance. "It is certain," he says, "that we can no more succeed in uniting two contradictory elements in a single conception than we can cause two bodies to occupy the same space at the same time. But two distinct forces can so act upon two bodies as to push them towards the same space, and thus to cause a shock or a succession of shocks. In like manner, diverse circumstances can prompt the understanding to attempt to make two contradictory ideas enter into the same conception. From this attempt a kind of intellectual contest results, of which laughter is the expression." This contest between contradictory ideas is nothing more than the sense of incongruity to which, as a cause of laughter, the attention of the reader has already been directed.

But besides those causes of laughter which are entirely intellectual in character, there are others which are sensational, others which are partly sensational and partly intellectual, and again others which are pathological. As an instance of a sensational cause (classed erroneously by Bain as mechanical), tickling may be mentioned. Among the pathological causes hysteria plays an important rôle, and the abnormal condition of the mind from which laughter is evolved as an expression of grief (sardonic laughter) may be placed in the same category. Among the mixed sensational and intellectual is the fact that individuals, especially children, laugh when the motion of tickling is made towards them. Here the laughter is the result of the perception of the approaching finger performing the motion of tickling, evoking the recollection of previous ticklings. According to Darwin, the anthropoid apes utter a reiterated sound when they are tickled under the armpits. The laughter from tickling is of reflex character, and scarcely if at all under the control of the will, though such control may be acquired by repeated efforts.

But there is frequently another governing factor in the laughter from tickling, besides the mere sensational excitation. We laugh when we are tickled by others, but we do not laugh when we tickle ourselves. This is especially the case when the motion is made on the skin covering the sides of the chest. The fact appears to be that in order for laughter to result from tickling we must be in ignorance of the exact spot which is to be tickled. When we know it, as we do when we are about to tickle ourselves, laughter does not result.

Bain asserts that cold and some kinds of acute pain cause laughter, but this is probably erroneous. The laughter of young infants in their sleep, commonly ascribed by mothers and nurses to colic, is more likely due to pleasant dreams.

The mechanism of laughter, so far as the muscles of the face are concerned, has been admirably studied through the agency of electricity by Dr. Duchenne (de Boulogne), and previously, very philosophically, by Moreau (de la Sarthe) and Sir Charles Bell.

*Bibliography.*—Thomas Hobbes, *Complete Works*, edited by Sir William Molesworth, Latin and English (London, 1839–45, op. *Human Nature*); Moreau (de la Sarthe), *Sur la Structure, les Usages et les Caractères de différentes parties de la Face de l'Homme*, art. 3, t. iv, cf. *L'Art de connaître les Hommes par la Physiognomie*, par Gaspard Lavater (Paris, 1820); Sir Charles Bell, *The Anatomy and Physiology of Expression* (3d ed., London, 1844); Alexander Bain, *The Emotions and the Will* (2d ed., London, 1865); Léon Dumont, *Des Causes du Rire* (Paris, 1862); ———, *Théorie scientifique de la Sensibilité, le Plaisir et la Peine* (Paris, 1875); Herbert Spencer, *The Physiology of Laughter* (Essays, 2d series, 1863; published in the U.S. as *Illustrations of Universal Progress*, New York, 1864); G. B. Duchenne (de Boulogne), *Mécanisme de la Physiognomie humaine*, etc. (Paris, 1862); Charles Darwin, *The Expression of the Emotions in Man and Animals* (London, 1872); L. Lays, *Études de Physiologie et de Pathologie cérébrales* (Paris, 1874).

W. A. HAMMOND.

**Laugier** (ANDRÉ, b. at Paris Aug. 1, 1770; was employed by the Convention during the French Revolution in collecting the bells from the churches of Bretagne to be melted into cannon; was afterwards at the head of the office for the manufacture of powder; served in the medical corps of the army; became professor of pharmacy and chemistry at several institutions, assistant professor at the Museum at Paris in 1802, and professor in 1810, on the death of Fourcroy, who was his relative. Laugier made numerous important chemical discoveries, recorded chiefly in the *Annales* of the Museum; he was long a member of the department of public instruction, and along with Fourcroy was the organizer of a large number of colleges and lycées. He published a *Cours de Chimie générale* (3 vols, 1828). D. at Paris Apr. 18, 1832.

**Laugier** (AUGUSTE ERNEST PAUL), son of André, b. in Paris Dec. 22, 1812; studied astronomy under Arago; obtained a post in the observatory at Paris; made important discoveries in regard to magnetism, comets, eclipses, meteors, and solar spots; made improvements in astronomical clocks; determined the exact latitude of the Paris observatory (1855), correcting previous errors; published a catalogue of 53 nebulae, and another (1857) of the declination of 140 stars, and contributed many astronomical papers to the *Commissaire du Temps*. He was long associated with Arago in researches on terrestrial physics, and was for some years president of the Academy of Sciences. D. at Paris Apr. 3, 1872.

**Launce**, a species of sand-eel. See AMMODYTES.

**Launceston**, parliamentary and municipal borough of England, formerly cap. of the county of Cornwall, on the Kensey River, a tributary of the Tamar, 22 miles N. E. of Plymouth, with which it is connected by railway. It is situated on a steep hill, at the top of which are the ruins of Castle Terrible, built by the ancient princes of Cornwall; has elaborately carved gates, several public buildings, and a grammar school founded by Queen Elizabeth. Pop. 5140.

**Launceston**, the second town of Tasmania or Van Diemen's Land, cap. of the county of Cornwall, situated on the river Tamar at its confluence with the Esk, 32 miles S. E. of Port Dalrymple, has 22 churches, 36 schools, 5 banks, 3 newspapers, commodious government buildings, and a considerable trade with South Australia and Victoria, exporting wool, timber, and fruits, and importing manufactured goods. Pop. 10,688.

**Launch**, the principal boat attached to modern ships. Ships of the largest size sometimes have steam launches, and these in the naval service frequently carry a piece of artillery, and are very serviceable in shallow waters and rivers.

**Launch'ing** [Fr. *lancer*, "to hurl out"], the removal of a new ship from the shipyard to the water. Ships are usually built upon inclined wooden ways, and when the hull is finished the vessel is allowed to slide stern foremost into the water. The spars are usually set up after launching. The Great Eastern was launched sidewise into the Thames (1855), powerful hydrostatic pressure being required to force her into her proper element.

**Laun'dale**, tp. of McLean co., Ill. Pop. 835.

**La Union**. See UNION.

**Laun'itz** (ROBERT ERIKHARD), b. at Riga, Russia, Nov. 4, 1806; studied in Rome under Thorwaldsen, and settled in 1828 at New York, where he d. Dec. 13, 1870. The battle monument at Frankfort, Ky., the Pulaski monument at Savannah, Ga., the monument to George H. Thomas at Troy, N. Y., were executed by him.

**Laun'ra** [Gr. *Laurea*, a "delft," or, as some say, a name taken from a district in ancient Alexandria], in former times, and especially in the Levant, a collection of hermits' cells, each of whose occupants either provided for himself alone, or at most passed but two days in the week in the community of his brethren. The tenants of the laura were subject to severe rules. Solitude, silence, and a most meagre diet were the lot of all.

**Lauraceæ** (from *Laurus*, the typical genus), a natural order of exogenous plants, chiefly trees, often of great size. This order is mostly tropical, and produces many trees of great economic value. Among its products are cassia, camphor, camphor, and many valuable drugs and timber-woods. The *cassafra*, bay, and a few other shrubs and trees of the U. S. are lauraceous.

**Laur'ramie**, tp. of Tippecanoe co., Ind. Pop. 2444.

**Laur'ra Town**, tp. of Stokes co., N. C. Pop. 1117.

**Laur'ra di Borel'lo**, town of S. Italy, in the province of Reggio di Calabria, about 20 miles E. of Palmi. Pop. in 1871, 5807.

**Lau'rel** [Lat. *Laurus*], a name properly belonging to the *Laurus nobilis* or bay tree of Europe, Asia, and Africa. In the warmer parts of Europe it becomes a large tree. Its wood has a limited use in the arts; its essential oil is employed in perfumery; its fruit yields a fixed oil, used in veterinary medicine; its flowers afford rich bee-pasture; its leaves were the material of the laurel crown of victors in war and of successful poets and artists. The name is often loosely extended to all the Lauraceæ, to which this tree belongs. Shrubs of the genus *KALMIA* (which see) are called laurels in the U. S. Some of the larger rhododendrons of our country are called mountain-laurels. The evergreen cherry trees are called CHERRY LAUREL (which see). In Great Britain they are often simply called laurel. The Portugal laurel is one of the cherry laurels. Several kinds of magnolia are known locally in the U. S. as laurel trees. In England the *Daphne laureola* is called spurge laurel. It is a handsome European evergreen shrub, sometimes planted in the U. S., and is of the order Thymelacæ. It has a poisonous bark.

**Laurel**, county of S. E. Kentucky. Area, 430 square miles. It is hilly and mountainous, but much of the soil affords fine pasturage. The grain crop is the most important. The county is traversed by the Knoxville branch of the Louisville and Nashville R. R. Cap. London. Pop. 6016.

**Laurel**, post-v. of Little Creek hundred, Sussex co., Del., on the Delaware R. R., 7 miles N. of Delmar, and on the navigable Broad Creek. Pop. 1080.

**Laurel**, post-v. and tp. of Franklin co., Ind., on White Water River and White Water Valley R. R. It has 1 weekly newspaper. Pop. of v. 711; of tp. 1942.

**Laurel**, a.v. (LAUREL FACTORY P. O.) and tp. of Prince George's co., Md., on Patuxent River and on the Washington branch of the Baltimore and Ohio R. R., has a large cotton mill. Pop. of v. 1118; of tp. 1684.

**Laurel**, tp. of Ashe co., N. C. Pop. 456.

**Laurel**, post v. of Monroe tp., Clermont co., O., 15 miles S. of Batavia. Pop. 126.

**Laurel**, tp. of Hocking co., O. Pop. 1343.

**Laurel Creek**, tp. of Watauga co., N. C. Pop. 585.

**Laurel Factory**. See LAUREL, Md.

**Laurel Fork**, tp. of Carroll co., Va. Pop. 2197.

**Laurel Hill**, tp. of Lincoln co., N. C. Pop. 430.

**Laurel Hill**, tp. of Richmond co., N. C. Pop. 2127.

**Laurel Hill**, a beautiful cemetery within the limits of the city of Philadelphia, on the left bank of the Schuylkill. The grounds comprise more than 20 acres, picturesquely situated upon several hills, are ornamented with great taste, and have a fine Gothic chapel. (See PHILADELPHIA.)

**Laurel Hill**, a range of mountains in Western Pennsylvania, rising in Cambria co. and running S. W. as the boundary between Somerset co. on the E. and Westmoreland and Fayette cos. on the W.

**Laurel Junction**, post-v. of Wood co., West Va., at the junction of the Laurel Fork and Sand Hill R. R. with the Baltimore and Ohio R. R. It is an important point in the trade in petroleum, which is obtained in large quantities in the vicinity, and brought here by pipe and rail to be tanked. It is called also LAUREL FORK.

**Laurell**, tp. of Madison co., N. C. Pop. 992.

**Laurel Ridge**, a range of mountains rising on the S. bank of the Youghiogheny River, in South-western Pennsylvania, and trending S. W. to Cheat River, through Taylor, Marion, and Monongalia cos., West Va.

**Laur'ence** (RICHARD, D. C. L.), b. at Bath, England, in 1760; graduated at Corpus Christi College, Oxford, in 1782; took orders in the Church of England; preached the Bampton lectures 1804; appointed soon after to the rectory of Marsham, Kent; became regius professor of Hebrew and canon of Christ Church, Oxford, 1811; archbishop of Cashel 1822, and d. at Dublin Dec. 28, 1838. Archbishop Laurence was one of the restorers of Oriental studies in England, and perhaps the only high dignitary of his times who cultivated the dialects of the Semitic languages. His most important service to theology was the recovery from Ethiopic manuscripts of several interesting apocryphal works, often quoted by the early Fathers, but supposed to have been lost. These were the *Book of the Prophet Isaiah*, edited with Latin and English versions in 1829, and *The Book of the Prophet Daniel*, 2d ed. 1838. He brought out a new version of Fourth Esdras (1820), also from the Ethiopic; published *A Dissertation on the Logos of St. John* (1805), *Critical Remarks on the Vulgar Version of the New Testament* (1814), *On the Existence of the Soul after Death* (1844), and numerous oec-



sional essays and sermons.—His elder brother, FRENCH LAURENCE, LL.D., regius professor of civil law at Oxford (d. 1809), was author of *Critical Remarks on Detached Passages of the New Testament* (1810) and other works, but is best known for his interesting *Correspondence with Edmund Burke*, published in 1827.

**Lau'rene**, or **Laurol** [Lat. *laurus*, "laurel"],  $C_{11}H_{16}$ , a hydrocarbon homologous with benzol. (See *Watts's Diet.*, Supplement, p. 301.)

**Lau'rens**, county of S. Central Georgia. Area, 759 square miles. It is generally level and has a good soil. Cotton and corn are staple products. The county is traversed by the navigable Oconee River, and has extensive forests. Cap. Dublin. Pop. 7834.

**Laurens**, county of N. W. Central South Carolina. Area, 600 square miles. Its surface is varied, its soil well cultivated and productive. Cotton and corn are staple products. Flour is the chief article of manufacture. Cap. Laurens Court-house. Pop. 22,536.

**Laurens**, post-v. and tp. of Otsego co., N. Y. The village has manufactures of importance, and there is a sulphur spring in the vicinity. Pop. 1919.

**Laurens**, tp. of Laurens co., S. C., containing the county-seat. Pop. 4289.

**Laurens Court-house**, post-v., cap. of Laurens co., S. C., on the Laurens R. R., 31 miles N. W. of Newberry. It has 1 weekly newspaper.

**Laurens** (HENRY), b. at Charleston, S. C., in 1724, of Huguenot stock; was well educated in Charleston and London; acquired an ample fortune in mercantile business, and was conspicuous in the contests with the Crown admiralty judges, whose injustice was then great. He served as a major against the Cherokees; went to England in 1771, and while there strove to avert a war; became in 1774 president of the South Carolina congress; in 1776 was sent to the General Congress, of which he was president 1777-78. In 1779 he was sent as U. S. minister to the Netherlands, but was made a prisoner by the British while at sea, and kept a close prisoner in the Tower for fifteen months. In 1781 he was released, and appointed by the Congress one of the commissioners to negotiate a peace, with Franklin and Jay as his colleagues. D. Dec. 8, 1792, at Charleston, S. C., and by a direction in his will his body was burned and the bones afterwards buried. Many of his pamphlets and other papers have been reprinted.

**Laurens** (Col. JOHN), "the Bayard of the American Revolution," b. in 1753, a son of Henry Laurens; educated in England, and in 1777 joined the army, and was placed upon the staff of Washington, who loved him as a son. From Monmouth to Yorktown he was in all of Washington's battles, and in all displayed the utmost valor, so that Washington is reported to have checked him for rashness. He wounded Gen. Charles Lee in a duel, and the latter declared he "could have hugged the boy" for his handsome behavior on that occasion. Laurens was badly wounded at Germantown and Coosahatchie. In 1780 he went as a special minister to France, and successfully negotiated a loan. Returning, he served with great and even unnecessary activity under Greene, and was killed in the contest on the Combahee, Aug. 27, 1782. (See his *Life and Correspondence*, by W. G. Sims, 1867.)

**Laurent'** (FRANÇOIS), b. in Luxemburg July 8, 1810; studied law at Louvain and Liège, and was appointed professor in civil law at the University of Ghent in 1835. His historical essays have been collected under the title *Études sur l'Histoire de l'Humanité* 14 vols., 1860-68.)

**Laurentian Mountains**, the principal range of British America, forming the watershed between Hudson's Bay, the St. Lawrence, and the great lakes, and between the same bay and the Mackenzie River. It rises near the Atlantic sea-coast of Labrador, sweeps S. W. across the Ottawa River to Lake Ontario at its outlet, thence curving N. W. skirts Georgian Bay, Lakes Huron and Superior, and thence N. to the Arctic Ocean, with a total length of 3000 miles. The fundamental series of rocks, called the Laurentian System by Sir William Logan, consists of highly metamorphosed sedimentary deposits of hornblende and micaceous gneiss, alternating with mica schist, and abounding in beds of crystallized limestone and of magnetic oxides of iron, as well as vast masses of granite, syenite, and greenstone. This system is believed to be older than any of the Silurian strata in Great Britain, and even to be the oldest on the globe. Indications of organic life have been detected and classified by Dr. J. W. Dawson as *Eozoon Canadense*, it being still uncertain to what groups they should be referred.

**Laurentius**, SAINT, was, according to tradition, a pupil of Sixtus II., who made him deacon, and afterwards archdeacon and treasurer, at Rome. In 258 A. D. the magis-

trate, during the Valerian persecution, commanded Laurentius to reveal the treasures of the Church; accordingly, the saint collected a company of poor, sick, lame, and blind persons and presented them as the required treasures; for which act he was condemned to be broiled alive. He underwent martyrdom with great courage and resignation Aug. 10, 258.

**Laurenza'na**, town of S. Italy, in the province of Potenza, situated in a mountainous and not very fertile district. It is not on the line of any railway, and is even without carriage-roads, but by means of mules it carries on a considerable trade with the neighboring provinces. Pop. in 1874, 6963.

**Lau'restine**, or **Lauresti'nus**, the *Viburnum Tinus*, an Old-World shrub, one of our finest cultivated evergreens, belonging to the order Caprifoliaceæ. It has somewhat poisonous qualities.

**Lau'ria**, town of S. Italy, in the province of Potenza, on the high-road from Naples to Calabria. It has fine churches and other good buildings, and was the birthplace of the celebrated Admiral Ruggiero di Lauria. P. in 1874, 10,696.

**Lau'ric Acid** [Lat. *laurus*, "laurel"], **Laurostearic Acid** (Marsson), **Pichuric Acid**, or **Pichurimtaig-säure** (Sthamer),  $C_{12}H_{24}O_2$ . This fat acid belongs in the fatty group of monatomic acids,  $C_nH_{2n}O_2$ , and was first described by Marsson (*Ann. Pharm.*, xli. 43, 1842) from the fat of the bay tree (*Laurus nobilis*), and by Sthamer (*l. c.* liii. 393) from the fat and the volatile oil of the pichurim bean (*Faba Pichurim maj.*). Gideon E. Moore also found it in the wax of *Myrica cerifera*. *Sill. Jour.* [2], xxxiii. 313). It exists as a glycide (laurostearine or laurine), from which it is prepared by saponifying these fats or the wax by caustic alkaline solutions, and after the soap is separated by common salt (Marsson), decomposing the soaps thus formed by hydrochloric or tartaric acids. Lauric acid also exists in other like vegetable bodies, sometimes in connection with myristic acid ( $C_{14}H_{28}O_2$ ), as in *Myrica cerifera* and the so-called Dika bread (*Mangifera Gabonensis*), and in a salve-like fat obtained from *Coccus Azin*, the *Age* or *axin* of the Mexicans. In connection with many other fatty acids, it exists in spermaceti and in the oil of the cocoanut. It fuses at about 43° C. to a colorless oil, and solidifies to a sealy crystalline white mass, and crystallizes from its alcoholic solution in white tufts and silky needles, or sometimes in nearly translucent scales. It dissolves readily in alcohol, and yet more freely in ether. Its alcoholic solution has a feebly alkaline reaction. It is quite insoluble in water, but when boiled in it volatilizes with the vapor. The sodium, potassium, and barium salts of lauric acid are soluble in water. The salts of the heavy metals with lauric acid are insoluble, or sparingly so. The calcium salt  $Ca''(C_{12}H_{23}O_2)_2$  obtained by mixing the solutions of laurate of sodium and calcium chloride is resolved by distillation into calcium carbonate and laurostearone =  $Ca''CO_3 + C_{24}H_{48}O$ . B. SELLMAN.

**Lau'rine** [Lat. *laurus*, "laurel"], or **Bayberry Camphor**,  $C_{22}H_{36}O_3$ , a crystalline body obtained from the berries of the bay tree.

**Lauriston', de** (JACQUES ALEXANDRE BERNARD LAW), MARQUIS, b. in Pondicherry, India, Feb. 1, 1768; was a companion of Napoleon at the military school of Paris, and distinguished himself in war and diplomacy during the Revolution, the Consulate, and the Empire. His defence of Ragusa against the Russians was a brilliant exploit, and the battle of Wagram was decided by his valor and judgment; and he was the negotiator of the marriage of Napoleon with Maria Louisa. He was favored by Louis XVIII., being made a marquis in 1817 and marshal of France in 1821. D. at Paris June 10, 1828.

**Lau'rite**, a sulphide of ruthenium and osmium, which occurs in small, iron-black, lustrous crystals, associated with native platinum, in Borneo and Oregon. It contains sulphur 31.79 per cent., ruthenium 65.18, and osmium 3.03, agreeing nearly with the formula  $OsS_4.12RuS_8$ . It was discovered by Wöhler, and named in honor of Mrs. C. A. Joy. (See *Ann. Ch. Pharm.*, cxxxix. 116, and *Zeitsch. f. Ch.* [2], vi. 85.)

**Lau'rium**, a range of hills in Attica, Greece, famous in ancient times for rich mines of silver, lead, zinc, and antimony. At the beginning of our era these mines were deserted, being considered exhausted. In 1863 a foreign company began to rework with profit the refuse left by the ancient miners, and have recently reopened the mines themselves.

**Laur'vig**, town of Norway, on an inlet of Christiania Fiord, has a good harbor, large distilleries, some trade in timber, and very important iron-works in its vicinity. Pop. about 5000.

**Lausanne'** [anc. *Lausanum*], city of Switzerland, capital of the canton of Vaud, on the northern shore of the Lake of Geneva, built on two hills, connected by a splendid bridge of granite, has a beautiful Gothic cathedral, commenced about 1000, completed in 1275; a library of 90,000 volumes, many good educational institutions, and several manufactories of tobacco, leather, and gold and silver ware. On account of its beautiful situation on the southern slope of the Jura Mountains, and near the Lake of Geneva, it attracts yearly a great number of tourists, who generally reside here for some time. Lausanne is famous in literary annals from having been the residence of Haller, Voltaire, and Gibbon. The house occupied by the latter while writing his celebrated *History* is still shown, and visited by multitudes of travellers. Byron wrote here his *Prisoner of Chillon*. An ecclesiastical council was held here in 1449, a conference between Calvin, Farel, and Viret in 1536, leading to the adoption of the creed of the Reformed faith, and in modern times it has been the scene of a noted peace congress (Sept., 1871), and a Masonic universal convention (1875). Pop. 26,520.

**Lausanne**, tp. of Carbon co., Pa. Pop. 1416.

**Lauzun', de** ARMAND LOUIS DE GONTAUT, DUKE, b. in Paris, France, Apr. 15, 1747; commanded a naval expedition which captured Senegal and Gambia from the English (1779); took part in the American war (1780-83) at the head of "Lauzun's Legion;" afterwards succeeded to the title of duc de Biron; was a deputy to the States General; a confidant and secret agent of the duke of Orleans; appointed general in chief of the army of the Rhine July 2, 1792, of the army of the coasts of La Rochelle May 15, 1793; took Saumur, and defeated the Vendéans at Parthenay. He then tendered his resignation, but being accused by Carrier before the Committee of Public Safety of too great lenity to the Vendéans, he was deposed, thrown into the Abbaye prison, tried for conspiracy before the Revolutionary tribunal Dec. 31, 1793, and executed the same day, meeting his fate with cynical courage. Lauzun had great ability, but was dissolute and unprincipled. His *Mémoires* were published at Paris in 1822.

**La'va** [Lat. *lavare*, to "wash"], the material, fused or solidified after fusion, which has escaped from a volcanic crater. The term is, however, applied generally to those volcanic rocks which are filled with ragged cells. If extremely light and loose, it is called scoria or slag. There are several varieties of lava. Molten lava flows like molten glass or iron, a portion being usually unfused and held in suspension in the fused portion, which is, indeed, a native glass. The boiling motion sometimes observed in hot lava is due to the escape of steam, sulphur-vapor, carbonic acid, air, etc. Lava-beds, after cooling, sometimes exhibit great caverns, which are ascribed to the flowing off of the lower strata of the lava after the cooling of the surface. (See *Volcano*, by PROF. ARNOLD GOYER, Ph. D., LL.D.)

**Lava Ornaments** (so-called) are made of iron slag, which is melted and manufactured into vases and other small ornamental and useful articles.

**Lavaca**, county of S. Central Texas. Area, 926 square miles. It is partly timber-land, and has considerable areas of prairie. Nearly all the soil is very productive. Livestock, corn, cotton, wool, and fruit are important products. The county is well watered by the Navidad and the head streams of the Lavaca River. Cap. Hallettsville. Pop. 9168.

**Lavaca** (PORT LAVACA P. O.), seaport of Calhoun co., Tex., on the W. side of Lavaca Bay, an arm of Matagorda Bay. It is the S. E. terminus of the Mexican Gulf and San Antonio R. R., and has an extensive coastwise trade. Pop. 768.

**Lavagna**, town of Italy, in the province of Genoa, famous for its excellent quarries of slate (Chiappami). This slate is extensively used for roofs, pavements, and other domestic purposes, and is largely exported to various European countries, and also to America. The public buildings of the town are imposing, especially the churches. Pop. in 1871, 6888.

**Laval**, town of France, the capital of the department of Mayenne, on the Mayenne River. It is noted for its linen manufactures; linen goods to the value of half a million francs are sold at each of its monthly markets. Among its other manufactures are paper and earthenware, and it has a brisk trade in grain, timber, and cattle. Pop. 22,892.

**Laval**, county of Quebec, Canada, consisting of the Isle Jésus, an island 23 miles long and 6 miles broad, lying between the Ottawa River on the N. W. and the Rivière des Prairies on the S. E. Pop. 9172.

**Laval, de** (FRANÇOIS DE MONMORENCY), b. of an ancient and noble family, at Laval, France, Mar. 25, 1622;

became a priest in Paris 1645; declined the bishopric of Cochín China in 1651; became archdeacon of Evreux in 1663; bishop of Petraea in *partibus et vicis-apostolicis* of New France in 1668. In 1663 he founded the seminary of Quebec, and in 1666 consecrated the parish church of Notre Dame. In 1674 he was bishop of the new see of Quebec, from which he retired in 1688 to his seminary, to which he gave his worldly possessions. He was *de facto* ruler of Canada, in civil as well as ecclesiastical affairs. The Laval University at Quebec commemorates his name. D. at Quebec May 6, 1708.

**Lavalle'**, post tp. of Sauk co., Wis. Pop. 881.

**La Vallière, de** LOUISE, b. in 1644 in the province of Touraine; was one of the "filles d'honneur" of the duchess of Orléans (Henrietta of England), when she became in 1661 the mistress of Louis XIV., whom she loved sincerely and for himself, not for his royal title, as did afterward Montespan, Maintenon, etc. She represented the only poetical ray which brightened the life of the man who was called the "sun king" (*roi soleil*). Mlle. de la Vallière never used her influence except for doing good to everybody, and she was so much ashamed of her equivocal situation that she entered a convent as soon as the passion of Louis XIV. for Mademoiselle de Montespan and others allowed her to bury herself in a religious life. The king took her forcibly once from the convent in 1670, but at last, in 1675, she took her religious vows under the name of Sister Louise of Mercy (*Sœur Louise de la Miséricorde*). D. at the Paris Carmelite convent in 1710. She left *Letters and Reflections on the Mercy of God*. FELIX AUCARNE.

**Lavandu'la Spi'ca**, the broad leaved *lavandula*, yields oil of spike (the true but not the common commercial article, which is valued by painters and artisans, and is used in farriery).

**Lavater'** (JOHANN CASPAR, b. at Zurich, in Switzerland, in 1741; studied theology, and in 1764 was appointed preacher, first of the orphan house, then of St. Petri church in his native town, which position he held till his death, in 1801. The most prominent trait in his character was his absolute veracity. Truth was with him not a duty, but a passion—not the honor of his soul, but the necessity of his nature. Wherever he found truth, with Christ or Cagliostro, with Spinoza or Mesmer, he acknowledged and accepted it unconditionally. But the consequence was, that his adversaries took the opportunity of accusing him of almost every kind of heresy which ever had appeared in the history of Christianity. With his character corresponded his talent. As his veracity was a passion, and not a pedantry, his conceptions of truth and falsehood were intuitions, and not products of analysis. Rapt in enthusiasm or struck by horror at what he saw, he painted his visions with a love or hatred which generally commanded the feelings of his audience, but which often gave his views a distasteful one-sidedness. His friendship with Goethe is one of the most beautiful instances on record of mutual sympathy, and its elevating and expanding influence on human character. But when in 1780 he wrote his *Pentius Plotius* he gave such a picture of a no Christian that Goethe literally shrank from him with all the aversion and antipathy of which his nature was capable. Lavater came to his door and wrote his name on the tablet, but Goethe remained unmoved, and would never see him any more. There was always a tendency towards mysticism in Lavater, but in his earlier days he was conscious of this tendency, and—for instance, in his *Ansichten in die Ewigkeit* ("Peeps into Eternity")—the reader is charmed without being duped by his mysticism. But when he grew old he became visionary, a prey to the obscurity of charlatanry, and his fervor and zeal turned into fanaticism. He hailed the French Revolution with unbounded enthusiasm, but when the king was beheaded he at once turned around and became one of its bitterest opponents. Even his life was often in danger, and when, in 1799, Massena took Zurich he was fired at in the streets, where he administered help to the wounded and dying, and he d. two years after from a wound he received on that occasion. His poetical writings are entirely without interest, and his religious writings are so interwoven with the interests of the moment that they cannot be appreciated, hardly even understood, without a thorough knowledge of the state of the German civilization at the end of the eighteenth century. But his *Physiognomische Fragmente*, which he published 1775-8, in four large volumes, profusely illustrated and very expensive, will never cease to interest mankind. That book started a new idea, or, rather, it does, but a natural and necessary process which takes place whenever man meets man, with such exactness and fertility as to raise this process from a dull and sluggish practice to a conscious and free mental activity. Where there is combination there is significance, where there is movement there is character. Consequently,



the human figure, which is the finest combination known, must signify something of its nature, and the motion of its parts, the play of its features, must express something of its character. But before Lavater this had never been said. The impression made by the outward appearance had been overlooked. People had judged one another from their clothes. And when Lavater demonstrated that the soul, the character, the history of an individual, was painted on his face, that a human face might be read like a printed leaf, he produced the profoundest sensation. People were panic-stricken. They began to wear masks. They left the drawing-rooms when a person entered who believed in Lavater. No less was the enthusiasm. People felt that a new signification had been added to beauty, a new charm to life, a new sensibility to the soul. It has been argued against the *Physiognomische Fragmente* that the author has tried to make physiognomy a science, but the criticism is hardly just. Lavater knew very well that physiognomy is a talent and not a science; and although he is very anxious to establish rules and show how a certain vice, for instance, always affects a certain feature in the same way, he is as anxious to impress upon his readers that the rules are subordinate to the total impression, and the single features must be interpreted by the view of the whole. His rules are to him a convenience, and hardly anything more.

CLEMENS PETERSEN.

**Lavaur'**, town of France, in the department of Tarn, on the Agout. It is the entrepôt of the silk produced in Upper Languedoc, which is spun here, and then sent to Lyons or Paris. Pop. 7438.

**Laveleye'** (ÉMILE LOUIS VICTOR), b. at Bruges, Belgium, Apr. 5, 1822; studied at the Athénæum of his native city, and at the Collège Stanislas in Paris, and took high honors in the law course at the University of Ghent. From 1848 onward he has been entirely occupied with those economical studies which have given him so great a reputation. At first he wrote in the Belgian periodicals, defending liberal principles against the Ultramontanes; became from 1853 a constant contributor to the *Revue des Deux Mondes*; was in 1864 appointed professor of political economy at the University of Liège, and in 1867 represented Belgium as member and secretary of the international jury upon paintings at the Paris Universal Exposition. He has been honored with membership in the Royal Academy of Belgium and the French Academy of Moral and Political Sciences. Among his numerous works, that on *Property and its Primitive Forms* (1874) has already become a classic. In June, 1875, he published a small volume on the *Religious Conflict in Europe*, with a preface by W. E. Gladstone.

**Lavello**, town of Italy, in the province of Potenza, of ancient origin. It suffered severely from an earthquake in 1801. Pop. in 1874, 5709.

**Lavender**, the *Lavandula vera*, a labiate shrub, a native of the S. of Europe, very extensively cultivated for its fragrant flowers, which yield a volatile oil much used in perfumery. Lavender-water, spirit of lavender, etc. are of considerable service in pharmacy and medicine.

**La'ver**, a name applied to several edible seaweeds, such as *Ulva latissima*, *Porphyra laciniata*, and *P. vulgaris*. These are quite commonly eaten as luxuries in Europe, either pickled or stewed.

**Laverdière** (CLAUDE H.), b. at Château-Richer Oct. 23, 1826; was ordained a Catholic priest in 1851; became a professor in the seminary and librarian of Laval University. He took part in the publication of three volumes of *Jesuit Relations* (1858) concerning early missions in Canada, edited the voyages of Champlain (5 vols., 1870), with notes and a biography, the *Journal des Jésuites* (1871), wrote a *Histoire du Canada* for schools, and several smaller treatises upon subjects connected with early Canadian history. D. at Quebec Mar. 27, 1873.

**Lavialle'** (PIERRE JOSEPH), D. D., b. at Mauriac, France, in 1820; came when twenty-three years old to the U. S.; was ordained a Roman Catholic priest; served for a while in New York, and then became president of St. Mary's College, Ky., and was its president 1855-65. In the latter year he was made bishop of Louisville. He founded a number of schools and charitable institutions. D. near Bardstown, Ky., May 11, 1867. Bishop Lavialle was a man of extraordinary energy and ability, and was highly esteemed by Protestants, as well as by those of his own faith.

**Lavington** (GEORGE), D. D., b. in Wiltshire, England, in 1633; became canon of St. Paul's, London, in 1732, and in 1747 bishop of Exeter. Becoming involved in a controversy with Wesley and Whitefield, he wrote in 1749 *The Enthusiasm of the Methodists and Papists Compared*, an amusing and well-written work, not without some passages

of a too broad railery, and very defective as a statement of facts. In 1755 he published a work of similar character respecting another sect of dissenters, *The Moravians Compared and Detected*. Bishop Lavington partially retracted his language towards Wesley, and partook of the communion with him as late as 1762, in which year he died.

**Lavin'ium**, now *Prænesta*, an ancient city of Italy, in Latium, was situated 17 miles S. of Rome, near the sea. It was founded, according to tradition, by Æneas, on his arrival in Italy, and named after his wife Lavinia, and was in early times the sacred metropolis of the Latin cities, but never acquired any importance, political or commercial. The name was often confounded by classical writers with that of another ancient Latin city, *Lanuvium*.

**Lavoisier'** (ANTOINE LAURENT), an illustrious savant, one of the fathers of modern chemistry, b. at Paris of wealthy parents Aug. 16, 1743; studied at the Collège Mazarin; pursued astronomical knowledge under La Caille; learned botany under Bernard de Jussieu; worked in Rouelle's chemical laboratory in the Jardin des Plantes; became an associate of the Academy in 1768; obtained a farmer-generalship in 1769, in order to increase his income, his expenditures in chemical research requiring a large outlay of money; took a prominent part in public affairs, writing numerous and able papers on state questions; discovered the composition of water in 1783; and made many important researches in physics. In chemistry, the science to which his attention was chiefly directed, he made not only important discoveries and great inventions in apparatus and in methods of work, but he was one of the first and ablest of philosophical chemists, the destroyer of the false theories of Stahl and Priestley, and was the principal inventor of the system of chemical nomenclature which prevailed exclusively for more than fifty years after his death. Lavoisier was guillotined by the Jacobins May 8, 1794, on account of his former connection with the farming of the taxes. The most important of his works are *Traité de Chimie* (1789) and *Mémoires de Physique et de Chimie*, which includes his principal occasional scientific papers.

**Law**. When the magnitude of any quantity is altered by changes of any other quantities, the statement of the relation existing between them is known as a law of nature. Thus, the fact that the force of gravity is inversely as the square of the distance is known as the law of gravitation, and the equality of the angles of reflection and incidence is the law of reflection. Generally, laws may be expressed by equations, and the highest aim of scientific investigation is to determine the form of these equations, and to show that they follow from simple well-established laws. Laws seldom seem exact, owing to various disturbing causes, but if these are properly allowed for, the true law is never deviated from in the ordinary course of nature. The failure of one or more of these laws in a particular case constitutes a miracle. The term "law" is also applied, but less properly, to the statement of any general fact, as that all bodies possess mass or that matter is impene-trable.

E. C. PICKERING.

**Law** [Lat. *lex*; Ang.-Sax. *lag*]. When taken in its widest and most comprehensive manner, without limitation to any particular subject-matter, certain essential and elementary notions are implied in the term Law, all necessary to its complete and accurate meaning. These essentials are (1) a lawgiver; (2) an inferior subject; (3) a command; (4) power in the lawgiver, resulting from some organic relation between himself and the subject, to enforce the command. As the utterance of a command implies the formation of a wish and an act of the will, it follows that the lawgiver must necessarily be a rational, intelligent being, and, so far as we are acquainted with existences, must be either God or man. The authors of all law, then, in a true sense of the term—the only lawgivers possible—are the Divine Ruler of the universe, and men who may be clothed with authority over individuals or over that organized aggregate of individuals which forms the state. The commands which God issues in reference to material objects, whether animate or inanimate, and which prescribe rules concerning all the movements and processes of the physical creation, fall under our general definition, and are truly *laws*. They certainly differ in a most important feature from the commands addressed to rational beings, since they are wholly without any moral quality; but it is only upon the assumption that the invariable order and sequence of acts and events in the material universe are the results of commands uttered and rules set by a conscious and intelligent lawgiver that the phrases "*laws of nature*," "*physical laws*," "*laws of natural science*," and the like, become at all proper and admissible; without this assumption such forms of speech are self-contradictory and unscientific. The other and more perfect class of the divine laws embraces those set by Him



to rational beings, to mankind. Here the inferior subjects are endowed with a free will, are clothed with an ability to choose between an assent and a refusal to comply with the command. The command to do or to forbear, which is only the expressed will of the lawgiver, in itself creates in the rational subject a corresponding duty or obligation to do or to forbear; he is bound to obey. When, therefore, the subjects of God's laws are intelligent beings, a fifth essential element is involved in the general conception of law, and that is the notion of duty or obligation. Again, as the choice exists between obedience and disobedience, as the inferior subjects may violate the duty which has arisen from the promulgation of the command, the power of enforcement residing in the lawgiver is exercised by the threat and imposition of some evil as a consequence of the violation. Hence we find a sixth essential element involved in the general conception of law when addressed to rational beings—that of compelling obedience by the danger or fear of suffering evil in the event of disobedience; which evil, thus imposed as a penalty, is termed the *sanction* of the law. Such is the nature of God's law, which is addressed to rational beings, and which may be collectively designated the "moral law," since its commands necessarily create an obligation resting upon those to whom they are addressed, and obedience or disobedience is therefore always a moral act.

Human laws, or those which are set by human lawgivers, are all of the same essential nature as those which have collectively been designated the moral law of God. The differences are plainly those of degree, and not of kind. The object of all human law—or, in other words, of all commands uttered by the constituted lawgiver—is to prescribe and impose duties, to create and define rights, and to enforce the observance of both. A brief analysis will disclose the general nature of all such juristic rights and duties, and will explain their genesis, or how they arise from the commands of the lawgiver. I select for the purpose of this analysis the highest type of human legislation—namely, the municipal law, or that of independent sovereign nations, in which all commands are uttered by the supreme power of the state, whatever be the form of the government, or whatever department thereof possesses this legislative function. The object of every command is to impose a duty and to create a right, and its effect is thus necessarily twofold: the duty rests upon some person or class of persons, and a corresponding right is given to another person or class of persons. Two distinct individuals or groups are thus necessarily affected by every command, and they are placed by it in a relation of dependence, or even of antagonism. All rights created by the law are correlative to duties, and all duties are correlative to rights. The supreme power in the state issues a command, the effect of which is to clothe a given person with a certain right. Now, a legal right in its highest and widest sense is nothing but a claim that another person or class of persons shall do some act or forbear from some act respecting the individual who holds the right. We could have no legal rights were there not other persons whom these rights obliged to do or forbear towards us. Every right, then, residing in one person corresponds or correlates to a duty devolving upon another person or class of persons. All possible rights and duties thus created or imposed by the commands of the supreme power in the state belong to one or the other of two classes: they are either private or public. In the first class the duties rest upon persons, and the corresponding rights are held by other persons, so that the command always and necessarily affects two different sets or groups of individuals, both standing in the same subordinate relation to the state. In the second class the duties also rest upon persons, but the corresponding rights are held by that organic aggregate or community of persons which constitutes the state. This capital line of distinction in reference to the holders of rights not only separates all the primary rights and duties into two grand departments, but it also divides the remedies for their violation into the corresponding classes of civil and criminal. These duties are either positive—that is, obligations to do some act; or negative—that is, obligations to refrain or forbear from some act. When the determined person upon whom the duty rests, or any one of mankind where the duty rests upon all, neglects to do the act which his positive obligation requires of him, or does the act which his negative obligation forbids him to do, he commits an injury, offence, or delict. A delict, injury, or offence is, therefore, at once the violation of a duty resting upon the offender and the infringement of a right possessed by some other person. Such violations of duty must be redressed, and for this purpose the law is provided with sanctions. Injuries themselves are divided into two general classes, exactly corresponding to the distinction of rights into private and public already stated—namely (1) those which primarily affect the rights of private persons, and are re-

addressed by private remedies pursued by the injured party; and (2) those which primarily affect the state, and are redressed in its name by means of punishment inflicted upon the wrongdoer. It sometimes happens that the same physical act is both a public and a private injury, and exposes the offender to both a criminal punishment and a private remedy. It is plain, however, that in such cases two distinct rights are invaded and two distinct duties are violated by the same physical act. How far this double nature of wrongs and this double redress thereof shall be allowed, greatly varies in different systems of national law, according to their notions of public policy.

The essential elements which enter into the conception of law set by human authority having been thus determined, I proceed to describe its grand divisions or departments and the general nature of its subject-matter, without reference to any particular national forms, or to any special modes of enactment or distribution of governmental functions. The law, considered both objectively and subjectively—that is, both as a system of rules creating rights and imposing duties, and as a method and a power of establishing further rules—consists of two distinct departments, two sciences—jurisprudence and legislation. Jurisprudence in its primary signification denotes the laws which have been enacted, either the entire body of existing legal rules which prevail in any particular state, or the features which are common to all the national systems as they have been established in different countries and at different times. As a science it is occupied with the study and investigation of these laws. It is naturally separated into two divisions, which may appropriately be called general and particular. General jurisprudence is employed in the discovery, examination, and arrangement of institutions, principles, and rules which are found as parts of all existing legal systems, and especially of those which have far advanced in the march of civilization. It does not represent the whole law of any country, but rather the similitudes between the laws of different countries. Particular jurisprudence is concerned only with the whole existing law of a specified country, in whatever form this may have issued from the hands of the legislator who had called it into being as a collection of positive rules—that is, with the municipal law. In determining the exact import of this term, another conception is introduced and joined with that of the law—the conception of the state. The state or nation—for the words are in this respect synonymous—is an independent, separate, and sovereign political society, with its own organization and government. The conception of the state may be summed up in the single but most comprehensive term, political sovereignty; but this includes the attributes of political independence, political equality, and absolute power within the domain of legislation. From the union of the notions involved in the terms "law" and "the state" we complete the description of the complex result which is denominated the "municipal law." It is the entire body of positive jurisprudence which belongs to a separate and sovereign political society, a state; which is promulgated in its name and by its authority, in whatever manner that authority may be exercised; and which is absolutely binding, throughout the territorial jurisdiction of that state, to the exclusion of all and every other law.

While jurisprudence is conversant only with laws which have been enacted, legislation has to do with laws which should be enacted, and with the process of enactment, with the discovery and statement of what the law as a whole ought to be, and with the bringing of it into an agreement with that perfect standard. Jurisprudence and legislation are therefore, in respect to their ultimate objects, separate, but in their study as sciences, and in the actual operations by which their objects are attained, they must necessarily be combined.

JOHN NORTON BODDIE.

**Law, Canon.** The term "canon law" designates the body of rules and regulations which were primarily established by the Christian Church and enforced by ecclesiastical authority, but which in the course of time became extended to many matters purely civil, and were recognized and sanctioned by the tribunals of the state. After the Roman empire became Christian, and the Church became in part identified with it, there arose a threefold jurisdiction of the ecclesiastical tribunals—that is, of the bishops in their various degrees of dignity and administrative authority. (1) This jurisdiction was exercised in respect of any subject-matter whatever, civil or otherwise, over all the clergy, over all persons who held orders. (2) The jurisdiction extended over laymen in relation to all matters strictly ecclesiastical—questions pertaining to the internal order, discipline, doctrines, and observances of the Church. It also extended over laymen in relation to certain special subjects, which, although strictly civil, and in modern systems of national jurisprudence universally regarded as such, were claimed by the Church to have a peculiar religious



aspect and to nearly concern the soul's welfare. The most important of these special subjects were marriage and divorce and the succession to the personal estates of decedents. The term canon law has a direct and primary relation to the creative source by which the rules that compose it are uttered—namely, the law-making power of the Church considered as an organic and independent society capable of legislating within a certain domain and upon a certain class of subjects. It is broader than the ecclesiastical law, for while it embraces within its scope everything that pertains to the organization, order, doctrine, and discipline of the Church, it also extends to many other topics which have only a very indirect connection with these purely ecclesiastical matters. In short, it is to be regarded as a comprehensive system of regulations, primarily established by the legislative authority residing in the Church, relating to subjects both spiritual and temporal, and administered by both spiritual and temporal tribunals.

The canon law as a separate and completed system is, and for several centuries past has been, contained in collections of digests and codes which taken together are denominated the *Corpus Juris Canonici*. The Roman law, by the orders of the emperor Justinian, had been arranged in three separate compilations—the Pandects or Digest, the Code, and the Novells—and in this compact form was known as the *Corpus Juris Civilis*. In direct imitation of this proceeding, both as respects name and method, the *Corpus Juris Canonici* is composed of three distinct parts—"The Decree," "The Decretals," and "The Extravagantes"—which have some correspondence with and analogy to the Pandects, the Code, and the Novells. I. "The Decree."—This work was composed and published about the year 1140 by Gratian, a Benedictine monk of Bologna, who undertook the task at the request of St. Bernard, with the immediate object of furnishing a treatise for use in the university at that city. It is based upon all the previous legislation of the Church, which was treated as authoritative, and which was scattered through numerous compendiums, acts of councils, and decretals of popes; and it is, in fact, a complete collection or epitome of the canon law as it then existed and was in force throughout the Western Church. The name given to it by the author was *Concordantia Discordantium Canonum*, but it is generally known and cited as the "Decree of Gratian" (*Decretum Gratiani*), or more often as the "Decree." It consists chiefly of extracts taken, as above stated, from all other writings that contained the law in a scattered and confused shape, and these citations are arranged and classified according to their subject-matter, being connected by a text which the author himself composed. In other words, these extracts do not, as in the Pandects, make up the entire work; the legal principles, doctrines, and rules are given by the author in his own language (technically, *dicta Gratiani*), and the citations are annexed thereto as proofs or illustrations. The whole body of the jurisprudence as it then existed is thus presented in an orderly and scientific method. The "Decree" is divided into three parts. Part First contains 101 sections or paragraphs—technically called "distinctions" (*distinctiones*)—and the important subjects of which it treats are the nature and sources of different kinds of law, and especially of the ecclesiastical law, persons in holy orders, and the bishops and other higher ranks of the clergy. Part Second is quite different in its external form, and consists of thirty-six "causes" or cases (*causæ*), which are first stated, and under each are placed the legal questions that arise therefrom (*questiones*), which questions are then solved by appropriate extracts similar to those in the first part. The thirty-second "cause" and third "question" is a special treatise on the subject of penance (*De penitentia*), and is separated into seven "distinctions." Part Third, which has for its title "*De Consecratione*," is divided, like the first, into "distinctions." It treats of the consecration of churches, of the sacraments, and of the performance of divine service. The work in all its parts contains about 3000 extracts, each being indicated by the letter C, which signifies "*caput*" or "*capitulum*," and not, as has generally been supposed, "canon." Although the "Decree" was the compilation of a private person, its substance was taken from the existing law; it was at once sanctioned and approved by the highest authority in the Church—by popes themselves—and thus acquired all the force of original legislation. Its text has been the object of numerous commentaries, or, as they are technically termed, glosses, the most important of which, the *Glossa ordinaria*, is usually printed with it. Many editions have been issued from time to time; and in consequence of a decree made by the Council of Trent a revised and corrected edition was prepared by papal command under the care and direction of several learned doctors, and was finally published A. D. 1580. II. The second part of the *Corpus Juris Canonici*, called "The Decretals," consists of three

distinct subdivisions: (1) "The Gregorian Decretals," or decretals of Pope Gregory IX., in five books; (2) the "*Liber Sextus*" or the "*Sextus*," being a collection of decretals prepared by order of Pope Boniface VIII.; and (3) the "Clementine Constitutions," or decretals published by Pope Clement V. The following is a brief description of these compilations. After the great work of Gratian was completed, numerous collections of subsequent decretals were made by private persons, which possessed a greater or less amount of authority, but which, on the whole, tended to produce confusion and uncertainty in the study and administration of the canon law. To remedy this evil, Pope Gregory IX. directed his chancellor, Raymond, a Benedictine monk, to prepare a new compilation, which should be based upon and should take the place of all those to which reference has been made. Raymond accordingly in 1234 published his *Quinque Libri Decretalium Gregorii Noni*, which was at once approved and ordered to be used in the courts and the universities. It contains not only the decretals which had appeared since the "Decree of Gratian," but also some of a more ancient date which had been omitted from that work, together with extracts from the Fathers and from acts of councils, the whole being arranged in five books and distributed into titles, and again into chapters. The principal subjects of which it treats are the organization and jurisdiction of the spiritual courts, the proceedings therein and their sentences, the clergy, betrothal and marriage, and crime. The same condition of affairs again arose at a subsequent period; the same need was felt, and the same remedy was adopted. Pope Boniface VIII. caused another compilation to be made, containing all the decretals which had been issued since that of Gregory. It was published in 1298, and follows the same order of arrangement as its immediate predecessor; and under the notion that it was the supplement to that work it was called *Liber Sextus*. Pope Clement V. in the year 1318 issued a collection of his own decretals and of the decrees of the Council of Vienne, over which he presided, which is known as the "Clementine Constitutions." To the text of all these decretals commentaries or "glosses" have been added, which have acquired a certain authority from long-continued usage, from the judgments of courts, and from the teachings of universities. III. The "*Extravagantes*." This third part of the *Corpus Juris Canonici* consists of two divisions—the "Extravagantes of John XXII." and the "Extravagantes Communes." The former contains certain decretals of the pope whose name it bears, collected by an unknown author, and published without official sanction in 1325. The latter is a collection of decretals by various popes from Urban VI. to Sixtus IV., A. D. 1483. Neither of these compilations was made with authority, nor did they originally form a part of the *Corpus Juris Canonici*, but in 1582 they were incorporated into it, and placed upon the same footing as the other decretals by Pope Gregory XIII.

JOHN NORTON POMEROY.

**Law, The Civil.** The "civil law" (*jus civile*), in its strictly technical import, denotes the body of Roman jurisprudence collected by order of the emperor Justinian, arranged and digested in the compilations which taken together bear the name *Corpus Juris Civilis*. In this form it became to a great extent the basis of the municipal laws of the continental states of Europe. The term is not, therefore, exactly synonymous with "Roman law," and does not describe that system in its condition as the actual jurisprudence of the Roman empire; it was first used in its present special sense by the jurists of the Middle Ages, and was applied to the collections made by Justinian to distinguish them from the "canon law." The civil law of the Roman state and the canon law of the Roman Church thus stood side by side, and were the two great sources from which the jurisprudence of modern Europe has been largely derived. A description of the civil law, therefore, requires some account of the Roman law, of which it was in fact the final stage. The Roman law, as a national jurisprudence from the foundation of the city to the death of Justinian, in whose reign it was fixed in its present shape and ceased to be a growth, extended through a period of about 1500 years, and from an archaic state of barbarism it was transformed through progressive stages into an enlightened and philosophic code, so wise and just in its principles, and so lofty in its practical morality, that it is susceptible of little improvement from the culture of the present age. So far as the narrow limits of this article will permit, I shall sketch in a very general manner (1) the external history of its development—that is, the forms, means, and modes by which the law was created, and the process of growth from its primitive rudeness to its final perfection; and (2) the more important and characteristic features of the law itself, the principles, doctrines, and rules which were at length gathered into the compilations of Justinian. This latter account must necessarily be exceedingly imperfect,



and is given simply to illustrate the spirit of the Roman jurisprudence and its method of development.

*Historical Sketch.* Little is known with absolute certainty of the law in the earliest centuries of the Roman state, during the period of the kings. The political organization was in the highest degree aristocratic, and all power was held by the superior orders, the patricians (*patres*). The commons (*plebs*), though free, had substantially no voice in the management of public affairs, and even the private law discriminated harshly against them. It is inferred upon general principles—that is, from the general nature of barbarous societies, that the laws, or what were called the laws, consisted almost entirely of tribal customs, which were handed down by oral tradition, and the knowledge of which was possessed exclusively by the ruling classes. It is certain that for several centuries the law largely partook of a religious character, was intimately connected with religious observances, and enforced by religious sanctions. After the overthrow of the kingly power, and as the result of a political revolution in which the commons (*plebs*) acquired an accession of authority, in the year 452 B. C. and 392 of the city a partial code was prepared and adopted, which became, and ever after was, the basis of the Roman jurisprudence—that is, all future growth of that jurisprudence was actually or fictitiously constructed upon it as a foundation. This code was the celebrated Law of the XII. Tables, or the XII. Tables. The contents of this statute as a whole, and even its order and arrangement, are unknown. Certain extracts from it have been preserved in the writings of various authors, and from them modern jurists have attempted to reconstruct the entire text, but the result is of course conjectural. It seems to be established, however, that among other subjects the first, second, and third tables treated of judicial proceedings; the fourth of the paternal power, the power of the *paterfamilias* over the family; the fifth of heirs and persons under the care of tutors, and doubtless of the whole subject of succession; the sixth of property and possession; the seventh of buildings and fields; the eighth of delicts—that is, of injuries to person or property from which a right of compensation arose; the ninth of public and political law; the tenth of the law relating to sacred rites and observances; and that the eleventh and twelfth were supplementary to the others. A part of this code was certainly political; that portion which related to the private law was probably an enactment in a statutory form of the pre-existing customary regulations, without substantial change. For a long period subsequent to the epoch of the XII. Tables, the public history of Rome was a continuous conflict between the aristocracy (*patres*) and the commons (*plebs*), which resulted in the latter's obtaining complete political equality with the former; but this struggle has no interest for us except in its effect upon the actual law-creating power of the state. In England and the U. S. the law-making power is conferred upon two distinct departments, the legislature and the higher courts, the authority of the legislature, however, being supreme. In other words, the actual law of England and of this country was partly made by the legislature in the form of statutes, and partly made by the courts and promulgated in the form of judicial decisions, the latter being so far inferior that it can be altered by statute. The law of Rome grew up in exactly the same method, by a process exactly the same in its essential nature, although differing somewhat in its external form. A portion of it was statutory, and a portion—and during a long period of its history by far the greater portion—was the law of judicial decision, or what Bentham sneeringly called "judge-made law." I will briefly describe the modes in which these two species of the legislation were effected prior to the time when the legislative function became possessed exclusively by the emperor. The political constitution of the state provided three different official assemblies of the citizens—that by the centuries (*comitia centuriata*), which consisted of both patricians and commons; that by the curies (*comitia curiata*), which was composed of the patricians alone; and that by the tribes (*comitia tributa*), which was confined exclusively to the commons. The resolutions of the centuries were termed "laws" (*leges*), statutes, and were always binding upon the whole state; those of the other assemblies were originally binding upon their respective orders alone, but in the year 463 of the city, in consequence of a statute *lex Hortensia*, they were clothed with all the efficacy of laws. The assemblies of the patricians soon lost their legislative function, and were long retained for certain formal purposes only, while those of the tribes greatly increased in importance, and their ordinances (*plebiscita*) became a common form of legislation. During the republic the senate did not possess the power of law-making, but upon the establishment of the empire the popular assemblies were abandoned, and their function was transferred

to the senate: its resolutions (*senatus consultum*) for a while thereafter took the place of both the "laws" and the "plebiscites"—that is, became the only species of statutes. The law of judicial decision, on the other hand, was created by the magistrates, by far the most important of whom was the prætor. This office was first instituted soon after the inauguration of the republic. Its term was but one year, so that the changes in the actual incumbents were very frequent. The law-making function of the prætor was exercised in the preparation and promulgation of an official declaration or document termed the "edict." Upon entering on the duties of his office each prætor issued a statement of the legal principles, doctrines, and rules by which he should be guided in administering justice during his term. Each new magistrate would adopt the whole or the greater part of his immediate predecessor's work, and annex such improvements, amendments, or additions as he thought proper. In this manner the edict became a continuous and, to a certain extent, systematic body of jurisprudence, based upon the XII. Tables as its foundation, and increasing each year by the work of successive magistrates. That portion of it which, once established, was continued from year to year without change was termed *edictum perpetuum*, and since it was borrowed by each prætor from his immediate predecessor and incorporated into his own, it was also named *edictum translativum*. The new portion which a magistrate added was called *edictum novum*. It must not be supposed that the prætorian edict bore any resemblance to a modern statute or to a decision of a modern court, much less to a modern code or digest. It did not contain a statement of principles in a general and comprehensive form, nor of abstract rules of conduct defining the primary rights and duties of citizens. Like all legislation in a certain period of social development, it was almost entirely a mere announcement of the remedies which would be allowed by the magistrate under specified circumstances, and which had not been provided for by the pre-existing law. The law as created by the edict was in substance the enumeration of remedial rights, remedies, and actions, rather than the utterance of general rules of conduct. About the year 508 of the city, after the conquests of Rome had been widely extended, and its relations with foreigners had become constant and intimate, they not being regarded as amenable to or governed by the law pertaining to its citizens (*jus civile*), a special prætor was constituted with jurisdiction over legal controversies in which both or one of the litigants were foreigners. He was called the *prætor peregrinus*—that is, the prætor for strangers (*peregrini*)—to distinguish him from the ordinary magistrate, who then took the name *prætor urbanus*. As the prætor peregrinus was not in any manner restricted by the Roman law pertaining to the citizen (*jus civile*), but could without limitation invoke the rules of law common to all nations (*jus gentium*), which in time came to be considered as identical with the general principles of abstract justice and equity, his edict was the most important instrument in shaping the entire jurisprudence of the state, in freeing it from its primitive technicality and barbarism, and in bringing it to an agreement with the essential rules of right. The principles which he announced were in time adopted by the *prætor urbanus*, and thus the Roman law in all its departments was brought under the influence of the same legislative forces. The process of judicial legislation which has been thus described seems on the surface to be very different from that pursued in the courts of England and of the U. S., but it is essentially the same. The Roman magistrate attempted to anticipate all the facts, events, and transactions that might arise during his official term, and to lay down a previous rule applicable to them; while the English and American court waits till the acts and events have happened, and have been brought before it in a forensic dispute, and then for the first time declares the rule which determines the rights and obligations of the parties. Our judges legislate *ex post facto*, in the form of single decisions; the Roman magistrates legislated before the fact in the form of a more general edict; both plainly accomplish the same purpose in the political organization of the state. Certain inferior magistrates of the city, and especially the judicial officers of the provinces, possessed the power of issuing an edict, and that of the provinces (*edictum provinciale*) was of great importance. The constructive and legislative labors of the prætors—for their number was largely increased—continued through the republic, and reached their height during the early period of the empire, but declined and finally ceased after the law-making function of the emperor had been firmly established. The edict itself had grown to be long, and doubtless unwieldy. At length, in A. D. 130, by command of the emperor Hadrian, it was entirely reorganized and put into a permanent form by Salvius Julianus, a professional jurist-consult. Under the name *edictum perpetuum* it remained



from that time unchanged, the official code of the "judge-made law," and upon it the succeeding race of jurists expended their labors and their learning in the form of commentaries and treatises; it was separated into titles according to the subject-matter, following the order of the XII. Tables. It has been suggested by some modern writers that in this work of redaction the three great edicts—that of the prætor urbanus, that of the prætor peregrinus, and that of the provinces—were consolidated into one. If this was so, the process was the same which would take place in this country or in England if the rules of equity and of the common law should be combined and reduced into a simple harmonious system by rejecting from the one all that was in conflict with the more just and moral doctrines of the other. Another force which was greatly efficient in promoting and guiding the development of the law through the formative period I have not as yet mentioned; namely, the opinions of learned jurists (*responsa prudentium*). It has sometimes been said that these utterances of the juriconsults always had an absolute authority and were binding upon the courts, and that the jurists themselves were thus actual legislators, recognized as forming a part of the law-making machinery of the state. This is a mistaken theory, and presents a very erroneous view of the Roman legislation. As has been already described, the only constituted means for the creation of law were the statutes passed by the citizens in their assemblies, or afterwards by the senate, and the edict of the prætors. Whatever part the juriconsults as a class played in the great work of legal development—and it was a most important one—was by way of influence, was moral, and chiefly consisted in advising and assisting the magistrates in the performance of their legislative work, and in aiding the courts in the decision of causes. Beyond a doubt, the aid was great, the advice and guidance were powerful and effective, but they were not compulsory. During the flourishing period of the republic, and down to the time of Cicero, many of the ablest, best, and most learned citizens devoted themselves to the study of the law as a science and as an art. They were not advocates like Cicero; they formed a distinctive class, to whom, on account of their special knowledge, the names "juriconsults" and *prudentes* were given. They publicly instructed students; they were consulted by litigants, to whom they gave legal opinions. During the earlier period to which reference is now made they did not compose systematic treatises upon the law, but contented themselves with answering the cases, actual or hypothetical, which were presented to them. These answers, technically termed *responsa prudentium*, when cited to the courts would undoubtedly be used with much effect in determining the decision, and the effect would depend upon the reputation of the person whose opinion was quoted. It cannot be doubted also that in preparing his edict each prætor availed himself of all the aid he could obtain from the learning and wisdom of these professional experts; and this is the more probable from the fact that the prætor himself was often, if not generally, chosen from the same class, and he would naturally be anxious that his legislative work should meet the approval of all his fellow-juriconsults. After the empire was established the position of these jurists was somewhat altered. Augustus accorded to their opinions a certain legal authority, but required an imperial sanction or appointment for those who desired to exercise the function. Hadrian afterwards ordered that their juridical opinion should have the force of law, provided they all agreed, but if they differed the judge should be at liberty to follow whatever one he pleased. The character of the jurists themselves was also greatly changed. In the second and third centuries of our era a class of juridical writers arose far surpassing the earlier *prudentes*, whose labors brought the law to the highest condition which it reached. They introduced the philosophic element; they created the system of classification, which has remained substantially unchanged to the present day; they composed elaborate treatises either upon the law as a whole or upon some special department, and it was from these treatises that the material was taken which formed the *Digest* afterwards compiled by the command of Justinian. Finally, most of them occupied high official positions under the various emperors, and thus took an active part in the work of legislation, either by framing the "constitutions" issued in the name of the emperor, or by rendering the decisions in his supreme court of appeal. Of these illustrious men, whose labors have influenced the jurisprudence of the entire civilized world, five stand in acknowledged pre-eminence—Gaius, Papinian, Paul, Ulpian, and Modestinus. Gaius, who wrote in the time of the Antonines, held no office, but was a private teacher of the law. Of his works, the *Institutes* has been preserved almost entire, and its discovery in 1816 marked an era in the study of the Roman jurisprudence. Papinianus was the prætorian prefect, supreme judge of appeal, under Septimius Severus, and was murdered by

his son and successor, Caracalla. He was universally regarded by all writers who succeeded him as the foremost and greatest of the Roman jurists. Nothing remains of his numerous works except the extracts found in the *Pandects*, of which there are a great number. Paulus was prætorian prefect under Alexander Severus, A. D. 222. Besides the quotations contained in the *Digest*, one of his treatises, *Recepte Sententia*, still survives. Ulpianus wrote during the reigns of Septimius Severus and Caracalla, and was killed by the soldiery (A. D. 228) while prætorian prefect of Alexander Severus. The *Pandects* contain a greater number of extracts from his works than from those of any other jurist. Fragments of a separate treatise are also extant. Modestinus lived and wrote in the reign of Alexander Severus, and was a member of his council. He is only known to us by his contributions to the *Digest*. At the final overthrow of the republic the popular assemblies lost the power of enacting statutes, which was for a while transferred to the senate; it soon, however, became practically, and ere long openly, the attribute of the emperor alone. Finally, when the peculiar function of the prætor had ended, the whole legislative authority was centred in the supreme head of the empire, and there remained as long as there was any life or creative force in the law itself. The official declarations by the emperor were generically termed "constitutions," and were of three species—edicts, decrees, and rescripts. "Edicts" were legislative in their character, addressed to the whole empire, and in every respect the same as the "*leges*" of the earlier form of the government, and as the statutes of the present day. "Decrees" were judicial decisions rendered in causes brought before the emperor on appeal; while "rescripts" were official answers made to those who consulted him whether as public functionaries or as private persons. Decrees and rescripts had not the force of general statutes, but were used as precedents, and are found in the collections of imperial constitutions. It must not be supposed that the emperor personally prepared and issued the constitutions. Although done in his name and by his command, they were usually the work of professional jurists who filled high offices of state, and who were often the ablest, purest, and most learned men of the empire. It thus happened that some of the best examples of philosophical legislation appeared during the reigns of the very worst of emperors, such as Commodus, Caracalla, and Nero. From the time of Alexander Severus, which may be regarded as its culminating epoch, the Roman law rapidly declined; all power of progress had gone; and at length the appeal was constantly to the past and to the writings of the dead jurists. As an illustration of its condition, of the loss of all intellectual vigor, and of the blind reliance upon authority, an imperial constitution made A. D. 426 by Theodosius II. and Valentinian III. ordered that in the decision of causes the judge should always follow the opinion expressed by a majority of the five jurists whose names have already been mentioned; but if there was an equal division among those of the five who had expressed an opinion on the particular point, that of Papinian should prevail; and if he was silent, then the judge could exercise his own discretion. Some attempts were made at a partial codification during this final period of decadence. Two collections of imperial rescripts were prepared by private jurists—one by Gregorianus (A. D. 306) and the other by Hermogenianus (A. D. 365). The emperor Theodosius II. (A. D. 438) published a code containing the general constitutions (edicts) issued since the conversion of Constantine to Christianity, which was during the same year adopted by Valentinian III. in the Western empire. Although superseded in the East by the compilations of Justinian, it long continued to be used in the West, and was the collection of laws chiefly known to and employed by the Germanic tribes which overran the Western empire. A portion alone of this code has been preserved, somewhat condensed, in the *Breviarium* of Alaric.

The emperor Justinian commenced his reign A. D. 527. In 528 he appointed a commission of ten juriconsults, among whom were Tribonian and Theophilus, with directions to select from all the existing imperial constitutions those which were operative, and to arrange them in a systematic order. They were permitted to change the words, to combine several constitutions into one, and to make other modifications that would better express the sense, but were forbidden in any manner to alter the law itself. Their work was completed in one year, and published with the title *Codex Justinianus*, but was soon supplanted by another. After the compilation of the *Digest* this original code was revised by a different commission, a considerable number of new constitutions which had been issued by the emperor was added, changes thus rendered necessary were made, and the new edition was published A. D. 534, under the name *Codex Repetitæ Prælectionis*. This work, known



as *The Code (Codex)*, has been preserved to the present day, the earlier edition being entirely lost. It contains the imperial constitutions from Hadrian to Justinian: it is divided into twelve books, each of these into titles: each title contains a number of constitutions arranged in a chronological order, with the names of the emperors who were their authors and their dates. In the year 529 the emperor created another commission of sixteen, at the head of which was Tribonian, and entrusted to them the task of compiling a body of the existing law from the writings of the great jurists. According to the general plan which he prescribed, all the juridical works of authority were to be consulted and extracts made from them; these quotations, with such modifications as should be necessary to explain the meaning and harmonize the whole result, were to be collected into fifty books, and arranged according to the order of the edict after it had been revised under Hadrian (*edictum perpetuum*). The commission finished their labors in three years, and in 533 published the result under the name of *Pandects* or *The Digest*. In compiling the *Digest* selections were made from more than 2000 different treatises written by thirty-nine jurists, most of whom flourished within the period of about 100 years from the formation of the perpetual edict in the reign of Hadrian to the death of Alexander Severus. Following the plan proposed by the emperor, the *Digest* is divided into fifty books; each book, with the exception of three, is separated into titles; and each title into sections, which consist of the extracts from various authors. The internal arrangement and classification of the material itself which forms the body of the *Digest* are universally admitted to be very defective. Having provided for these great compilations of the law, Justinian ordered an elementary work to be composed and entitled *The Institutes*. It was prepared by two jurists, Theophilus and Dorotheus, under the supervision of Tribonian, and was published about the same time as the *Digest*. Chiefly based upon the *Institutes* of Gaius, it is separated into four books, and these into titles, and deals alone with the private law. *The Institutes* was written principally for use in the law-schools as an introduction to the study of jurisprudence, and this use has continued unchanged to the present day; no other elementary work has superseded it. It was the design of Justinian that the entire body of the Roman law should be comprised in the *Code* and the *Digest*, and to that end he forbade any reference to or citation of the ancient jurists either in the courts or the schools, and abrogated all the constitutions which were not found in his collection; he even prohibited all commentaries upon the *Pandects*. The emperor, however, did not restrain himself from making additions to the law which he had codified, but he issued from time to time new constitutions (*novelle constitutiones*), the number of which exceeded 150, some of them relating to very important points of the private law. They were officially published after his death, and are known as *The Novella*. The four works thus described, *The Pandects* or *Digest*, *The Code*, *The Institutes*, and *The Novella*, constitute the *Corpus Juris Civilis*.

These law-books of Justinian were not immediately introduced into the West, and in fact the Roman law was for a long time perpetuated among the barbarian invaders of the Western provinces by means of very inferior and imperfect compilations, and not by the *Corpus Juris Civilis*. From A. D. 415 the Visigoths had established themselves in Southern Gaul. About the middle of the same century the kingdom of the Burgundians was founded on the Rhone. In 493, Italy was subjugated by the Ostrogoths. For these three kingdoms three different codes were formed, by which, rather than by those of Justinian, the Roman law was kept alive among all the Germanic peoples. The first of these was the *Edict of Theodoric* (*Edictum Theodorici*), prepared in 500 for the Ostrogoths. It contained extracts from the sources of the Roman law, freely treated; it was very short and incomplete, but it left the existing law in full force in all cases for which it did not expressly provide. The second was the *Breviarium*, composed by Alaric in 506 for the Romans within the kingdom of the Visigoths. It contained a part of the Theodosian code, and extracts from the novells annexed thereto, from two works of Gaius and Paulus, from the Gregorian and the Hermogenian codes, and from a treatise of Papinian. The third and least important of these compilations was that made for the Burgundians, about 517.—*Lex Romana Burgundionum*, sometimes though erroneously named *Papinianus*. Upon the defeat of the Ostrogoths in 554 under Justinian his collections were introduced into Italy, but they retained their position of authority for a short time only. In 568 the Lombards subjugated the greater part of Italy, and the Germanic tribes from that time were established in permanent supremacy over the entire Western empire. (See Falcet, *Encyclopédie Juridique*, § 80.) This political revolution

did not blot out the Roman law, which continued to exist as an actual jurisprudence, but under a very peculiar form, utterly unknown to modern usages and opposed to modern conceptions. The Germanic invaders wherever they spread did not destroy the Romans nor impose upon them a new law. Each race, living upon the same soil, preserved and obeyed its own laws, which were thus no longer territorial, as are laws at the present day, but were *personal*, in that they applied to different classes of persons dwelling in the same country. According to the general rule, each person was subjected to the law of his birth—Roman to Roman, Frank to Frankish, or Burgundian to Burgundian. Wherever, therefore, the province had become thoroughly Romanized, wherever the Roman dominion had been fully established, as in Gaul, Spain, and Italy, there were left, even after the supremacy of the German invaders, the remains of Roman institutions, laws, and modes of thought. The codes above mentioned, compiled after the conquest, although exceedingly imperfect, were vastly superior to the Germanic laws and customs with which they were contrasted, and as society gradually became settled they were taken as the basis of the legislation that was created for the nations which finally came into existence from the united populations. In this manner the Roman law was historically, and as it were unconsciously, incorporated into the jurisprudence of the continental nations, and was the great storehouse of principles, doctrines, and rules whence the material of that jurisprudence was drawn during its process of development. The important influence exerted by the ecclesiastics in this work has already been described in the article upon the CANON LAW, and the explanation need not be repeated. The reason is plain why the like effect was not produced in the legislation of England. The Saxon invaders of Britain found but few traces of the Roman institutions: there was no opportunity for a "personal" law with them; all was territorial. The Saxon customs prevailed to the exclusion of all others throughout the kingdom; the Roman law was not left side by side with them, to grow up, and finally to overshadow them. The only influence which it exerted upon the legal development during the Saxon domination was through the ecclesiastics and the canon law which they administered. In addition to the foregoing silent, unconscious, historical method by which the law of the dead empire was perpetuated and made dominant over modern states, there was another open, external, conscious, and intentional cause which exerted a powerful aid in producing that result. About the beginning of the twelfth century a spirit of free inquiry was suddenly awakened throughout Europe, and one of its earliest and most remarkable manifestations was shown in the scientific study of the Roman law, which, commencing in Italy, soon extended to France, Spain, and even to England. A school was founded at Bologna in which Irnerius commenced to lecture upon the *Corpus Juris Civilis* (A. D. 1120). The professors at Bologna, as a part of the instruction which they gave to their students, composed short notes upon the text of the *Digest* and the *Code*, explanatory of obscure and doubtful passages. To these notes the name "glosses" was given, and the entire school of early commentators have been denominated "glossators." The glosses themselves were collected and revised by Accursius (A. D. 1220-60), and form the earlier body of commentaries upon the books of Justinian. From Bologna the study of the law rapidly spread over Europe, and lectures were even delivered at Oxford in 1149. The effect of this movement upon the local jurisprudence of the Continent was immediate and profound. From the universities the influence extended at once to the tribunals, and the Roman law was thenceforth acknowledged to be the common law of Europe.

*The Substance of the Roman Law.*—The limits of this article will not permit even an outline of the law itself, and I shall merely attempt to explain and illustrate its internal growth and gradual transformation. In the primitive period, although even then showing the wonderful capacity of the Roman people for legislation, the law as a whole was exceedingly arbitrary and technical, dealing in external symbolic acts, demanding a strict observance of prescribed formulas, and without a single element of abstract morality and justice. The Romans conceived of their law as applying only to the citizen, and thence termed it *jus civile*. Its rules concerned none but citizens, and while strangers and foreigners, even when permanent inhabitants of the territory, could obtain none of the advantages which it conferred, they were at the same time free from its peculiar burdens. Side by side, however, with this strictly national law of the state and the citizen, the Romans from an early day conceived of another system of legal rights which they regarded as common to all nations, and therefore termed *jus gentium* the law pertaining to all nations. Whenever a judicial controversy arose in which a foreigner



or stranger was a party, since the law for the citizen did not apply to him, the magistrate fell back upon the rules which he found prevailing among all the peoples with which he was acquainted. As these regulations were thus common, and not local and particular, it necessarily followed that they were based upon some universal principles, and were not as arbitrary and technical as the corresponding rules of the Roman civil law. The notion thus introduced from an actual observation of the neighboring peoples was greatly extended in subsequent times, until at length, under the philosophical jurists of the early empire, the *ius gentium* came to be considered as synonymous with absolute right, justice, and equity. Again, it frequently happened, especially after trade and commerce had sprung up, that in controversies between citizens questions would arise that were not covered by any existing rule of the Roman civil law, and the magistrate would be required to exercise his legislative function. Here also in creating the new rule he naturally invoked the broader and juster doctrines which he had introduced while adjudicating upon the rights of strangers. There thus existed in the administration of justice two widely different systems: (1) the original civil law of Rome, which was enforced against the citizen in all cases that were expressly provided for by its rules or that could be fairly brought within their operation; and (2) a body of regulations contained in the prætorian edict, primarily applicable to persons who were not citizens, but afterwards extended to citizens, and enforced in all cases where the former system was silent. The internal growth of the Roman jurisprudence as a whole, as a single municipal law for the Roman state, consisted in the steady expansion and development of the latter branch under the edictal legislation of the prætors and the scientific labors of the later jurists, until it finally displaced and completely absorbed the original civil law, of which no traces are left in the compilations of Justinian. This statement may be illustrated by a reference to a few of the most important divisions. So far as it is concerned with primary rights, the Roman law is separated into three grand departments: (1) the status of persons; (2) things as the objects of rights; and (3) obligations. In the primitive period the status of persons formed by far the most important department of the national jurisprudence. The peculiar feature of the early society around which all rights and duties were grouped was the family. Its head was the *paterfamilias*. It included his wife, all of his descendants who had not been emancipated or transferred to another by marriage, the wives of his male descendants, all persons incorporated into it by adoption, and the slaves. The legal authority of the *paterfamilias* was prodigious, and embraced three distinct branches—the paternal power (*potes-tas*), the marital power (*manus*), and the power over things (*dominium*). He was thus the legal representative head of his wife and children, and other descendants; all their labors and acquisitions within the sphere of private affairs belonged to him. Even the ties of relationship, and the rights and capacities incident thereto, were not determined by the common descent and a common blood, but by the subjection to a common paternal power. This primitive condition of the family, of which a slight outline only has been given, was gradually changed; the paternal and the marital powers diminished, and finally disappeared, and the family as exhibited in the books of Justinian is substantially the same as in the modern law. The early rules of property were to the last degree arbitrary and unjust. The strictly legal property in things, the only one recognized by the civil law (*dominium ex jure quiritum*), could only be acquired, held, or transferred by a citizen. Things as the subjects of property were separated into two classes—*res mancipi* and *res nec mancipi*, the former embracing land in Roman territory, slaves, horses, cattle, and beasts of burden, and the latter all other things. To constitute a valid transfer, even between citizens, of articles belonging to the first class, required the observance of certain exceedingly technical formulas termed "manicipation," or a constant possession for one year called "usucapion." A stranger could acquire legal property (*dominium*) in no manner. These unjust and arbitrary rules of the civil law were utterly abrogated by the prætorian legislation. By inventing, protecting, and enforcing a species of property denominated *in bonis*, which was based upon principles of justice and equity, and which could be held in things of all kinds, and acquired and transferred in simple and natural modes, this entire department of the law was revolutionized, and became the comprehensive and complicated system suited to a wealthy and commercial people. In the primitive condition of the law obligations resulted either from contracts or from delicts. The rudeness and technicality which characterized other parts of the system were especially prominent in all that related to contracts. Four classes alone were recognized as binding—that is, as raising

any obligation—and these did not depend upon good faith, or a valuable consideration, or any other element of right and equity, but upon a compliance with the prescribed forms. These four classes were—(1) Those made by the thing (*res*), which became binding by a delivery of the thing to which they related; of which class there were four species—loan (*mutuum*), where the same amount was to be returned; *commodatum*, where the very thing loaned was to be returned; deposit (*depositum*), and pledge (*pegno*). (2) Those made by words (*verbis*). These were executory agreements, which became binding by the use of certain specified words put in the form of a question and answer. (3) Those made by letters (*litteris*), which became binding by the entry of a memorandum in the domestic books of account of the parties. (4) Those made by consent (*consensu*), which became binding by the mere consent of the parties, without any formalities. Of this class four species alone existed—sale, hiring, partnership, and a kind of bailment. The changes wrought by the prætorian legislation in the law of contract were more numerous and important than those made in any other department. In the place of these few and arbitrary rules a system was built up which, with a few special additions, is sufficient for all the business and commercial transactions of modern society. JOHN NORTON POMEROY.

**Law, Municipal.** See MUNICIPAL LAW, by PROF. T. W. DWIGHT, LL.D.

**Law** (ANDREW), b. in Connecticut about 1748; graduated at Brown University 1775; became a clergyman, and was for forty years a teacher of music; published a *Collection of Hymn-Tunes* (1782), *The Rudiments of Music* (1783), *The Musical Magazine* (1792), and *The Art of Singing* (3 parts, 1803). He was author of the well-known tune "Archdale," invented four characters to express the four syllables of music, and was one of the earliest American musical composers. D. at Cheshire, Conn., in July, 1821.

**Law** (EDMUND), D. D., b. near Cartmel, Lancashire, England, in 1703; was educated at St. John's College, Cambridge, of which he was chosen fellow upon graduation in 1723; obtained the rectory of Graystock, Cumberland, in 1723; became archdeacon of Carlisle in 1743, master of Peterhouse College, Cambridge, in 1754, librarian of the university, professor of casuistry, and archdeacon of Lincoln soon afterward, prebendary of Durham in 1767, and bishop of Carlisle in 1768. D. at Rose Castle, Carlisle, Aug. 14, 1787. Bishop Law was one of the most learned and liberal prelates and acute metaphysicians of his age; translated from the Latin Archbishop King's *Essay on the Origin of Evil* (1731), with copious notes; wrote an *Enquiry into the Ideas of Space and Time* (1755), *Considerations on the Theory of Religion* (1745), and *Reflections on the Life and Character of Christ* (1749). He published an edition of the *Works of John Locke* (1777), with a biography of that philosopher, of whom he was an admirer and follower. His *Considerations*, "a work of singular beauty," was often reprinted, and was edited in 1820, with a *Life* by Dr. Paley. —His eldest son, EDWARD, was the first LORD ELLENBOROUGH (which see); another son, GEORGE HENRY (1761–1845), became bishop of Chester in 1812 and of Bath and Wells in 1824; and a third son became bishop of Elphin.

**Law** (JOHN), OF LAURISTON, b. in Edinburgh, Scotland, Apr. 21, 1671, eldest son of a goldsmith and money-changer who accumulated a fortune and bought the large estate of Lauriston, which John inherited, deriving from it his title. At the age of twenty Law settled in London, and soon became prominent in financial circles, though addicted to gambling and dissipation. Having killed an antagonist in a duel (1694), he was condemned to death, but escaped from prison and took refuge in France, travelling thence into Italy and Holland, and was for some time connected with a banking-house in Amsterdam. Returning to Scotland in 1700, he published a pamphlet advocating a state bank, but as the project met with no favor at home, he presented it to the French government, with the same result. Another pamphlet was issued on the same subject in 1705. For several years Law led a wandering life in European capitals, gaining large sums at the gaming-table, until the death of Louis XIV. in 1715 opened a field for his grand scheme. The kingdom was burdened with an enormous debt, and the regent caught at a plan which promised unlimited gain to the state. A private "general bank," with a capital of 6,000,000 livres, was chartered under letters patent of May 2, 1716, and began to emit vast quantities of notes, redeemable in specie, discounting bills of exchange, and accepting at par the government paper, then at 80 per cent. discount. The national credit and the general prosperity immediately received an immense stimulus; the vicious principles involved were not at first detected. Law was hailed as a national benefactor, and in a few months had issued notes for



nearly 20,000,000. But their circulation was limited to a few large cities, until in Apr., 1717, the government decreed that Law's notes should be accepted in payment of imposts. Another feature was added to the scheme in Aug., 1717, by the formation of the celebrated Mississippi or West India Company, with a capital of 100,000,000 livres, a monopoly of trade with Canada, and sovereign rights over the territory of Louisiana, which was to be colonized upon a vast scale. Parliament was hostile, and in Aug., 1718, prohibited the receipt of Law's bank notes in payment of taxes; D'Argenson, president of the council of finances, lent his patronage to a rival Western company called the *Anti-System*, but Law's star was still in the ascendant, and the decree of Parliament was declared invalid by judicial interposition. By royal edict of Dec. 4, 1718, the "general bank" was transformed into a royal bank, with Law as director and the king as security. Another edict of May, 1719, conferred a monopoly of East Indian and African trade upon the favored organization, which now absorbed the East India Company, took the name of "Company of the Indies," augmented its capital, and undertook to pay the national debt, agreeing to lend the king 16,000,000,000 livres at 3 per cent. An unexampled fever of speculation now carried the shares to 30 or 40 times their original value, and nearly 20,000,000,000 in notes were issued. On Jan. 5, 1720, Law received the appointment of controller-general of the finances, and in March he united the royal bank to the Company of the Indies. It was in the conversion of paper demanded by this colossal operation that the utter bankruptcy of the company was first perceived. The government, becoming alarmed, issued an edict deposing Law from the controllership, abolishing the bank, and depriving the company of its home monopolies and its connection with the state revenues. As a commercial corporation the company struggled for existence during several months, and disappeared in November. In December, Law quitted France, carrying with him only a few hundred louis-d'or, and loaded with the public execration. He travelled on the Continent for some time, returned to Great Britain by permission of the ministry, received a pardon for his early crime, was presented at court, and entertained illusive hopes of repairing the disasters of the "system," in which he preserved a genuine confidence. A friend in France, the marquis de Lassay, gave him for some years a pension of 20,000 livres. He gradually fell into obscurity, and d. in poverty at Venice Mar. 21, 1729. His remains were buried in the church of San Geniano, from which they were transferred in 1808 to that of San Moise by the celebrated Marshal Law, a grandson of his brother, who found d. in France a noble family, still flourishing under the name of Law DE LAURISTON. The complete works of John Law were translated for the first time into French in 1790. They were reprinted in 1842, and have since been inserted in the great collection of the writings of the principal economists and financiers of the eighteenth century, published by M. Guilhaumin. (See Thiers's *Histoire de Law* (1848); John P. Wood's *Memoirs of the Life of John Law* (1824); and Mackay's *Memoirs of Extraordinary Popular Delusions* (1860).) (See MISSISSIPPI SCHEME.) PORTER C. BLISS.

**LAW (JOHN)**, b. in New London, Conn., in 1796; was son of Lyman; graduated at Yale College 1814; admitted to the bar in 1817; emigrated to Indiana and located at Vincennes, where he was successively elected prosecuting attorney, member of the legislature (1823), and judge, holding the latter office eight years. In 1838 he was appointed receiver of public moneys; in 1855, judge of the court of land claims; removed to Evansville; was elected in 1869 a member of Congress, and re-elected in 1872. He drew up and reported the bill assigning a pension to the surviving soldiers of the Revolution, and has been president of the State Historical Society.

**LAW (JONATHAN)**, b. at Milford, Conn., Aug. 6, 1674; graduated at Harvard in 1695; studied law, and practised at Milford, and was a magistrate for more than thirty years, having been chief-justice from 1725 to 1741, and governor from 1741 until his death in May, 1741.

**LAW (LYMAN)**, b. at New London, Conn., Aug. 19, 1770; graduated at Yale College 1791; studied law with his father, Richard; served in the State legislature, of which he was at one time Speaker, and was a Representative in Congress 1811-17. D. at New London Feb. 3, 1842.

**LAW (RICHARD)**, LL.D., b. at Milford, Conn., Mar. 17, 1733, son of Gov. Jonathan; graduated at Yale College in 1751; studied law, and practised at New London, where he became chief judge; delegate to Continental Congress 1777-78 and 1781-84; mayor of New London for more than twenty years; justice and chief justice of supreme court of State, and district judge by appointment of Washington. He aided Roger Sherman in revising the Connecticut code of statute law. D. at New London Jan. 26, 1806.

**LAW (WILLIAM)**, b. at King's Cliffe, Northamptonshire, England, in 1686; was admitted into Emmanuel College, Cambridge, 1705; became a fellow of that college 1711; graduated as M. A. 1712; took orders in the Church of England, and preached for a time in London, but on the accession of the house of Brunswick to the throne (1714) forfeited his fellowship and his prospects of advancement in the Church by refusing, as a Jacobite, to take the oath of allegiance. He never again officiated in public as a clergyman. In 1717 the bishop of Bangor, Dr. Benjamin Hoadley, having in a sermon before the king given rise to the famous "Bangorian controversy" by attacking the non-jurors, Law wrote in reply *Three Letters to Bishop Hoadley*, remarkable for their close reasoning and command of language, which placed him at once in the front rank of the defenders of authority both in Church and State. In 1724 he wrote one of the best of the numerous replies to Mandeville's *Fable of the Bees* (republished with introduction by Rev. F. D. Maurice, 1844), and in 1729 his masterpiece, the *Serious Call to a Devout and Holy Life*—a work to which Dr. Johnson attributed his conversion, which had great influence upon the brothers Wesley, and which elicited the warmest praise even from the pens of the historians Gibbon and Macaulay. Shortly before this time Law became tutor to Edward Gibbon, father of the historian, accompanied his pupil to Oxford, and was for several years a member of his family at Putney. Between the years 1733 and 1736 he became acquainted with the writings of the German mystic Jakob Böhme, and adopted his teachings, which influenced the treatises *On the Sacrament* (1737), *Christian Regeneration* (1739), and his numerous other tracts. In 1740 a wealthy widow lady, Mrs. Hutcheson, and Miss Hester Gibbon, sister of his pupil, resolved to spend their lives in a quasi-conventual manner, devoting their fortunes to charity, and engaged the services of Law as chaplain and almoner. The three thenceforth resided at King's Cliffe, and Law now prepared a series of works expounding the doctrines of Böhme; these were *The Way to Divine Knowledge* (1746), *The Spirit of Prayer*, and *The Spirit of Love*. He also wrote some illustrative materials for a translation of the works of Böhme executed by the ladies above named, but published after his death under the name of Law (4 vols., 1764-81). He d. at King's Cliffe Apr. 9, 1761. In the following year his collected works were published in 9 vols. (See his *Life*, by R. Tighe (1813), and a volume of *Notes and Materials* for his biography, printed for the Theosophical Library, 1856.)

**Lawes (HENRY)**, b. about 1600 at Salisbury, England, where his father, Thomas Lawes, was vicar-choral in the cathedral. Educated as a classical musician under the instructions of John Cooper, he became about 1625 one of the "gentlemen of the royal chapel" to Charles I. and acquired celebrity as a composer of music for masques and songs. Milton's *Masque of Comus* was set to music and brought out under his personal direction at Ludlow Castle in 1634, and the great poet, probably a pupil of Lawes in music, bestowed upon him extraordinary eulogies in several of his poems. Waller, Herrick, and Phillips wrote of him in a similar strain, and were indebted to him for the popularization of many of their songs. The music of Lawes was of the Italian style, and was of very unequal merit. He was a royalist; remained in the service of the king as clerk of the cheque" until 1649, and composed the anthem for the coronation of Charles II. He published in 1633 *Ayres and Dialogues, for One, Two, and Three Voices*, comprising 130 pieces. D. at London in Oct., 1662, and was buried in Westminster Abbey. His elder brother, WILLIAM LAWES, also a gentleman of the chapel, and killed at the siege of Cheater, was associated with Henry in several of his musical undertakings, composed the music for Sandys's version of the Psalms (1648), and for many songs of that period.

**Lawler (JOHN)**, b. in North Carolina June 12, 1796; was educated for the ministry, and became a Baptist clergyman; served from 1826 to 1831 in the lower house of the Alabama legislature; was elected State senator 1831; was receiver of public moneys 1832-3, treasurer of the University of Alabama 1833, and elected to Congress in 1834. D. at Washington, D. C., May 8, 1838.

**Lawler**, post-v. of Chickasaw co., Ind., on the Chicago Milwaukee and St. Paul R. R. Pop. about 400.

**Lawn**, from the Old English *lænan*, an open clear place, meant formerly an open space between woods, but is now mostly restricted to a space of ground covered with grass for ornamental purposes. In order to produce a thick, turfed, dark green, velvet lawn, the soil, especially if light, should be well provided with manure, and worked so deeply as to allow the plant to extend its roots below the stratum generally reached by a surface-drought. The seed used should be a mixture of red-top and white clover, in the proportion of three parts of the former to one of the



latter; but it is not recommended to mix the grass-seed with that of some grain, which is often done. The idea is to produce shade for the young grass-plant, but the effect really is that it is starved. A third and indispensable condition is frequent mowing—once a week, at least once every two weeks, and each spring a little top-dressing, especially on any poor spot.

**Law of Nations.** See INTERNATIONAL LAW.

**Law of Storms.** See STORMS.

**Lawrence** (JOHN), b. in Cornwall, England, in 1750; came to New York in 1767; was admitted to the bar in 1772; was aide-de-camp to Washington in 1777, and judge-advocate at the trial of Major André; member of old Congress 1785–86, of the new Congress 1789–93; U. S. district judge 1794–96; U. S. Senator 1796–1800; presiding over the Senate in 1798. He was a zealous defender of Washington and Hamilton. D. at New York Nov. 10, 1810.

**Lawrence**, county of N. W. Alabama. Area, 830 square miles. It is bounded N. by the Tennessee River. The S. part is a high plateau. As a whole, it is a very fertile county. Cotton, corn, and live-stock are largely produced. The county is traversed by the Memphis and Charleston R. R. Cap. Moulton. Pop. 16,658.

**Lawrence**, county of N. E. Arkansas. Area, 540 square miles. It is a fertile wooded plateau, with ridges and rich alluvial valleys. Cotton and grain are produced. The county has rich ores of iron, copper, zinc, and lead. It is traversed by Black River and by the Cairo and Fulton R. R. Cap. Powhatan. Pop. 5,981.

**Lawrence**, county of S. E. Illinois, bounded E. by the Wabash River, which separates it from Indiana. Area, 400 square miles. It is partly uneven and partly level, with considerable timber and some swamps. It is traversed by the Embarras River and by the Ohio and Mississippi and the Cairo and Vincennes R. Rs. The soil is fertile. Cattle, grain, and wool are staple products. Cap. Lawrenceville. Pop. 12,533.

**Lawrence**, county of S. Central Indiana. Area, 444 square miles. Its surface is broken and well timbered. The soil is productive. Cattle, grain, and wool are staple products. Coal is found in some places. The county is traversed by the E. branch of White River and by the Ohio and Mississippi and the Louisville New Albany and Chicago R. Rs. Cap. Bedford. Pop. 14,628.

**Lawrence**, county of E. Kentucky, bounded E. by West Virginia. Area, 642 square miles. It is mountainous, with fertile valleys. Corn is the chief farm product. Coal is found in great quantities and of superior quality. The navigable Big Sandy River washes its E. border. Cap. Louisa. Pop. 8,497.

**Lawrence**, county of S. Central Mississippi. Area, 580 square miles. It is generally fertile. Corn, rice, and cotton are staple products. The county is traversed by the Pearl River. Cap. Monticello. Pop. 6,720.

**Lawrence**, county of S. W. Missouri. Area, 576 square miles. It is undulating and in part hilly, with a large area of timber-land. Copper, lead, and iron ore have been found. The soil is good. Live-stock, grain, tobacco, and wool are staple products. The county is traversed by the Atlantic and Pacific R. R. Cap. Mt. Vernon. Pop. 13,067.

**Lawrence**, county of S. Ohio, bounded S. E. and S. W. by the Ohio River. Area, 400 square miles. It is uneven, but fertile. Grain and tobacco are staple crops. Coal and iron are mined, the latter very extensively. Iron, charcoal, and cooperage are leading manufactures. The county is traversed by the Iron R. R. Cap. Ironton. Pop. 31,380.

**Lawrence**, county of Pennsylvania, bounded W. by Ohio. Area, 425 square miles. It is uneven, but fertile. Cattle, grain, and wool are staple products. Lumber and flour are leading manufactures. Coal and iron ore are mined. It is traversed by Beaver River and its affluents, and by the Erie and Pittsburgh and the Pittsburgh Fort Wayne and Chicago R. Rs. Cap. Newcastle. Pop. 27,298.

**Lawrence**, county of Tennessee, bounded S. by Alabama. Area, 630 square miles. Its surface is mostly high, healthy, and productive. Grain and tobacco are staple products. There is abundant water-power. Iron is mined to some extent. Cap. Lawrenceburg. Pop. 7,601.

**Lawrence**, tp. of Sanford co., Ala. Pop. 537.

**Lawrence**, tp. of Lawrence co., Ark. Pop. 244.

**Lawrence**, tp. of Lawrence co., Ill. Pop. 1,492.

**Lawrence** (SEDAN P. O.), a v. of Richland tp., De Kalb co., Ind., on the Michigan Southern R. R. (Air-line division). Pop. 176.

**Lawrence**, post-v. and tp. of Marion co., Ind., on the Cleveland Cincinnati and Indianapolis R. R. Pop. 2,360.

**Lawrence**, city, cap. of Douglas co., Kan., on both

sides of the Kansas River, at the junction of the Kansas Pacific with the Leavenworth Lawrence and Kansas R. R., 38 miles S. W. of Leavenworth, has 17 churches, 2 national and 3 other banks, a public library, 3 daily, 2 tri-weekly, and 4 weekly newspapers, and is the seat of the State University. Lawrence is the second city of the State, both as to population and wealth; has a dam across the Kansas River nearly completed, which will afford 3000 horsepower, the largest pork-packing establishment in the State, a woollen-factory, iron-foundries, machine-shops, planing and flouring mills, tanneries, and a large number of mercantile houses. Six railroads centre here, affording low freights and easy communications in all directions. Lawrence has had an eventful history. It was founded in 1854 in the midst of the struggle for a free State, and was the head-quarters of John Brown, Lane, Robinson, Conway, and other noted leaders. It was burned in 1863 by the Quantrell raid, but has been rebuilt, and is now one of the most beautiful and enterprising cities of the West. Pop. 8,320. T. D. THACHER, ED. "DAILY JOURNAL."

**Lawrence**, city and one of the caps. of Essex co., Mass., on both sides of the Merrimack River, 26 miles N. W. of Boston, on the Boston and Maine, the Lowell and Lawrence, and the Manchester (N. H.) and Lawrence R. Rs., was until 30 years ago an almost uninhabited waste, forming portions of the towns of Andover and Methuen. The river in its natural condition flowed over a bed of rocks at this place, having a descent of 26 feet, without any sudden fall, for the distance of about half a mile, affording unrivalled water-power, which in 1845 led to its selection for a manufacturing centre. By the efforts of Abbott Lawrence, Nathan Appleton, and other enterprising capitalists of the State, the Essex Company was incorporated in that year, proceeded to construct a dam of solid granite across the rapids, and opened a canal 90 feet wide and 1½ miles long for the utilization of the water. This dam, 900 feet long and 40 feet high, one of the most substantial constructions in New England, was completed Oct. 14, 1847, at a cost of \$250,000, and on Feb. 24, 1848, the first wheel was set in motion by water from the canal, since which time the industries of the place have acquired a rapid and almost unexampled development. A second canal has recently been built, on the opposite side of the river. The most important establishments are the Atlantic cotton-mills, capital \$1,500,000, employing 1800 looms and 1400 operatives; Pacific Mills, capital \$2,500,000, employing about 5000 operatives; and the Washington Mills, capital \$1,650,000, 1265 looms, and 2900 operatives. Other prominent establishments are those of the Lawrence duck and woollen mills, Hoadley steam-engine works, the Everett and Pemberton mills (cotton and woollen), Arlington woollen, Russell, and other paper mills. The Pacific mills occupy a vast area; their buildings are of colossal dimensions and considerable architectural beauty, this company being noted for the educational and social advantages it offers to its operatives with its fine library (6000 volumes), reading-room, relief societies, and hospitals for the sick and aged. The original Pemberton mill, a brick structure, suddenly fell Jan. 10, 1860, burying 700 persons in its ruins, of whom 91 were killed or mortally injured. The new building is very strongly built. The city received its name in honor of the Lawrence family, its principal founders; was incorporated as a town Apr. 19, 1847, and as a city Mar. 21, 1853; has 21 churches, 3 national and 3 savings banks, 2 daily and 4 weekly newspapers, 59 public schools (graded), a public library (14,000 volumes), very fine high and grammar school-houses, a beautiful common (17 acres, with miniature lake) and park, excellent water-works and fire department, court-house, city-hall, Masonic temple, Odd Fellows' and music hall, several institutions of public and private beneficence, numerous manufactures of machinery, carriages, hardware, and flour; an assessed valuation of \$24,117,373, a large proportion of which consists of capital invested in manufactures, which afford employment to nearly 15,000 operatives. The prosperity and enterprise of Lawrence are notable phenomena of America. Pop. in 1850, 8,282; 1860, 17,639; 1870, 23,921.

GEORGE S. MERRILL, ED. "DAILY AMERICAN."

**Lawrence**, post-v. and tp. of Van Buren co., Mich., 9 miles W. from Paw Paw. It has 1 weekly newspaper. Pop. of v. 555; of tp. 1927.

**Lawrence**, tp. of Mercer co., N. J. Pop. 2,251.

**Lawrence**, tp. of St. Lawrence co., N. Y. It is level and very fertile, contains several flourishing villages and 7 churches, and is traversed by the Ogdensburg and Lake Champlain R. R. Pop. 2,577.

**Lawrence**, tp. of Lawrence co., O. Pop. 1,245.

**Lawrence**, tp. of Stark co., O. It contains CANAL FULTON (which see). Pop. 3,366. Lawrence Station (N.



Lawrence P. O.) is on the Pittsburg Fort Wayne and Chicago R. R.

**Lawrence**, tp. of Tuscarawas co., O. Pop. 1479.

**Lawrence**, post-tp. of Washington co., O. Pop. 2860.

**Lawrence**, tp. of Clearfield co., Pa. Pop. 1720.

**Lawrence**, tp. of Tioga co., Pa. Pop. 957.

**Lawrence**, tp. of Brown co., Wis. Pop. 750.

**Lawrence**, SAINT. See LAURENTIUS, SAINT.

**Lawrence** (ABBOTT), LL.D., b. at Groton, Mass., Dec. 16, 1792. His father, Samuel Lawrence (1754-1827), was a Revolutionary officer. Abbott Lawrence studied in the academy at Groton, and became in 1808 a clerk, and in 1814 a partner in the dry-goods business of his brother Amos in Boston. In this business he often visited Europe. He was an early advocate of the protective tariff, engaged largely in manufacturing, and was one of the principal founders of the city of Lawrence, Mass. He was a member of Congress 1835-37 and 1839-41; was in 1842 a commissioner to settle the Aroostook boundary question; U. S. minister to Great Britain 1849-52. He founded the Lawrence Scientific School of Harvard University, founded scholarships and prizes in public schools, and was a liberal benefactor of the Groton Academy, now known by his name. He was liberal in all philanthropic and charitable causes. He received in 1854 the honorary degree of LL.D. from Harvard University. D. at Boston Aug. 18, 1855.

**Lawrence** (AMOS), b. at Groton, Mass., Apr. 20, 1786, and studied in the academy of his native place. In 1807 he set up a mercantile business in Boston, and in 1814 his brother Abbott became his partner. He acquired a large fortune, which he freely and unostentatiously employed for the good of the public and of individuals, bestowing in the most unobtrusive and noiseless way hundreds of thousands of dollars for benevolent uses. D. in Boston, Mass., Dec. 31, 1852. (See *Extracts from his Diary and Correspondence, with Memoir* by W. R. Lawrence, his son, 1855.)

**Lawrence** (EUGENE), b. in New York Oct. 10, 1823; graduated at New York University in 1841; has written *Lives of British Historians*, and is a voluminous contributor to Harpers' periodicals, chiefly upon subjects connected with the political influence of the Roman Catholic Church, of which he is an earnest opponent.

**Lawrence** (GEORGE ALFRED), b. in 1827 in England; was educated at Rugby and Balliol College, Oxford, where he graduated with honors in 1848; was admitted to the bar; author of *Guy Livingstone, Seward and Goben, Barren Honor*, and other popular novels. D. Sept. 24, 1876.

**Lawrence** (SIR HENRY MONTGOMERY), b. at Matura, Ceylon, June 28, 1806; studied at the Military College at Addiscombe; went to India in 1821 as a cadet in the Bengal artillery; took part in the Afghan war in 1843; was sent in the same year as British resident to Khatmandoo; participated in the Sutlej campaign; was resident at Lahore from 1846 to 1849; then chief of the board of administration in the Punjab, agent of the governor-general in Rajpootana 1852, and in 1857 commissioner in Oude. He conducted the memorable defence of the British residency at Lucknow against the mutineers, until on July 2 he was mortally wounded, and d. at Lucknow July 4, 1857. (See his *Life*, by Edwardes and Merivale, London, 1872.)

**Lawrence** (CAPT. JAMES), b. at Burlington, N. J., Oct. 1, 1781; entered the U. S. navy as a midshipman in 1798; became lieutenant in 1802; took part in the war with Tripoli (1804-05); was appointed in 1810 to the command of the *Hornet* (18), with the rank of master-commandant; cruised in Com. Bannbridge's squadron on the South American coast at the close of 1812, and on Feb. 24, 1813, captured, near the mouth of the Demerara River, the British sloop-of-war *Peacock* (18), after an engagement of fifteen minutes. The *Peacock* had six feet of water in her hold when she surrendered, and went down immediately after with a number of men of both crews. Returning to New York with these prisoners, and those of several other prizes, Lawrence received from Congress a gold medal, was promoted to lieut. (Mar. 4), and commander of the frigate *Chesapeake*. On June 1, while he was lying in Boston harbor, the British frigate *Shannon* (38), Capt. P. V. Boker, came in sight with the express design of fighting the *Chesapeake*. Capt. Lawrence accepted the implied challenge, but both he and his principal officers were soon mortally wounded, and the *Chesapeake*, being much disabled, was taken by assault, and carried into Halifax, where he d. July 5, 1813. His exclamation on being carried below, "Don't give up the ship!" became a household word in the U. S.

**Lawrence** (JASON VALENTINE O'BRIEN), M. D., b. in New Orleans, La., in 1791; graduated in medicine at the University of Pennsylvania in 1815, having previously for

some time been house-physician to the Pennsylvania Hospital. After securing a lucrative practice in New Orleans he returned to Philadelphia, where in 1822 he gave a six months' course of lectures on anatomy and surgery, and prepared for the press a work on morbid anatomy. D. Aug. 19, 1823. His papers were published in the *Philad. Jour. of Med. and Phys. Sciences*. PAUL F. EVR.

**Lawrence** (JOHN LAIRD MAIR), D. C. L., BARRON, b. at Richmond, Yorkshire, England, Mar. 4, 1811; was educated at Haileybury College, where he became proficient in Oriental languages and laws; went to India in 1829 as a cadet in the Bengal civil service; filled various subordinate administrative and judicial posts, and in 1846, after the first Sikh war, was called to the responsible office of chief commissioner of the Punjab, becoming lieutenant-governor in 1849. In this post, which he retained many years, Lawrence displayed rare talent in the government of a naturally turbulent race, and with such perfect success that the Punjab, far from joining the mutiny of 1857, as was anticipated, was able to send forces of Sikhs and Punjabees to the relief of Delhi. His co-operation with Canning, Havelock, Outram, and Clyde for the suppression of the mutiny was of inestimable value, and gave him popular fame as "the saviour of India." Having returned to England in 1858, the last special court of directors of the East India Company, on the eve of its abolition, conferred a pension of £2000 upon Lawrence, who also received a baronetcy, and was sworn of the privy council. He was viceroy of India from 1863 to 1868, and was created a baron in 1869. D. June 27, 1879.

**Lawrence** (SIR THOMAS), b. in Bristol, England, in 1769; d. Jan. 7, 1830. His father was a tavern keeper. When a mere child he made sketches in chalk; at ten he used the crayons with skill; at seventeen he painted in oil; he was but thirteen when he received a silver palette and five guineas from the Society of Arts for a copy of *The Transfiguration*; at the age of twenty-two, being younger than the rules required, he was made a "supplementary associate" of the Royal Academy, and painted portraits of the king and queen; in 1794 he was elected an academician; in 1815 he was knighted; in 1820 he became president of the Academy. Lawrence came to London in 1789. Reynolds befriended him with counsel and influence, and so diligent was he that during his first year in London he exhibited at Somerset House seven portraits of women. Flattered by his success in portraits, Lawrence was moved by an ambition to attempt historical painting, and produced *Satan Summoning his Legions*, the subject taken from Milton; but, though the picture was praised by his admirers, its reception did not justify his abandonment of the department in which he so far excelled all others. The most distinguished men and women of the time sat to him; his prices were high, rising in 1810 to 100 guineas for heads and 400 for full-lengths—more than thrice his earlier charges. In 1814 the prince regent commissioned Lawrence to paint the sovereigns, generals, and statesmen who were in league against Napoleon. The famous Waterloo gallery at Windsor is the result. In Vienna he painted the emperor of Austria; in London he painted Blücher and Platoff; in Rome he painted Pius VII. and Cardinal Gonsalvi. Honors were showered on him at home and abroad; foreign academies elected him to membership; he was made a chevalier of the Legion of Honor. A handsome person and elegant manners aided Sir Thomas in his profession with the nobility and people of wealth. His pictures are remarkable for richness of color, a mingled softness and splendor that was of great effect, particularly in the portraits of women, which are preferred to those of men. So great was the fame of Lawrence that a school of art was formed after his example, but of late years his fame has been declining. (See *Memoirs and Correspondence*, by D. E. Williams, London, 1831, 3 vols.) O. B. FROTHINGHAM.

**Lawrence** (TIMOTHY BIGFLOWS), b. in Boston, Mass., Nov. 23, 1826, a son of Abbott Lawrence; graduated at Harvard in 1846; was an attaché of the American legation in London during his father's residence as minister at the British court, and remained in that position until 1855; was U. S. consul general in Italy 1862-69. D. in Washington, D. C., Mar. 21, 1869.

**Lawrence** (SIR WILLIAM), BART., F. R. S., b. at Cirencester, England, July 16, 1783; studied surgery for five years as apprentice to Dr. Abernethy; became in his twentieth year demonstrator of anatomy at St. Bartholomew's Hospital; professor of anatomy and surgery at the College of Surgeons 1815-19, and director of St. Bartholomew's 1819, which position he retained until 1856. His name is intimately connected with the progress of practical surgery in England, to which he made brilliant contributions, described in a long series of papers in the *Transactions of the Medical and Chirurgical Society*. He was re-



markable for varied attainments beyond the line of his profession; possessed an elegant literary style; was unrivalled as a lecturer; was twice president of the College of Surgeons, member of a host of scientific societies, and surgeon extraordinary to the queen, by whom he was made a baronet. His most important works were the *Lectures on Physiology, Zoology, and the Natural History of Man* (1819; 9th ed. 1848), the *Treatise on Hæmia* (1807), and the *Treatise on Diseases of the Eye* (1841), edited in the U. S. by Dr. Isaac Hays 1847; new ed. 1853).

**Lawrence** (WILLIAM), b. at Mt. Pleasant, O., June 26, 1819; graduated at Franklin College, O., in 1838, and at the Law School of Cincinnati in 1840; settled at McConnellsville, and afterwards at Bellefontaine, O., and engaged with success in law-practice; edited (1845-47) the *Logan Gazette*, and at one time the *Western Law Monthly*; was often in the senate and lower house of the Ohio legislature; was the founder of the reform school and of the free banking law of the State; a judge of the common pleas 1856-64; for some time colonel of the 84th Ohio in the civil war; a member of Congress 1865-71 and 1873-74. Author of a work on the *Ohio Civil Code, The Law of Interest and Usury*, and a compiled vol. xx. of the *Ohio Reports*.

**Lawrence** (WILLIAM BEACH), LL.D., b. in New York City Oct. 23, 1800; graduated at Columbia College in 1818; studied law in Europe; admitted to the New York bar in 1823; secretary of legation in London 1826-27; chargé d'affaires *ad interim* 1827-28; resided for some time in Paris, where he made a translation of Barbé Marbois's *History of Louisiana, and its Cession by France to the U. S.* (1830), adding an introduction and notes. Returning to the U. S. in 1832, he delivered a course of lectures on political economy at Columbia College, published in 1834; gained a prominent position in his profession; was influential in promoting the Erie Railway enterprise; was vice-president of the New York Historical Society 1836-45, to whose *Proceedings* he was a frequent contributor; wrote a *History of the Negotiations in reference to the Eastern and North-eastern boundaries of the U. S.* (1841), a brief *Memoir of Albert Gallatin* (1843), a small volume on the *Colonization of New Jersey* (1843), and numerous articles in the quarterly and monthly reviews. In 1850 he became a resident of Rhode Island, where he became lieutenant-governor and acting governor in 1851, and member of the constitutional convention in 1853. He was a member of the Social Science Congress which met at Bristol, England, in Oct., 1869, and lecturer on international law (1872-73) at the law school of Columbian College at Washington, D. C., in which city he has been employed for several years as an advocate in cases of international claims, especially those arising from the Treaty of Washington of 1871, and has published several arguments and brochures upon that subject. His most important original works have been *The Laws of Charitable Uses* (1845), *Visitation and Search* (1858), a *Commentary on the Elements of International Law* (in French, 3 vols., Leipzig, 1868-73), *Disabilities of American Women Married Abroad* (1871), and *Administration of Equity Jurisprudence* (Boston, 1874). He is, however, best known by his valuable edition of Wheaton's *Elements of International Law*, with an introduction, memoir, and copious notes (1855; revised ed. 1863).

**Lawrenceburg**, city and tp., cap. of Dearborn co., Ind., on the Ohio River, 20 miles below Cincinnati, on the Ohio and Mississippi and the Indianapolis Cincinnati and Lafayette R. Rs., has 2 national banks, 2 weekly newspapers, 7 churches, the usual number of stores, several hotels, and a large number of furniture manufactories. It is the terminus of the White Water Canal, which affords excellent water-power. Pop. 3159; of tp. exclusive of city, 1708. E. F. SIBLEY, ED. "DEMOCRATIC REGISTER."

**Lawrenceburg**, post-v. and cnp. of Anderson co., Ky., 10 miles S. of Frankfort, on the line of the proposed Frankfort and Harrodsburg R. R., has 3 churches, a national bank, and a seminary. Pop. 393.

**Lawrenceburg**, post-v., cap. of Lawrence co., Tenn., on the projected Memphis and Knoxville R. R., 20 miles W. of Pulaski and 80 S. W. of Nashville, on Shoal River, 40 miles above its confluence with the Tennessee, has 4 churches, a Catholic convent, 1 weekly newspaper, 3 hotels, 4 large cotton-factories, and the usual number of stores. There are fine beds of iron in the vicinity. Pop. 351.

THOMAS B. MALONE, ED. "JOURNAL."

**Lawrence University of Wisconsin**, an institution of learning in Appleton, Outagamie co., Wis. It was founded in 1847, the Hon. Amos A. Lawrence of Boston, Mass., offering to give \$10,000 towards the establishment of a collegiate school, provided an additional \$10,000 should be raised by the Methodist denomination. This was done, and the first classes were formed in the preparatory department in the fall of 1849. In 1852, Rev. Edward Cooke,

D. D., was elected president of the college, and entered upon the duties of his office with the collegiate year beginning in 1853. According to the catalogue of 1873-74, the number of different students in attendance during the year was 377, of whom 85 were in the regular college classes. The whole number of graduates up to 1873 was 148, of whom about one-third were ladies. The library of the institution was founded by the Hon. Samuel Appleton of Boston, Mass., by a donation of \$10,000; it now comprises 7000 volumes. The property of the university amounts to about \$180,000. Besides the original donation of Mr. Lawrence to the foundation of the institution, he has favored it with several additional gifts. Dr. Cooke resigned the presidency about 1860, and was succeeded by R. Z. Mason, LL.D., who resigned in 1865, and was succeeded by Rev. G. M. Steele, D. D., the present incumbent. The courses of instruction in the college are two, classical and scientific. There is also provision for instruction in civil engineering. In the academical department the facilities for a broad English culture and business education are ample.

J. H. WORMAN.

**Lawrenceville**, tp. of Henry co., Ala. Pop. 1194.

**Lawrenceville**, post-v., cap. of Gwinnett co., Ga., 15 miles N. E. of Stone Mountain, beautifully situated in the centre of a fine cotton-producing district, has 2 churches, 2 academies, 1 weekly newspaper, a handsome court-house, and considerable trade.

**Lawrenceville**, post-v. of Lawrence tp., cap. of Lawrence co., Ill., on the Embarras River, at the junction of the Ohio and Mississippi with the Paris and Danville R. R., 9 miles W. of Vincennes, has 3 churches, 2 weekly newspapers, 2 hotels, and a number of stores. Principal business, farming. Pop. 455.

MARY BUNTIN, ED. "RURAL REPUBLICAN."

**Lawrenceville**, post-v. of Lawrence tp., Mercer co., N. J., 6 miles N. of Trenton. It has a boys' high school and seminary for young women.

**Lawrenceville**, post-v. of Lawrence tp., St. Lawrence co., N. Y., on the Ogdensburg and Lake Champlain R. R., and the seat of a fine academy. Pop. 350.

**Lawrenceville**, post-b. of Lawrence tp., Tioga co., Pa., on Cowanesque Creek, at the junction of the Corning Cowanesque and Antrim and the Tioga R. Rs. Pop. 476.

**Lawrenceville**, post-v., cap. of Brunswick co., Va., 20 miles W. of Hicksford Station. It has 1 weekly newspaper.

**Laws**, tp. of Williamsburg co., S. C. Pop. 1274.

**Law'son** (JOHN), a native of Scotland, who in 1700 became surveyor to the province of North Carolina, and in 1709 published a valuable work, *A New Voyage to Carolina, containing the Exact Description and Natural History of that Country*, etc., with a good map and accurate illustrations. In 1712, while engaged in prosecuting his surveys, he was taken prisoner by the Tuscarora Indians, and burned at the stake as a supposed usurper of their lands. His *New Voyage* was reprinted at Raleigh, N. C., in 1860.

**Lawson** (J. M.), M. D., b. in Nicholas co., Ky., Sept. 10, 1812; graduated in 1837 at Transylvania University, where he became professor of anatomy in 1843. He subsequently filled the chair of materia medica in the Medical College of Ohio (1847), occupied similar posts in the Kentucky School of Medicine at Louisville (1854), the University of Louisiana at New Orleans (1860), returning to the Ohio College in 1857 and in 1861. He conducted the *Western Lancet* from 1842 to 1864, edited Hope's *Morbid Anatomy* (1844), and published his best work, a *Practical Treatise on Phthisis Pulmonalis*, in 1864. D. at Cincinnati, O., Jan. 21, 1864.

**Lawson** (THOMAS), b. in Virginia; entered the navy in 1809 as surgeon's mate, which position he resigned in 1811 to take a similar position in the army; in 1813 was promoted to be a full surgeon, and after serving in this capacity for twenty-three years was appointed surgeon-general of the army, with the rank of colonel. This responsible position he ably filled for a quarter of a century, during which time he labored incessantly to improve the condition of his corps, and it was under his direction that the publication of statistics and reports by the medical officers of the army was inaugurated. Of a fiery, chivalric nature, he acted as colonel of a regiment of Louisiana volunteers in the Florida war, and as chief medical officer accompanied the general-in-chief throughout the war with Mexico, gaining the brevet of brigadier-general for bravery. D. at Norfolk, Va., May 15, 1861.

**Lawson** (SIR WILFRID), BART., b. in Cumberland, England, in 1829; became at an early age an enthusiastic advocate of the temperance movement; elected to Parliament for Carlisle in 1859, and introduced in Mar., 1864, the mea-



sure well known as the Permissive Bill, the main principle of which is the giving to two thirds of the inhabitants of any parish or township an absolute veto upon all licenses for the sale of intoxicating liquors granted within their district. Defeated at the election of 1865, he was returned at the head of the poll in 1868 as a supporter of Gladstone, and again elected in Feb., 1874. He is the leader of the United Kingdom Temperance Alliance, and its spokesman in Parliament, where he figures also as a frequent opponent of Disraeli upon other subjects.

**Lawson's**, tp. of Somerset co., Md., on Tangier and Pocomoke sounds, traversed by the Eastern Shore R. R. Pop. 3349.

**Law'ton**, post-v. of Antwerp tp., Van Buren co., Mich., 16 miles S. W. of Kalamazoo, at the junction between the Michigan Central and the Paw Paw R. R.s., has a large blast furnace, a foundry and machine shop, a plough factory and planing mill, 2 wagon shops, 1 weekly newspaper, several churches and schools, and the usual number of stores, shops, and smaller manufacturing establishments. The principal industries are farming and fruit raising. Pop. 1081. E. V. HAYDEN, Ed. "TRIBUNE."

**Lawton**, tp. of Beaufort co., S. C. Pop. 3905.

**Lawton** (Gen. ALEXANDER R.), b. in Beaufort dist. (now co.), S. C., about 1820; graduated at West Point in 1839, when he was commissioned as second lieutenant in the 1st Artillery, and stationed on the northern frontier until 1841. Then resigned; studied law at Harvard Law School, Mass., and commenced the practice in Savannah in 1842. Soon rose rapidly in his profession, and was repeatedly elected to the State legislature, first to the house and then to the senate, where he achieved great distinction. Upon the organization of the Savannah and Augusta R. R. in 1849, he was chosen its first president. In Apr., 1861, he was appointed brigadier-general in the provisional army of the Confederate States, and was put in command of the coast of Georgia. This position he held until June, 1862, when he was transferred to Virginia, where he served with Stonewall Jackson in his several campaigns; received the command of a division, and was severely wounded at Sharpsburg, disabling him for a year, after which he served as quartermaster-general until the close of the war. After the surrender in 1865 he resumed the practice of law in Savannah, which he still pursues with eminent success. He is also at this time (1875) a distinguished member of the legislature from the county of Chatham. A. H. STEPHENS.

**Lawyer**. See ATTORNEY, BARRISTER, KING'S COUNSEL, ADVOCATE, SHERIFF, PROCTOR, SERGEANT-AT-LAW.

**Lay (BENJAMIN)**, b. at Colchester, England, in 1681; settled at Barbadoes in 1710; became obnoxious on account of abolition principles, and being a Quaker removed to Abington, Pa., where he was one of the earliest and most zealous agitators against slavery, in which connection he was an associate of Franklin and Benezet. He separated from the Society of Friends in 1717 on account of slaveholding being permitted to its members, but had the pleasure at a later day to see that body assume an attitude similar to his own. In 1737 he wrote a pamphlet, *All Slavekeepers that keep the Innocent in Bondage, Apostates*, printed by Franklin. He opposed tea-drinking, distributed religious books as prizes in the schools, and manufactured his own clothing, so as not to avail himself of the products of slave-labor. D. at Abington in 1760.

**Lay (HENRY CHAMPLIN)**, D. D., LL.D., b. at Richmond, Va., Dec. 6, 1823; graduated at the University of Virginia in 1842, and at the Theological Seminary of Virginia; ordained deacon July 10, 1846; was minister in Lynnhaven parish, Va., until June, 1847, when he removed to the church of the Nativity, Huntsville, Ala.; ordained priest July 12, 1848; consecrated missionary bishop of the south-west Oct. 23, 1859, and translated to the diocese of Easton Apr. 1, 1869.

**Lay'mon**, a priest at Ebury on the Severn River, Worcestershire, England, flourished in the second half of the twelfth century as the author of the *Brut*, a rhyming chronicle of English history from the time of the fabulous Brutus of Troy to the death of King Cadwallader (689 A. D.). His work is an amplified translation of the *Brut d'Angleterre* of the Anglo-Norman poet Wace, the additions being derived chiefly from the writings of Bede and St. Augustine of Canterbury, while Wace's work is itself little more than a translation of Geoffrey of Monmouth's Latin *Historia Brittonum*. The value of Layamon's chronicle is mainly philological. It contains 22,250 lines, some alliterative, but more imitating the imperfect rhyme of its Anglo-Norman original. The best edition is that of Sir Frederic Madden, with a literal translation, notes, and a grammatical glossary, published by the English Society of Antiquaries (3 vols., 1847).

**Lay'ard** (AUSTEN HENRY), D. C. L., b. of English parents at Paris, France, Mar. 3, 1817; spent several years of his youth in Florence, Italy, and commenced the study of law in England. In 1839 he undertook a course of Eastern travel extending over several years, chiefly within the Turkish empire; learned Persian and Arabic; was for a time correspondent at Constantinople for a London paper; spent many months in 1842 in exploring the antiquities of Susa and S. W. Persia; and passing through Mosul, became deeply interested in the excavations then being made by the French consul, M. Botta, at Khorsabad, the supposed site of Nineveh. After consultations at Constantinople, the British minister, Sir Stratford Canning, offered to assume a portion of the expenses of similar excavations, and Layard, returning to Mosul in 1845, began that series of wonderfully successful researches which has made the British Museum the richest Oriental museum in the world, and laid the foundation for the reconstruction of ancient Oriental history by means of the copious cuneiform inscriptions. Accounts of these discoveries were given by Layard in *Nineveh and its Remains* (1849). The British government in 1849 appointed him attaché to its legation in Constantinople, and he undertook for the British Museum a second series of excavations in Assyria and Chaldean, which resulted in another work, *Discoveries among the Ruins of Nineveh and Babylon* (1853). He also published 2 vols. of engravings of the *Momuments of Nineveh*, 1849-53, and a volume of inscriptions (1851). In 1852, Layard was elected to Parliament for Aylesbury, and for a few weeks was under-secretary of state for foreign affairs in Lord John Russell's administration. He was again on duty in the legation at Constantinople for a short time in 1853, and took an active part in the House of Commons in the debates on Eastern questions, advocating a vigorous policy against Russian aggression. He visited the Crimea in 1854, witnessed the battle of the Alma, and examined the condition of the army, concerning which he soon afterward gave testimony before a parliamentary committee, the appointment of which he was instrumental in procuring. In 1855 he became one of the leaders of the Administrative Reform Association; was chosen lord rector of Aberdeen University in 1855 and 1856; was defeated at the election of Mar., 1857; spent some months in India during the great rebellion of 1857-58; was elected to Parliament for Southwark in 1860, and appointed by Lord Palmerston in July, 1861, under-secretary of state for foreign affairs, holding that post until the fall of the Russell ministry in July, 1866. In that year he became a trustee of the British Museum; was chief commissioner of works and privy councillor in Gladstone's administration (Dec., 1868) until in Nov., 1869, he accepted the post of envoy at Madrid, where he still remains (1875), having rendered important services, both to England and incidentally to the U. S., during the troubled period of his diplomatic life in Spain.

**Lay'cock** (THOMAS), M. D., b. Aug. 10, 1812, at Wetherby, Yorkshire; was educated at London, Paris, and Göttingen, where he received degrees; became professor of the practice of physic and of clinical medicine at Edinburgh 1855; physician to the queen in Scotland 1869; wrote and observed much upon sanitary science, physiology, mesmerism, insanity, etc. Author of *The Nervous Diseases of Women* (1840), *Mind and Brain, or the Correlations of Consciousness and Organization* (1850); 2d ed. 1869), *Methods of Medical Observation*, etc. D. Sept. 21, 1876.

**Lay Days**, a term used in the law of shipping to denote the days allowed to the charterer or freighter of a vessel by the terms of the charter-party for loading and unloading. For detaining the vessel during this stipulated time no expense is incurred by the charterer, but if this time is exceeded he is obliged to pay to the master or owner a certain sum for the additional detention, the amount of which is usually determined beforehand by a provision in the charter-party. The sum to be paid is technically termed demurrage. (See DEMURRAGE.) Lay days for unloading, as a rule, commence when the vessel has arrived at the usual place for discharging the cargo. When such place is a dock, they commence when she enters the dock, and not when she reaches the wharf. The parties may, however, make a special agreement as to the time when they shall begin. Sometimes this depends upon usage. See CHARTER-PARTY. In the absence of custom to the contrary, Sunday is included in the computation of lay days at the point of discharge. GEORGE CHASE, REVEREND T. W. DWIGHT.

**Lay'ering**, or **Laying**, the propagation of herbaceous plants by pegging down branches, and covering the portion to be rooted with earth, or of trees by bending down a low branch, pegging it to the ground, and partly covering it with earth. The covered part takes root, and as soon as the roots are well developed the layer may be cut off and planted as a new tree. It is thought that a notch cut in



the branch between the trunk of the parent tree and the covered part favors the early development of the new roots.

**Layneze'** (Disco), b. in 1512 at Almazan in Castile; studied at Alcalá and Paris; became the general of the Jesuits on the death of Loyola in 1556, and d. at Rome Jan. 19, 1565. He was a man of great natural gifts, and still greater attainments; played a conspicuous part in the debates of the Council of Trent and at the assembly of Poissy; and left several theological works in manuscript, which, however, no one has been able to read on account of the bad handwriting. His labor in the service of the order was very successful, and his influence on the members was decisive. It is generally acknowledged that the peculiar spirit which characterized the Jesuits issued from Laynez.

**Lazarists**, a body of Roman Catholic missionary priests, founded by St. Vincent de Paul in 1624. The name is derived from the College of St. Lazare at Paris, their original house given them in 1632, but their proper title is "Priests of the Mission." They are engaged in foreign, and especially in domestic missions, and in the teaching of theology. They are found in most civilized and in several barbarous countries, and have fourteen establishments in the U. S., including three colleges.

**Lazulite** [Arab. *azul*, "heaven," and Gr. *λίθος*, "stone"], or **Azurite**, a mineral composed of phosphate of alumina, magnesia, and iron, and bearing some resemblance in color to lapis-lazuli.

**Lazzaro'ni** [It. *lazzaro*, "a leper"], formerly the popular name for the lower classes of Naples, so called from the hospital of St. Lazarus, their customary place of refuge. The name is ultimately derived from that of the beggar Lazarus in the parable. The lazzaroni of Naples numbered at the close of the eighteenth century nearly 40,000 persons, who had no fixed employment or home, but were by turns porters, boatmen, or peddlers, besides their constant recourse to begging. From the Middle Ages they derived the obligation to wear a peculiar dress of the simplest description, were treated by the government as a separate class, electing annually a chief called *capo lazzaro*, and often took part in political revolutions. They upheld Masaniello in 1647, and fought bravely against the French during the siege of Naples in 1799. During the republican agitations of the present century they generally sided with the Bourbon monarchy. They are no longer recognized as a separate class, and their condition has much improved under the government of Victor Emmanuel.

**Lea** (HENRY CHARLES), son of Isaac Lea, b. in Philadelphia Sept. 19, 1825; early displayed a talent for science, and at the age of fourteen wrote for *Silliman's Journal* a paper on the salts of manganese. He gave much attention to conchology, publishing *Description of new Species of Shells*, and at a later period to the organization of society in the Middle Ages. He has published a remarkable work, *Superstition and Force: Essays on the Wages of Law, the Wages of Battle, the Obedience and Torture* (1866; 2d ed. 1870), a *Historical Sketch of Sacerdotal Celibacy in the Christian Church* (1867), and *Studies in Church History: The Rise of the Temporal Power, Benefit of Clergy, and Excommunication* (1869). Mr. Lea early became a member of the important publishing-house of Lea & Blanchard, of which he was long the head, and is now the sole representative. He was prominent during the civil war in organizing the system of municipal bounties, has written much on political subjects, and has been for years engaged on a work on the history of the Inquisition with special reference to America (Mexico and Peru).

**Lea** (ISAAC), LL.D., b. of Quaker stock at Wilmington, Del., Mar. 4, 1792; was engaged in mercantile pursuits in his early youth, and devoted his spare time to the study of natural history, especially geology, making collections of fossils, minerals, and shells in the vicinity of Philadelphia. In 1815 was elected a member of the Academy of Natural Sciences, and began to contribute papers to its *Journal*. From 1821 to 1851 was a partner with his father-in-law, Matthew Carey, in what was then the principal publishing-house in the U. S., and in 1827 commenced a remarkable series of memoirs upon fresh-water and land mollusks, which were continued for nearly fifty years, and form the materials for a great work upon American Unionidæ on which he has long been engaged. In 1828 was elected a member of the American Philosophical Society, was chosen president of the Academy of Natural Sciences in 1858, and is connected with the chief societies of natural history throughout the world. His private collection of Unionidæ is the richest in existence, embracing nearly 10,000 specimens, and his memoirs, read chiefly before the Philadelphia societies, number more than 150. He made important discoveries of saurian remains in the red sandstones of Pennsylvania below the coal-measures, published

*Contributions to Geology* (1833), *Fossil Footmarks in the Red Sandstones of Pottsville* (folio, with colored plates, 1853), and, besides other works, collected into 13 vols. (1827-73) his miscellaneous papers with the title *Observations on the Genus Unio*.

**Lea** (MATTHEW CAREY), b. in Philadelphia in 1823, son of Isaac Lea; studied chemistry under Prof. James Booth; has printed in the *Am. Jour. of Science* many analyses of minerals and chemical compounds; has given special attention to photography, and published on it an important work, *A Manual of Photography* (1868; 2d ed. 1871).

**Lea** (THOMAS GIBSON), b. in Wilmington, Del., Dec. 14, 1785, a brother of Isaac Lea. His *Catalogue of Plants Collected near Cincinnati, O.*, was published in 1849 by the late Dr. W. S. Sullivant. D. Sept. 25, 1844.

**Leach** (WILLIAM ELFORD), b. at Plymouth, England, in 1790; became in 1809 a pupil of Dr. Abernethy at St. Bartholomew's Hospital; became an enthusiastic investigator in zoology and curator of the natural history department of the British Museum. In his work on *Crustaceology* (1813) he was the first to separate the *Insecta* of Linnæus into *Myriopoda*, *Arachnida*, *Insecta*, and *Crustacea*; he published a *Zoological Miscellany* (3 vols., 1814-17), and commenced a *History of the British Crustacea*, of which 17 parts appeared, when an affection of the eyes forced him to resign the curatorship, and abandon in great degree his favorite studies. D. at San Sebastiano, Piedmont, Aug. 25, 1836.

**Leacock**, post-tp. of Lancaster co., Pa., 7 miles E. of Lancaster. Pop. 1906.

**Lead** [Ang.-Sax.], a plummet used on shipboard for taking soundings or measurements of the depth of the sea. The ordinary lead is attached to a line of twenty fathoms; the deep-sea lead weighs some twenty-five pounds and has a much longer line. (For improved methods of deep-sea measurements see art. DEEP-SEA SOUNDINGS, by PROF. W. P. TROWBRIDGE, A. M.)

**Lead** (Ger. *Blot*; Fr. *plomb*; Saxon, *bed*; Dutch, *lood*, also meaning a "ball" [suggesting "load," as of a gun]; Lat. *plumbum*, also *Saturnum*: to the modern word is assigned a kindred with "clot" and "clot"). Lead is one of the metals mentioned in the book of Job, and known therefore in the earliest times. In Numbers, also, among the spoils of the Midianites, lead occurs. It has been maintained that Solomon's verse in Proverbs—"Burning lips and a wicked heart are like a potsherd covered with silver dross"—refers to the glazing of pottery with litharge made from lead. In the hanging gardens of Babylon lead existed largely as a building material.

1. *Occurrence in Nature*.—Lead is known in nature as a constituent only of solid rocks and soils. It has not been discovered in mineral waters or in the ocean, nor in vegetable or healthy animal bodies. On life it acts as a poison. Its ores are numerous. It is found as sulphide, chloride, and iodide, as oxides and oxychlorides, selenides and tellurides, as sulphate, carbonate, chromate, phosphate, molybdate, vanadate, tungstate. Its commonest metallic chemical associates are silver, gold, antimony, and arsenic. Though in its veins in the rocks it is commonly found associated with iron and copper sulphides and other compounds, yet it is almost never found crystallized together in the same mineral species with these two latter metals.

*Native Lead*.—Metallic lead, as a mineral, has been reported at many localities, widely distributed over the earth, but occurs in such minute quantities that it is one of the rarest of all minerals, and difficult to find in mineral collections. Though other native metals, such as gold, silver, platinum, mercury (and copper, in a smaller degree), have a great tendency to alloy with lead, yet there are scarcely any well-ascertained cases, among the great number of analyses of these native metals on record, of the detection of the slightest traces of lead. This alone is proof positive that these native metals have not been formed by igneous processes, but rather by chemical precipitation at temperatures below that of the fusion of lead and its alloys. This argument is strengthened by the fact of the common natural association of silver and gold with lead in *its* ores, especially in galena. Two localities of metallic lead in minute quantities on the American continent are a point in the country immediately N. of Lake Superior, called Dog Lake, where Prof. Chapman of Toronto recognized it forming a small string in white quartz; and in an argentiferous galena of the Zomelahuacan district of Vera Cruz in Mexico.

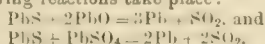
2. *Metalurgy of Lead*.—In the consideration of the extraction of lead from its ores, by far the most important ore is galena, from which very nearly all our lead comes. Galena, or galenite (the word being the Greek γαλήνη, "serenity," from imaginary medicinal virtues early attributed to it), is sulphide of lead, PbS, and is the only known



compound of this metal with sulphur, containing 86.6 per cent. of lead and 13.4 of sulphur. There are few metallic ores more easily and simply reducible to the metallic or "regulus" form than common galena, and hence, no doubt, the very ancient knowledge of lead possessed by man. Simple roasting of galena in an ordinary fire will drive off the sulphur and furnish melted lead. Nevertheless, as lead is a metal required by man in enormous quantities, extreme economy is needed in its metallurgical manipulation, and hence this branch of technology is practically by no means so simple and obvious a business as might be supposed.

Lead-smelting furnaces are of two classes, reverberatory and blast furnaces, corresponding to two very different modes of smelting. We shall speak first of the operation with the *reverberatory furnace*.

It has been stated that simple roasting eliminates metallic lead from galena. It has been no unusual occurrence, indeed, in the early history of different countries, and particularly so in America, for hunters and pioneers, and even for the aborigines after instruction by the former class, to procure their bullets by smelting down galena broken by themselves from the rocks. Some mines of this metal are said to owe their discovery to this need on the part of the primitive explorers. The ability to accomplish the reduction so simply proceeds from the following chemical facts. The first effect of a preliminary roasting upon sulphide of lead—in a reverberatory space, for instance—at a comparatively low heat, for about two hours, is to oxidize portions of the mass into both oxide of lead and sulphate of lead. On then raising the heat for about half an hour to a bright red, the following reactions take place:



the products in each case being simply metallic lead and sulphurous acid gas. This is a general description of the most essential steps in the simplest kind of lead-smelting, which requires, however, many further precautions and operations, to detail which would carry us too far. These two successive steps of oxidizing-roasting and smelting are sometimes conducted in separate furnaces. In the case of argentiferous galenas, when their lead is to be subsequently treated to separate the *silver* it carries with it (see SILVER), much more knowledge and skill than are usually exercised in the smelting operation are called for to avert loss of silver by volatilization. It appears to have been proved by chemists that certain chemical reactions occur in the mass, accompanied probably by intense temperature *locally*, which cause much loss of silver unless the heat be regulated carefully, and not continued unnecessarily long. The subject is, however, not well understood. In another process, in use in France, metallic *iron* is employed with ores containing much quartz to reduce the lead, and prevent its being converted into a fusible silicate, which would be difficult or impossible to reduce. The charge of the furnace is 800 pounds of the silicious ore, with from 200 to 240 pounds of scrap iron, excluding cast iron, which is less suitable in this case.

*Lead-smelting with a Blast.*—This is accomplished in two classes of apparatus—the "cupola furnace" and the "ore-hearth." The cupola is the apparatus most used throughout the continent of Europe, being adaptable to poorer ores, while the simple ore-hearths are adapted only for very clean and pure galenas, producing at the same time, however, the purest and softest lead, which brings the highest prices. The smelting with a blast in a cupola furnace is sometimes practised upon the raw ore—as by what is called the *Silesian process*—in which case waste metallic iron is employed, as in the French method above, to take up the sulphur of the galena. Six parts of galena require one part of cast-iron scrap; and to flux out the silica, etc. of the ore, about 1½ parts of *bois de char*, a highly basic fusible silicate of iron, are added. This mixture and coal in equal parts are thrown separately into the top of the furnace. The lead fuses down into a cavity in the hearth below the tuyere, and a *matt* is also formed of mixed sulphides of lead and iron (usually with silver also), which requires subsequent separate treatment. The action of the fusible lead-slugs on the walls of the furnace is terribly destructive, and a furnace will run but about *eight days* before requiring a new lining.

The commonest practice in Prussia, Sweden, France, and Belgium is to roast out the sulphur from the ore before smelting with a blast. In Prussia a large part of the sulphur is even saved in this operation, by forming cavities in the upper parts of the heaps of ore and wood, in which it condenses. The expense of the roasting operation is thus nearly covered. Such roasted ore is then fluxed in the blast furnace with silicious slags from previous operations. A *matt* is the product, which goes through subsequent complex operations to separate the copper, lead, and silver it is liable to contain.

Ore-hearths are much more primitive contrivances, used where ore is pure and abundant, and economy of the same less important than cheapness of plant and saving of labor. Without cuts but an imperfect idea can be conveyed. For the "Scotch hearth" the ore is now usually roasted, though formerly worked raw. This is a very simple apparatus—little more than a rectangular chamber, with opening in front and tuyere entering at the rear. The lead drains off through a channel in front. In the case of the "American hearth"—which has been used, among other places, at Roscoe in St. Lawrence co., N. Y.—the hearth is sometimes surrounded with a hollow iron casing, through which the blast passes on its way to the tuyere, thus attaining a high temperature. Great rapidity and cheapness of working are thus attained. Even this simple apparatus of the ore-hearth requires much special skill and many precautions in its management on the part of the workmen, which cannot be entered into here.

*Fumes from Lead-smelting.*—In all furnace operations with lead much smoke and fume result, chiefly mechanical, but partly through volatilization. Some compounds of lead—pre-eminently the *chloride* of lead—are very volatile at high temperatures. Even metallic lead volatilizes rapidly at a high red heat, and boils at a white heat. If any common salt or chlorides are present, great loss may result in the furnace. In all cases where economy is an object measures must be taken to catch and save the fumes. The condensing flues or chambers through which the draft or blast is caused to pass have sometimes an immense length. In one case in England a flue *five miles long* and eight feet wide by six feet high saved *fifty thousand dollars'* worth of lead per annum. Other arrangements are chambers furnished with filters of pebbles kept constantly wet with running water, through which a powerful blower forces the fumes. By means of exhausters in other plans the fumes are drawn through a series of water-seals under diaphragms which dip therein. Dr. Thomas Richardson, one of the most distinguished of the British metallurgists, relates that the purification of lead-furnace gases by this latter plan was so complete that he *walked through the exit-flue* without perceiving any fume—an experiment which should not be rashly emulated.

*Refining of Lead.*—Two metallurgical operations coming under this head are of especial interest and importance—the extraction of the silver often contained in it, and the converting of hard into soft lead. The former subject will be treated of under SILVER. Hardness in lead is due to several causes, presence of *antimony* being the commonest. Exposure of the lead in a fused state on the hearth of a furnace to continued currents of air over its surface will gradually remove the antimony and other metallic impurities, and yield a soft or *softer* lead. Such a hearth, it is found, must have an impervious metallic lining, as otherwise the very fluid alloy will leak through like water and be lost. This operation is stated to be carried on on an enormous scale in England, on hard, antimoniferous Spanish lead. Chinese *tea chest lead* is one of the hard alloys (with tin) that is thus susceptible of being refined, yielding over 75 per cent. of soft refined lead, tin being separated by this method as easily as antimony. The dross that forms in this process, containing usually lead with tin or antimony, is utilized best, according to Richardson, by treating it with acetic acid, which converts the lead into commercially valuable acetate, and the residue on smelting yields good antimony or tin.

3. *Chemical Constitution and Properties.*—Lead is one of the softer and more plastic and sectile of the metals, being only approached in these respects, among the metals in common use, by *pure gold*. Color, when fresh cut, bluish-gray, with beautiful lustre, but a dull film of an oxygen-compound quickly forms over the surface. The malleability of lead is great, and its ductility also, but its tenacity is so small that it is drawn into fine wire with great difficulty. It has so little strength that a wire one-twelfth of an inch in diameter breaks with a weight of 20 pounds. It melts at about 625° F., beginning to soften and become pasty, however, at about 617°. Its specific gravity is certainly somewhat variable, being but 11.07 by the lowest determination of Playfair and Deule, and 11.445 by the highest figure given, attributed to no less an authority than the great Berzelius; and for chemically pure lead Herapath gives 11.352, and Karsten 11.388. It is probably compressible to some degree, which may account in part for the diverse densities. Playfair and Deule found its density in *melted* lead to be 10.435. Its crystals are isometric. Fresh cut lead does not tarnish in perfectly dry air, nor in pure water entirely free from dissolved oxygen, showing that the tarnish is due to conjoint action of oxygen and water. If exposed to both water and air, or immersed in *pure water* exposed to the free air, it is rapidly corroded, and a *patina* *forms*. If the water contains carbonic acid or carbonates, however, or, according to some,



also sulphates and phosphates, there is formed over the metal a film of an insoluble salt of lead, which retards further action. As these insoluble compounds, particularly the carbonate of lead, are somewhat soluble in water containing free carbonic acid, some slow action often still continues, and no prudent person will venture to use habitually, for drinking or cooking purposes, water that has stood for any appreciable time in leaden pipes or tanks, or even in a well or cistern into which a leaden pipe has been inserted for connection with a pump—a practice extremely common with plumbers. Waters containing *nitrate*s, not uncommon in well-waters, are believed to dissolve lead with especial rapidity.

4. *Uses of Lead.*—In metallic form lead is used for many purposes too familiar to need enumeration. The principal compounds of lead that have known uses are *litharge*, the protoxide; *minium*, or red lead, the three-four oxide; the carbonate, or *white lead*; the *nitrate*, *chromate*, and *acetate* of lead, all of which will be referred to again; and the several alloys with other metals, which will be treated of first.

5. *Alloys of Lead.*—Few metals form alloys so easily and in such number as lead; and to this fact, together with the great cheapness of this metal, is due to a large extent its high value to the human race. In an alloy may frequently be combined the chemical and physical properties of each of its metallic constituents, and the cheap metal, lead, may thus, to a very important extent, be endowed with strength, hardness, whiteness, brilliancy, and resistance to oxidation, while retaining its easy fusibility, and even gaining in this latter respect. Lead alloys readily, permanently, and in various proportions with the metals *potassium*, *sodium*, *arsenic*, *antimony*, *tellurium*, *bismuth*, *tin*, *cadmium*, *manganese*, *mercury*, *silver*, *gold*, *platinum*, *paladium*, and *iridium*, but apparently not easily or readily with *aluminum*, *iron*, *cobalt*, *nickel*, *zinc*, and *copper*. With some of these latter metals it may be mixed mechanically when both are in fusion, but on standing more or less separation, sometimes nearly complete—as in the case of lead and zinc, for example—will be found to occur, owing to differences of density. The alloys of lead will be taken in the order in which they are above enumerated.

*Alloys with Potassium and Sodium.*—The salts of potash and soda with organic acids, if fused with litharge, yield these alloys. Serullas prescribes for the lead-sodium alloy, to fuse together at a high temperature 100 parts of litharge and 60 parts of cream of tartar. Two parts of sodium to one of lead give a brittle alloy, but with less sodium the compound is malleable. The curious classes of organic compounds containing lead, ethylides, methylides, and amylides of lead, are prepared with the help of the lead-sodium alloy.

*With Arsenic.*—This alloy is white, brittle, and crystalline, and very fusible. It is of practical interest in connection with the manufacture of *lead shot*, which are formed of a true alloy of lead with metallic arsenic, containing some 2 per cent. of the latter, held by the shot-manufacturers to be absolutely essential to success in the manufacture.

*With Antimony.*—Here we have alloys of eminent importance, *type-metal* being the chief. The alloys of these two metals are harder and more fusible than either metal, while endowed with peculiar qualities adapting them for making fine and sharp castings. Common *type-metal* contains 17 per cent. of antimony, the remainder being lead, sometimes with a little zinc. Common stereotype metal varies from these proportions within small limits, sometimes a little tin being added. *Music plates* are chiefly tin, being about 60 per cent. of this metal to 35 of lead and 5 of antimony. Some of the various alloys used for machinery-bearings, called "*Babbitt metal*" and the like, contain lead and antimony. Emery-wheels, in Europe at least, are made of an alloy of lead and antimony mixed with emery. A large proportion of this brittle metal, antimony, even 75 per cent., may be added to lead without making the mass brittle, great whiteness, hardness, and capacity for polish being thus attained. Keys of musical instruments, such as flutes, etc., are made of such an alloy, containing two-thirds of antimony.

*With Tellurium.*—With this metal, and with its related metalloids *selenium*, lead forms definite crystallized compounds, occurring in nature as crystallized mineral species. *Attaite* is the telluride of lead; *clausenthalite*, *zorgite*, and *lehrbachite* are selenides of lead.

*With Bismuth.*—Malleable alloys when the bismuth is small, but when equal to the lead they become brittle. The most useful alloy with bismuth is one also containing antimony, 70 of lead, 15 of antimony, and 15 of bismuth, which expands on solidifying, and hence has been used for stereotype metal, but from the present high price of bismuth is costly.

*With Tin, etc.*—Here we have some of the most valuable

alloys of lead, including hard and soft *solders*, *pacers*, and with bismuth also the common *fusible alloys*. Three grades of solder are in common use: common solder, of equal parts of tin and lead; fine solder, of 2 parts of tin to 1 of lead; and a cheaper article, of 2 of lead to 1 of tin. The following figures are the fusing-points of the different alloys, in Fahrenheit degrees:

Tin 1 to lead .....	25, 558°	Tin 1½ to lead .....	1, 334°
" 1 " " .....	10, 541°	" 2 " " .....	1, 340°
" 1 " " .....	5, 511°	" 3 " " .....	1, 356°
" 1 " " .....	3, 482°	" 4 " " .....	1, 365°
" 1 " " .....	2, 441°	" 5 " " .....	1, 378°
" 1 " " .....	1, 376°	" 6 " " .....	1, 381°

Common pewter contains 4 of lead to 1 of tin. The following are the best-known fusible alloys:

	Lead.	Bismuth.	Tin.	Fuses.
Homburg's alloy. ....	1	1	1	252° F.
Krafft's " .....	2	1	1	220° F.
Newton's " .....	5	8	3	202° F.
Rose's " .....	1	2	1	201° F.

The last two will of course melt in boiling water. These fusible alloys are of great value in taking anatomical casts and impressions of delicate and combustible objects, or those which will not stand a heat above the boiling-point. By adding mercury, their fusing-points may be lowered still further. Such an alloy with mercury will adhere to glass, and is much used for coating the interior of glass globes, tubes, etc. The alloy called in England *Queen's metal* contains of antimony, lead, and bismuth 1 part each with 9 parts of tin. Teapots, spoons, etc. are made of it.

*With Cadmium*, fusible alloys of tin and lead similar to those with bismuth may be made, which fuse at even lower temperatures still. This fact was discovered by an American chemist named Wood. (See *FUSIBLE METAL*.)

*With Silver, Gold, Platinum, etc.*—Lead has a great affinity for the noble metals. It is stated that if a thin sheet of one of these metals be held horizontally, and a drop of melted lead be let fall on it, it will make a perforation and pass through, in consequence of the great fusibility of the alloys formed. In the process of assaying, when litharge is reduced to metallic lead in admixture with an ore of gold or silver for subsequent cupellation, the lead takes into alloy with itself every trace present of the precious metals, the success of assaying as an art being dependent on the completeness of this combination. In the chemical laboratory, if any substance containing lead is incautiously heated in a platinum or silver crucible or other vessel, a perforation is the certain consequence.

6. *The Useful Compounds of Lead.*—*Litharge*,  $PbO$ , the protoxide of lead, also called *massicot*. This is chiefly a product of a special cupellation of metallic lead, carried on for the purpose of its manufacture. Some of it is sent to market in scaly or flaky form, as it cools quickly from fusion; but the more compact, lumpy portions are ground and constitute *levigated litharge*. The color of the scales is sometimes yellow and sometimes reddish, but there has not been found any chemical difference between the two varieties. Protoxide of lead is also obtainable by igniting the nitrate, carbonate, or oxalate of lead. Its density is about 9.15. It is dimorphous, crystallizing in the regular system as cubes and dodecahedra, and also in the trimetric system. *Minium*, *Red Lead*, the 3-4 oxide,  $Pb_3O_4$ . This is a fine-colored red substance, familiar to all from being used extensively as a pigment and for coloring paper. It is poisonous, of course, and should therefore be employed and handled far more circumspectly than is customary. Minium occurs as a native mineral in many European localities, and in one known place in America—Austin's mine, Wythe co., Va. It is a product of the continued action of a low red heat upon litharge while exposed to the air. Its density when pure is about 8.8. Besides its use as a pigment, etc., it is employed as one of the most important materials in the manufacture of lead or flint glass. *White Lead*, *Carbonate of Lead*, *Ceruss*.—This highly important compound,  $PbO.CO_2$ , is found native, sometimes in very beautiful transparent crystals, as the mineral *cerussite*. There are several American localities of fine varieties—at Phoenixville, Pa.; in Wythe co., Va.; at King's mine, Davidson co., N. C., and other places. The crystals are right rhombic. White lead is prepared commercially by two methods, the older of which, called the "*Dutch process*," is somewhat curious and complex in its character. Sheet lead is rolled into loose rolls, each of which is placed in an earthen jar containing a little vinegar at its bottom, the lead not touching the vinegar. These jars are piled up in alternate layers with some material which is fermenting and evolving carbonic acid gas, spent tan-bark being preferred, though formerly stable manure was used and thought essential to success. A large building is thus filled with jars and closed. Basic acetate first forms on the surfaces of the



sheets, which is decomposed by the atmosphere of carbonic acid, forming carbonate and free acetic acid, which latter then acts again on fresh portions of lead: so that but little vinegar is needed to keep the process going on continuously. The heat of the fermentation helps; and in due time, the jars being opened, the lead sheets are found encrusted with white lead, which is beaten off, ground, and washed. The product thus obtained is deemed superior in "body," or opacity in mixture with oil, to that of any other method yet discovered, and brings therefore a higher price. Much white lead is made, however, by simpler and more speedy operations, as by boiling solutions of the nitrate or acetate of lead with litharge, which dissolves to form a basic salt. Carbonic acid gas then precipitates a very good quality of white lead, not generally accepted, however, as equal in body to that of the old Dutch process. The liquid drained off from the precipitate is boiled again with litharge, and so on. *Nitrate of Lead.*—This is used as a material for the preparation of the carbonate and chromates, and is therefore, in crystallized form, a regular article of commerce. *Acetate of Lead, Sugar of Lead.*—This familiar article has well-known uses in medicine. It is manufactured by dissolving litharge in wood vinegar or other cheap form of acetic acid. It crystallizes very beautifully, few objects being more beautiful than a mass of fresh crystals of acetate of lead; but on exposure to the air acetic acid is lost, with formation of a basic acetate, with a little carbonate also in time. Hence sugar of lead has an odor of acetic acid, and the transparent crystals gradually fall down to a white powder, to dissolve which in water requires an addition of acetic acid to replace that which has been lost. It is from this circumstance that the *nitrate*, which undergoes no such spontaneous change, but remains clean and uniform, is largely supplanting the acetate in commerce of later years. *Chromates of Lead: Chrome Yellow and Chrome Red.*—These are two brilliant and valuable pigments, chrome-yellow being especially so. The latter occurs naturally as an elegant crystallized mineral called *crocoite*, of which an American locality is at Congonhas-do-Campo in Brazil. It was in *crocoite* that Vauquelin first discovered the metal chromium in 1794. *Chrome-yellow* is, however, prepared artificially by precipitating a solution of the nitrate of lead with chromate of potash. The brilliant yellow precipitate that falls, after thorough washing and drying at a low heat is ready for grinding with oil for pigmentary purposes. If the heat in drying much exceeds that of boiling water, the color will be liable to injury from reducing action of traces of organic matter always present. In calico-printing chrome-yellow is formed on the tissue itself by successive application of the above specified compounds of lead and chrome in appropriate ways. This color, however, does not attach itself so well to silken and woollen fabrics. Chrome-yellow as a pigment is liable to be much adulterated with cheaper substances. As most of these are insoluble in nitric acid, they may generally be detected by heating a little of the color with diluted nitric acid, which should dissolve it wholly to a clear yellow liquid. *Chrome-red* is a chromate containing twice as much lead as the yellow chromate:

Chrome yellow is.....  $\text{PbO}, \text{CrO}_3$ .  
 Chrome red ".....  $2 \text{PbO}, \text{CrO}_3$ .

The red pigment is produced from the yellow by several different methods—either by boiling with lime or an alkaline solution, which takes out half the acid; or by digesting with levigated litharge; or by boiling it with neutral yellow chromate of potash, which forms bichromate of potash with half its acid; or by fusing it with saltpetre. Its color is very fine, considered equal in tint to vermilion, but, like all lead-colors, it becomes dingy in the air in time, through the action of sulphur, forming black lead-sulphide. *Chrome-green* should strictly be the green oxide of chromium, but most of what passes under that name commercially at the present day is a mixture of chromate of lead with some blue pigment—prussian blue or ultramarine. A dilute acid will quickly distinguish such mixtures from true chrome-green, which latter should be totally unacted on.

HENRY WURTZ.

**Lead** [Ang. Sax.; Dutch, *lood*]. After iron, this is the most abundant and widely distributed of the metals. It is bluish-gray in color, very soft and ductile, but without elasticity. Its specific gravity is 11.35. It fuses at  $612^{\circ}$  F., and when raised to a white heat in the open air it volatilizes, burning with a blue flame and leaving an oxide known as litharge. Its uses in the arts are very varied, such as for roofing, for lining sinks, cisterns, etc., for shot and balls for firearms, and for the manufacture of lead pipes. This latter is formed by mechanical pressure, the softness of the lead permitting of its being forced out in tubes of indefinite length without welding. From the facility with which lead pipes are manufactured, and after-

wards bent, cut, and united, they are almost universally employed as conduits for the distribution of water through buildings in cities; and the employment of lead in this connection has created the plumber's trade, which takes its name from *plumbum*, "lead." Type-metal is formed of an alloy of lead and antimony, and the alloys which go by the name of pewter or solder are composed of lead and tin.

Lead has apparently been in use among civilized nations from the dawn of the historic period. Among barbaric races it seems to have been but little used, its softness making it of little value to the savage man, whose only use for metals was for the manufacture of offensive and defensive weapons and for tools—purposes served much better by bronze and iron. Lead is found in all the geological formations except the igneous rocks, and deposits of it are known to occur on every considerable portion of the earth's surface. In China lead-mines have been worked from remote ages, the metal being there chiefly employed for the production of sheet lead used to line the chests in which tea is stored and transported. Among the nations of Western Europe lead was apparently first brought into general use by the Romans, who derived a large part of their supply from Spain, where the remains of their smelting-works are still to be seen. Lead occurs as a component element in many minerals, but the lead of commerce is almost exclusively obtained from the sulphide, or galena. This consists of lead 86.55, and sulphur 13.45. Near the outcrops of lead-deposits this ore is sometimes extensively decomposed by oxidation, and the carbonate (*cerussite*) and the phosphate (*pyromorphite*) are formed in such quantities as to have an economic value. The other ores of lead which deserve to be mentioned are *bournonite*, antimonial lead ore; *metacinnabarite*, the arseniate; *anglesite*, the sulphate; and *cerussite*, the chloride. There are also vanadates, chromates, etc., which have only interest to the mineralogist. Nearly or quite all galena contains some silver, and often so much that it is called argentiferous galena, and is one of the most important ores of SILVER (which see). Lead occurs in three distinct classes of deposits—viz. what are known as gash veins, segregated veins, and fissure veins. Of these the first class is confined to the sedimentary rocks, and consists of fissures or crevices filled or lined with galena. These are generally vertical, though sometimes horizontal, when the ore which they contain is said to form *floors*. Gash veins are usually restricted to a single stratum of limestone, and have apparently been produced by the formation of cracks and joints by shrinkage. These joints have been subsequently enlarged by the solvent power of atmospheric water, which has flowed through them and filled or lined them with galena deposited from a solution issuing from the adjacent rock. Segregated veins are sheets of mineral matter found in metamorphic rocks conformable to their bedding. Galena rarely occurs in large quantities in deposits of this kind. Those of Spain are the only ones known which have economic value, and they may perhaps belong to a different category. In fissure-veins lead occurs, frequently in large quantities, associated with copper, silver, zinc, antimony, and many other minerals. It is an important fact that highly argentiferous galena is mostly confined to fissure veins traversing crystalline rocks. By far the greater portion of the lead of commerce is obtained from rocks of sedimentary origin, especially the limestones of the Silurian and Carboniferous ages. These are the calcareous sediments of ancient seas, the waters of which contain lead in solution, part of which was sparsely distributed through the materials that accumulated at the bottom. Subsequently, it was leached out and redeposited when the sea-bottom was raised, hardened into limestone, and was traversed by fissures which became channels of drainage. Deposits of this class are typified by the lead-mines of Wisconsin and Missouri, which will be described in another paragraph.

Among the lead producing nations of the globe, England is the first. The product of her mines in 1872 was 10,400 tons. This was obtained chiefly from the Carboniferous and Silurian rocks of Wales, and from the Carboniferous limestones of Devonshire, Cumberland, Northumberland, and Durham. The next largest producer of lead is Spain, in which the mines worked from the remotest ages have been recently reopened and largely multiplied. The production of lead in Spain was at one time over 10,000 tons per annum, but it has now fallen to less than half that amount. The deposits which have been the most productive are those of the Sierra Gador, where the lead occurs in Lower Silurian limestones, much in the same way as in the Mississippi Valley. The third in the list of lead producing nations is the U. S., in which the annual product is from 12,000 to 15,000 tons. Though widely distributed throughout the country, the mining of lead is now almost exclusively confined to the "lead region" of the upper Mississippi and that of the State of Missouri. Throughout the Alle-



gheny belt and the metamorphic region of New England galena occurs in numerous localities. Most commonly it is contained in segregated veins, but is occasionally found also forming part of true fissure or cross-cut veins. Nearly all the galena of this region is argentiferous, but the quantity is generally small; and with one or two exceptions all the mines which have been opened here have failed to be remunerative. The exceptions referred to are the Washington mine of Davidson co., N. C., and the Wheatley mine, situated at Phoenixville, Pa. In Eastern New York there is a group of lead-mines which at one time produced large quantities of metal, but which have of late years been abandoned. These are the Ancram mine in Columbia co., the mines near Ellenville in Ulster co., and that at Rossie. The Ellenville mines were opened in vertical veins in the Shawangunk grit which lies at the base of the Upper Silurian series of rocks. In 1853 the Ellenville mines yielded over half a million pounds of lead. The lead-mine at Rossie, St. Lawrence co., N. Y., was at one time very productive, and famous not only for its yield of lead, but for the beautiful crystallized minerals with which it was associated. It ceased to be remunerative some years ago, and has now been for a long time unworked. The lead occurs here in a well-defined vein cutting gneiss rocks. It has an average width of about two feet, half of which in places was solid galena. The vein-stone is chiefly calc-spar. The mines of Phoenixville, Pa., are located in veins which penetrate the gneiss and Triassic sandstones. Here the lead is associated with considerable copper, and is remarkable for the occurrence of a large quantity of phosphate of lead (pyromorphite), which has been extensively worked as an ore. In East Tennessee and Virginia considerable quantities of lead were produced in former years, but the mines in this region have been for some time abandoned. This has been for the most part due to the abundant production of the lead-mines of the Mississippi Valley; and it is highly probable that hereafter, when the means of transportation shall be improved and the collateral industries are introduced into this region, the working of some of these mines will be resumed with profit. In Central Kentucky, near Lexington, a group of lead-veins is found traversing the Lower Silurian limestones. These are fissure veins, of which the vein-stone is chiefly sulphate of baryta. Though containing so much galena as to convey the impression of great richness, it is a question whether any of these veins can be profitably worked. The lead of this region is argentiferous, and a continuous sheet one inch in thickness would abundantly pay for mining, but it is doubtful whether this quantity can be depended upon in any vein yet opened. It is a matter of no little interest in connection with the Lexington lead-veins that at least one of them was quite extensively worked by the ancient inhabitants of the Mississippi Valley. Galena seems to have been highly prized by this ancient people, as it is frequently found in their mounds. It is, however, always in the condition of the ore, and it is doubtful whether they made any use of the metal itself. Probably the brilliant ore was valued for ornamental purposes, as was the mica of North Carolina, also mined by the same people. The only lead-producing districts of the U. S. at the present time are those of the upper Mississippi and the State of Missouri. Of these, the first covers the contiguous angles of Wisconsin, Iowa, and Illinois, by far the larger part of the district lying within the first-mentioned State. Lead is here found in gash veins, contained in the Galena limestone, a portion of the Lower Silurian system, and the equivalent in part of the Trenton group of New York. This formation has been extensively eroded by atmospheric action, and forms broad valleys and plains, where the soil, derived entirely from the decomposition of the underlying rock, contains many masses of galena, which in these circumstances is known as "float mineral." These scattered masses frequently lead to important deposits in the rock itself, and they are therefore sought in the "diggings" with which the region is dotted over, both for their own sake and because they so often lead to something still more valuable. In the Galena district there are two sets of fissures which traverse the limestone, and run, one imperfectly N. and S., the other nearly at right angles to this. These fissures are sometimes as much as 500 feet in length, and they have been known to expand into caves thirty or forty feet wide, and of equal or greater height. The walls of these fissures are frequently lined with the sulphides of iron, lead, and zinc, and with masses and crystals of calc-spar. These sometimes form stalactites and incrustations in such a way as to show distinctly that they have been deposited from solution in water which continually percolates through the soil and subjacent limestone. Everything indicates that the lead of this region is indigenous to the Galena limestone, as it is restricted to it, and all explorations of the underlying

and overlying rocks have failed to detect any continuation of the lead-veins above or below. It is also apparent that the deposit of lead in the cavities which now contain it is a phenomenon of comparatively modern date, as it could only have taken place when the Galena limestone was raised above the sea-level, and was traversed by a flow of surface water which drained through its fissures, and more or less completely filled them with ore. It may be even said that the lead is being deposited there at the present time, for the bones of the elephant and mastodon have been found at the "diggings," in which the cavities were filled with crystals of galena. Such being the nature of the deposits of the upper Mississippi, it may be predicted that they will never be worked over a much larger area than that now covered by the mines, for the twofold reason—that in the district where the Galena limestone is deeply buried it has never served as a channel through which surface drainage has passed, and it is therefore probably without any considerable fissures; and even though the Galena limestone should contain important deposits of lead where covered by the Hudson River group, its lead-veins would there give no sign at the surface.

The production of lead in the Galena district was in 1825, 664,530 pounds. From this date it rapidly increased, and in 1845 it was 54,494,856 pounds; since when it has gradually, though somewhat irregularly, declined, and it will probably never again reach the figures quoted. The lead-mines of Missouri are like in all essential particulars to those of Wisconsin, except that the formation which contains them is older—the equivalent of the Calciferous sand-rock of New York—and the fissures which contain the lead are somewhat more continuous, giving more system and certainty to mining operations. Among the Missouri lead-mines the "Mine La Motte" was first worked 150 years ago, and is now valued at more than \$500,000, although it has at times yielded more than 1,000,000 pounds of lead per annum. Vallé's and Perry's mines in St. François co. have been scarcely less productive. In these mines the ore is found in a system of insulating veins, forming a network of which the limits have not yet been reached. The production of the Missouri mines could apparently be not only largely increased, but maintained at a much higher than the present yield for an indefinite period.

In the far West lead occurs in a great number of localities, but has nowhere been the object of special search or mining enterprises, as its value is too low to pay for the necessarily great expense of mining and transportation in that region. It is abundant in the silver districts of Colorado and Utah, nearly all the silver ores there having the character of argentiferous galena, and their treatment being greatly facilitated by the lead they contain. In Nevada and California lead is comparatively rare.

The ore from which lead is almost always extracted fuses at nearly the same temperature as the metal itself; hence it would seem that the metallurgy of lead would be very simple; but the facility with which it is oxidized and dissipated by heat makes it a matter of no little difficulty to avoid serious loss in the process of reduction. The different varieties of ore which are met with also require very considerable diversity in their method of treatment. Where the galena is mixed with much silicious matter it has been found most profitable to smelt it in a cupola; but where it is purer, or the foreign matter it contains is calcareous, the Scotch hearth or some form of reverberatory furnace is used. In the valley of the Mississippi, where the ore contains very little mineral matter, and the galena contains little over an ounce of silver to the ton, the processes adopted in the reduction of the ore are quite simple. A reverberatory furnace is usually employed. This has a sloping hearth to carry off the fused metal as fast as it is produced. The ore is charged into the hot furnace, and is permitted to remain for a time at a low temperature, undergoing a kind of calcination. Subsequently, a higher heat is applied for a time, to be followed by another "firing," so that by alternations of smelting and roasting the ore is ultimately deprived of its metal. Argentiferous galenas require a special and somewhat elaborate treatment, for the details of which, as well as for further information on lead-smelting proper, the reader is referred to the articles METALLURGY and SILVER, and the previous article, LEAD.

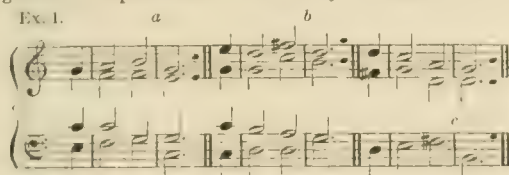
The salts and oxides of lead are quite numerous, and are somewhat extensively employed in manufactures and medicine. Of these one of the best known is the protoxide called litharge, used as a drier with oils and varnishes and in the manufacture of glass. Red lead, or "minium," is a compound of the protoxide with the peroxide. It is very generally employed as a pigment, either in oil paints or in the coloring of wall-papers, sealing-wax, etc. It is also employed, like litharge, in the manufacture of glass. Perhaps the most important preparation of lead is that of the carbonate of the protoxide. This is commonly known as



**WHITE LEAD** (which see). Some of the salts of lead are highly poisonous, and, since the quantity of lead used by every civilized community is great, grave accidents are not uncommon from this cause. The carbonate, the oxide, and the acetate of lead are the most active poisons. They are introduced into the system both by the lungs and the digestive organs. With those who work much in the preparations of lead, as painters, plumbers, and those employed in glazing cards, earthenware, etc., cases of lead-poisoning are constantly met with. One of the most striking symptoms of the disease is what is called "lead colic," or *colica pictorum*. It also produces local or general paralysis or other symptoms, which are always grave and difficult of cure. The use of lead pipe must be regarded as the source of many cases of lead-poisoning. It has been proposed to avoid this danger by lining lead pipe with tin, and pipe of this kind is now coming into general use. It is but little more expensive, and is certainly far safer, than that made from pure lead. (See **LEAD POISONING**.) J. S. NEWBERRY.

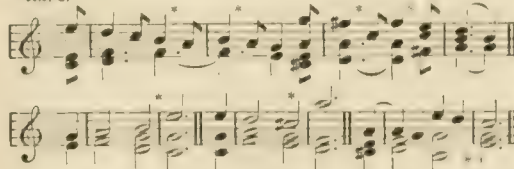
**Leading-note**, in music, the seventh degree of the major scale, or the semitone next below the octave. In the scale of C the leading-note will thus be B: in that of F, it will be A, and so in the other keys. In major keys with sharps the *last* sharp of the signature is always on the leading-note. From a certain natural tendency to resolve itself upward into the octave, the major seventh of the scale is said to *lead* the ear in that direction, or cause it to expect that the next progression will be to the octave, and hence its name of *leading-note*. In *minor* scales the seventh in its natural form is not properly a leading-note, being a minor seventh above the tonic. It is thus a whole tone below the octave, and does not possess any special upward or leading tendency. This defect, however, is removed by the use of an accidental sharp, which brings the seventh into the same relation to the octave as in the major mode, and makes it equally characteristic. The leading-note is considered as the most sensitive interval of the scale, because (as already stated) it creates in the mind of the hearer a peculiar longing or desire for an ascent into the octave above, which it already seems almost to touch. In the majority of cases, especially in cadences, the ear feels disappointed and balked when the leading-note takes any other direction, and particularly so when the progression is a downward one. Instances of this are given at *a*, *b*, and *c* in Ex. 1, and these may be compared with the true progression as represented in each case by the black dots:

EX. 1.



Exceptions to this general rule, however, occur in good compositions when special effects are to be produced, or in flowing melodies where the leading-note is not prominent *as such*, or when by an upward spring the leading-note in its resolution passes over the octave and takes the third or fifth above. Some cases of this kind will be seen in Ex. 2 under the asterisks:

EX. 2.



The leading-note, as third in the chord of the seventh on the dominant, is subject also to the rules relating to the resolution of sevenths. But in this case the rule of the leading-note as such, and that affecting it as third in the chord of the seventh, are coincident in requiring that the progression should be one semitone upward—i. e. into the tonic.

WILLIAM STACSON.

**Leading Question**, a phrase used in the law of evidence to denote a question put to a witness which is so framed as to suggest or indicate the answer desired. Thus, for example, if a witness were asked, "Did he not do a certain act?" or "Did he not carry a pistol?" an affirmative answer would be plainly suggested. It is a general rule in regard to the taking of testimony that leading questions are not allowable in the direct examination of a witness; by which is meant an examination by the party producing him. The object of the rule is to prevent a witness from being a facile instrument in the hands of skillful

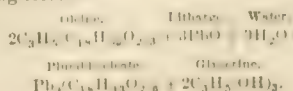
counsel for the introduction of testimony, artfully colored or fabricated, or presenting the facts of the case in a distorted or inaccurate form, and to obtain a version of the circumstances of the case which shall depend entirely upon his own recollection. There is particular danger that a witness will be *led* upon a direct examination, because he is likely to favor the cause of the party for whom he appears, and to desire that he may succeed in the action. Leading questions are, however, permitted even upon a direct examination when the witness appears to be hostile to the party producing him, or in the interest of the other party, or unwilling to give evidence. They are also allowed where an omission in testimony is evidently caused by a want of recollection, which a suggestion may assist, as where a transaction involves numerous items or dates. The same is true when a particular specification of a matter of inquiry is necessary, in order that a witness's attention may be directed to it. The prohibition of leading questions only applies to material subjects of inquiry, and not to that part of the examination which is merely introductory to the principal points in controversy. Such questions are allowed at the preliminary stage of the examination for the sake of convenience and expedition. Upon cross-examination, or examination by the opposing party, there is no restriction upon inquiry by leading questions. The object in this case is to expose the inaccuracies in the witness's direct testimony, and as he appears in opposition to the counsel then examining him, there is no danger of his being influenced to subserve their designs. (See **EVIDENCE**.) The whole subject is peculiarly within the discretion of the judge presiding at the trial, subject to review by an appellate court in a plain case of an abuse of the discretion. GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Lead, Medicinal Uses of.** In this relation the local and constitutional effects of lead compounds have to be considered. *Locally*, soluble salts of lead are astringent and irritant, but the latter property is much less marked in proportion to the astringency than in the case of salts of mercury, silver, copper, and zinc. Indeed, weak solutions of lead-salts are positively soothing. Taken internally in large dose, however, these salts are powerful irritant poisons. Solutions of lead-salts are used in medicine as local applications in catarrhs of mucous membranes and in many inflammations of the skin, especially where attended by much heat and pain. They should not, however, be used in inflammations of the eye, except by physicians' prescription, as if there be any ulceration of the cornea an indelible white opacity will be produced at the spot by chemical decomposition of the lead-salt. The preparations used as lotions are solutions of lead acetate, nitrate, and subacetate. Two official solutions of the latter are directed by the U. S. Pharmacopœia, the stronger being commonly called "Goulard's extract," and the latter "lead-water." From the former are also prepared a cerate ("Goulard's cerate") and a liniment. Internally, lead-acetate is alone used, its employment being as an astringent in diarrheas and in bleeding from the stomach. *Insoluble* lead compounds, like the carbonate, are simply soothing to moist surfaces, but as, if applied in quantity, they may be rendered soluble, and thus irritant, or become absorbed, and thus induce lead-poisoning, other insoluble powders, like zinc-oxide or salts of bismuth, are safer. The constitutional effects of lead are wholly poisonous, and are brought on by a slow and steady impregnation of the system with the metal. (See **LEAD-POISONING**.)

EDWARD CURTIS.

**Lead Plaster, Diachylon, or Emplastrum Plumbi.** This familiar plaster of lead is a lead soap (see **SOAP**), formed by the action of litharge or plumbic oxide on olive oil in presence of water. These materials are boiled together in the proportion of 6 pounds of plumbic oxide in fine powder, 1 gallon of olive oil, and water 2 pints, supplying more water as it evaporates, until the oil and lead oxide unite into the consistence of a plaster. The glycerine of the oil, set free by the basic power of the plumbic oxide, remains in aqueous solution, the fatty acids of the oil forming with the lead the lead plaster, which is made up in cylindrical sticks of a yellowish-white or gray color, brittle when cold, but softening and melting by a gentle heat, when it is readily spread upon leather or cotton cloth for use. It is quite insoluble in water, and nearly so in alcohol. It is without taste, but has a faint peculiar odor. This preparation of lead was well known in ancient surgery. Pliny (*Hist. Nat.*, xxxiv. 53) gives a formula for its preparation almost identical with the one now in use.

The nature of the reaction which occurs is explained by the following formula:





Lead plaster may also be prepared by double decomposition, precipitating a solution of acetate of lead by one of soap.

It is employed in surgery on account of its adhesiveness, and for this purpose a portion of resin is added while the diachylon is in a fused state. In this way it is used to hold together the edges of wounds in persons of delicate skins. It is also used, spread on cotton bandages, as a strapping for giving support and causing pressure, as in ulcers of the leg.

In the large way, this important preparation is made in a steam-jacketed copper holding fifty gallons or more, and capable of standing a pressure of about 10 pounds per inch, giving a temperature slightly above boiling-point. Lard and lard oil may be substituted for olive oil in the preparation of lead plaster, but by no means will all kinds of animal and vegetable fats answer this purpose. Logan's plaster is made by boiling together litharge, 16 ounces; carbonate of lead, 16 ounces; Castile soap, 12 ounces; butter (fresh), 4 ounces; olive oil, 24 pints; mastic (powdered), 2 drachms. By a high heat lead plaster is decomposed, giving off irritating vapors of acrolein from the decomposition of the glycerine, and leaving a blackened residue, with oxide of lead. Diachylon or diachylum is a derivative of far-fetched meaning, from the Greek *διάχυλος*, "very juicy," or "prepared with the juices of plants," such having been the ancient practice in preparing this plaster, vegetable juices supplying the place of water. Its chief use in pharmacy is in the preparation of other plasters. Made from the refuse oleic acid of stearic acid candle-factories, and mixed with a certain quantity of oil or tallow, it has been used as a wheel grease. A compound of lead oxide with the acids of linseed oil, prepared by decomposing the potash soap of linseed oil with solution of acetate of lead, serves, when dissolved in oil of turpentine, for printing on wall-paper previous to gilding it with gold-leaf or Dutch metal, or dusting it with wool-shearings for the production of flock patterns. B. SILLIMAN.

**Lead-Poisoning**, a diseased condition resulting from the presence of a considerable amount of lead in the system. This condition is induced in various ways: (1) By the use of lead pipe for the conduction of drinking water. Happily, a large proportion of the waters used for drinking and cooking have not the power to take up lead in solution; but there can be no doubt that a very great number of cases of lead-poisoning are induced in this way. (2) By the use of lead pipes in racking off wines, cider, and beer; by the use of lead-lined chambers in soda-water apparatus and the like. It is very certain that the use of leaden siphons for drawing cider and vinegar from the cask is a very common practice among farmers and dealers in the U. S.; and a dangerous, senseless, and even criminal, practice it undoubtedly is. (3) By the use of lead-paints; hence the name "painter's colic" applied to one symptom of lead-poisoning. *Symptoms*.—These are (1) pain, often intense in the abdominal region, with constipation, sometimes, though rather rarely, accompanied by acute inflammatory symptoms; (2) a blue line visible on the gums near the roots of the teeth; the gums and teeth often foul and tender; the breath offensive, the mouth having a metallic taste; (3) sometimes iteirus or jaundice—the skin dark rather than yellow; the patient usually looking pinched and haggard; (4) there is a certain proportion of cases which have "lead-palsy," affecting primarily the extensors of the wrist. This is called "wrist-drop," though it is sometimes seen with no other indication of lead-poisoning. Lead rheumatism sometimes occurs, and disease of the brain from lead-poisoning, while delirium, convulsions, and coma are not unknown, but are rare. *Treatment*.—Opium is the sheet-anchor in ordinary lead-poisoning. It relieves the pain, and even at times the obstinate constipation of this disease. Cathartics are very useful, except when there is much tenderness of the bowels. Then their use should be deferred for a time. Iodide of potassium is prescribed in chronic cases, and is believed to assist in the elimination of the metal. Sulphuric acid and the sulphates are given with a view to precipitating lead from the circulation, and fixing. Revised by WILLARD PARKER.

#### Leadville. See APPENDIX.

**Leaf** [Ang.-Sax.: Gothic, *lanfs*; Ger. *Laub*; denoting something broad and thin], in botany, one of the pieces which make up the expanded portion or green foliage of a plant. Being the essential organs of vegetation, leaves are the most important part of a plant. In them actual assimilation, or the conversion of the plant's inorganic food into organic matter, only takes place. This, accordingly, may be taken as the primary function of the leaf, which may be defined as being, physiologically, an arrangement for the exposure of a large green surface to the light and air; of "green surface," because it is only in the presence of the green matter of vegetation (called *chlorophyll* or

leaf-green) that assimilation takes place; and "to the light," because this takes place only under solar radiation. The green rind of shoots subserves the same purpose, so far as it goes; but the expansion of definite portions of the green surface of the shoots in the form of foliage vastly increases the amount of working surface, and therefore the power of vegetation.

Considered even as foliage, the word *leaf* is naturally and almost inevitably used in more than one sense, both popularly and in descriptive botany; as (1) for the expanded green blade alone (the *lamina* of the leaf); and (2) for this and its supporting footstalk (petiole), and whatever else is normally connected with it. A complete leaf, in the botanist's sense, consists of blade, footstalk, and a pair of stipules (lateral appendages at the base of the latter); but these three parts are very commonly reduced to two, the stipules being wanting or fugacious, and not rarely to one, the footstalk being absent, and so the blade growing directly out of the stem. Indeed, sometimes the blade is wanting, while the footstalk remains, with or without the stipules, or only the stipules are produced, or there is in the place of the leaf a body not distinctly answering to either of these three constituent parts. This leads us to the botanist's idea of—

*A Leaf Morphologically considered*.—As leaves are produced on the stem at definite points (called *nodes*), and in a fixed arrangement and order, and as they appear under most diverse forms, and either with or without all the parts which a leaf may have—the deprivation or transformation sometimes being such that the organ fulfils little or no function as foliage—so the botanist has come to regard the leaf generically, as being whatever body occupies the place of a leaf, however unlike a foliage-leaf it may be either in appearance or function. The intermediate gradations between ordinary leaves and these various representatives of leaves, both as regards office or structure and appearance, compels this view, irrespective of other considerations. In the absence of any generic name for this protean organ, which takes almost all forms and functions, the botanist, from the morphological point of view, extends the significance of the term *leaf* to cover them all. Leaves as foliage are the typical leaves. Of these the diversity is great, and the nomenclature correspondingly extensive. The details of structure and terminology need not here be entered upon; they have a place in every elementary treatise on botany. Suffice it to say, that a foliage leaf is either simple or compound—*simple*, when there is a single blade, with or without its footstalk; *compound*, when the footstalk divides or branches, or bears distinct partial blades, called *leaflets*. Of specialized leaves, a series of the more important modifications will serve to illustrate the plan upon which, in the plant, one and the same organ, fundamentally, is modified and made subservient to wholly diverse offices. Some are storehouses of food, in which organic vegetable products for future use are deposited and concentrated. To this use the first leaves (namely, the cotyledons in the seed of a large proportion of phænogamous plants) are wholly or partly devoted. So are the bud-scales of bulbs, which are modified leaves or bases of leaves; while the fleshy leaves of houseleeks, of the century plant, aloe, and such-like succulent plants, serve at the same time as ordinary foliage for the production of food, and as magazines for its storage. So bud-scales represent leaves devoted to the use of protection; the tendrils of the pumpkin are probably leaves transformed for the purpose of climbing; and in the pea-plant some of the leaflets of a compound leaf are tendrils for climbing, while the rest serve as foliage. In the barberry some of the leaves are branched spines; in *Sarracenia* and some other plants they are pitchers or tubes in which insects are caught; and in the Venus's flytrap (*Dionæa*) a part of the leaf, endowed with a special sensitiveness, power of rapid closing, and a digestive apparatus, is clearly carnivorous. (See *PHYSIOLOGY, VEGETABLE, DIONÆA*, etc. Also, Darwin, *Insectivorous Plants*, 1875.) The "leaves" of a flower—of the corolla no less than the calyx—afford another instance so obvious that this name has always been applied to them in common language; and to the morphological botanist the essential organs of the blossom (stamens and pistils) equally represent leaves, more completely transformed and specialized, and devoted to sexual reproduction. They conform to leaves in situation, arrangement, etc. (For the arrangement of leaves upon the stem, and the laws governing it, see *PHYLLOTAXY*. Their anatomical structure, behavior under light, action upon the air, and general functions are considered in the article *PHYSIOLOGY, VEGETABLE*.) ASA GRAY.

**Leaf-cutter Bee**, a name given to several solitary bees of the genus *Megachile*, which construct, or sometimes merely line, their cells with bits of leaves cut out by their scissor-like jaws. *M. centuncularis*, our most common species, is found also in Europe. It cuts out pieces of rose-



leaf for its cells, which are of a very neat and curious structure. The cell it stuffs with pollen, in which it deposits an egg.

**Leaf River**, tp. of Ogle co., Ill. Pop. 1057.

**Leaf River**, a v. of Perry co., Miss., near the S. W. bank of Leaf River, 10 miles S. E. of Augusta. Pop. 720.

**Leaf-Rollers** (*Tortricidae*), an important family of small lepidopterous insects, characterized by short beak-like palpi. They are mostly nocturnal, and take their name from the fact that many species make a rude tent by rolling up the leaves of trees, often fastening them with silken threads. The number of genera and species is great, and as a rule the insects are great destroyers of useful vegetation. The genus *Tortrix* is the typical one.

**Leaf Valley**, post-tpn., Douglas co., Minn. Pop. 232.

**League** [*It. lega*; Span. *lega*; Fr. *lieue*, from the Gaelic *leac* or *leachd*, "a stone," as the Gauls used to mark distances by stones] is a measure of length, used in America mostly for distances at sea, but in Europe also upon land. The nautical league is  $\frac{3}{4}$ th of a degree, or 3 geographical miles, or 3.457875 statute miles. In England the land-league is 3 statute miles. In France the legal post-league is 2.42 English miles; in Spain, 8000 *varas*, or 7418 English yards.

**League, Achæan.** See **ACHÆAN LEAGUE**.

**League, Anti-Corn Law**, a name taken by a famous association of Manchester manufacturers, founded in 1839, for abolishing all fiscal imposts on corn. The first Manchester election of members of Parliament, which took place in 1832, carried free-trade candidates, that electoral issue being then raised at the hustings for the first time in England. In 1834 the first meeting of Manchester merchants was called to consider the question of corn-law repeal. In 1836 a miscellaneous anti-corn law society was formed in London, which included 22 members of Parliament. Among the names of the adherents were those of Grote the historian, Hume the economist, Sir William Molesworth, and J. A. Roebuck; Ebenezer Elliott, the corn-law rhymer; W. H. Ashurst, a leading promoter of the penny-postage system; Francis Place, the chief of working-class agitators; William Weir, subsequently editor of the *Daily News*; Col. Thompson, the great expositor of free trade. But no intellect, however eminent and various, could avail against monopoly without money and popular opinion, and of these forces the precursor was W. A. Paulton, a young surgeon of bright, elastic enthusiasm, with a genius for agitation. In 1838 a Dr. Birnie had announced, at the theatre, Bolton, Lancashire, a lecture on the corn laws. The doctor was laden with notes, in which he got so entangled that he could not tell what he had to say. Mr. Thomas Thomasson, afterwards the executor of Cobden, a man of striking energy of character and commercial sagacity, being among the auditors, said to Paulton, who was near him, "You can speak; go down on the stage and deliver the doctor." The spontaneity and capacity which Paulton showed on that occasion led to his being invited to lecture himself, and ultimately he delivered 300 lectures against the corn laws throughout Great Britain. He became the private and confidential secretary of the future League, which his eloquence and thoroughness mainly instigated. At a dinner given to him at Boston, Mr. Bright made the first public speech delivered out of his native town, Rochdale. Later in the same year Dr. Bowring, then of free-trade repute, being entertained at a dinner in Manchester, Mr. James Howie cried out, on Mr. Paulton's health being drunk, "Why could not we have a free-trade association?" A week later one was formed, consisting of seven persons, of whom the chief was Mr. Archibald Prentice, founder of the *Manchester Examiner*, who had himself, as early as 1828, advised the formation of such a society. A subscription of five shillings each was adopted; £5000 each was wanted before corn-law repeal was carried. In 1838, Mr. Cobden first became prominent in the Manchester Chamber of Commerce for resistance to the restrictive commercial policy of the manufacturing trade of the country. In 1839 delegates from the manufacturing districts were appointed to proceed to London to press their opinions upon the legislature. Mr. Charles Pelham Villiers, who ten years later became president of the Poor Law Board, undertook to represent the free-trade question in the House of Commons. On Feb. 19, 1839, Mr. Villiers moved that certain manufacturers be heard by counsel before the bar of the House of Commons, against the corn laws, as injurious to their private interests. The motion was rejected by an overwhelming majority. On Mar. 12 following, the day on which the Anti-Corn Law League originated, Mr. Villiers again moved "that the House resolve itself into a committee of inquiry on the corn laws," when only 195 members could be found to vote for inquiry,

while 342 voted against it. Discouraged and dismayed, the partisans of inquiry, who had come up from Manchester to await the result of the motion, rushed over to Herbert's hotel, then standing in Palace Yard, opposite the House of Parliament, to consider what could be done. It was in that crowded room that Cobden, leaping on a chair, reminded the delegates of the victorious efforts of the Hanseatic League, which three centuries previously had freed the trade of the Hanse Towns from the imposts of German princes. "Let us," cried Cobden, "have an Anti-Corn Law League, which shall free corn and trade also." It was then and there that the League originated. Cobden proposed that a fund of £50,000 be raised, and a considerable portion of that sum was subscribed in the room. The chief Manchester commercial houses followed with subscriptions of £50 and £100 each.

The English corn laws, which had for their object the restriction of the trade in grain, date as far back as 1360. At that time the prohibition was against exportation. It was not until 1462 that an act was passed prohibiting its free importation. The object of the Anti-Corn Law League of 1839 was stated by the chairman (Mr. J. B. Smith), on the occasion of Paulton's first lecture in the Manchester Corn Exchange, "to be the same righteous object as that of the Anti-slavery Society, which sought to obtain for the negro the right to dispose of himself; and the object of the League was to obtain for the people the right to dispose of their labor for as much food as could be got for it" in whatever market the exchange could be made. The Leaguers little foresaw at the time the formidable work they had undertaken, and only gradually learned themselves, as the great agitation proceeded, the principles they had to establish. What they discovered was that monopoly always had advocates ready-made, who, sharing in its exclusive advantages, had reasons for being enthusiastic in its defence. Any tradesman would profit could he exclude from the market rival articles of those in which he dealt. His profits would increase at the expense of the purchaser. The monopolist dealer considers this protection, but the public, who are the customers of the market, find it to be but protection on one side—the protection of the seller while he has his hands in the pocket of the buyer. What the public want is free purchase in a free market, the power to procure what they want from whoever has it to offer. Free buying—that is protection to the customer. The doctrine of the purchaser is as much food as a man can buy, for as much wages as a man can earn, for as much work as a man can do; and is the natural, and ought to be the inalienable, birthright of every man who has the strength to labor and the will to work. On other things besides corn, protection was always on the side of the seller until the Anti-Corn Law League freed all English industry from restrictive imposts. These "free traders," as the Leaguers were styled, were opposed by an organized party who took the title of "protectionists," who maintained (1) that protection was necessary to keep certain lands in cultivation; (2) that it was desirable to cultivate as much land as possible in order to improve the country; (3) that if improvement by that means were to cease, there must be dependence on the foreigner for a large portion of the food of the people; (4) that such dependence would be fraught with immense danger. In the event of war supplies might be stopped, for the ports might be blockaded, the result being famine, disease, and civil war. (5) That the advantage gained by protection enabled the landed proprietors and their tenants to encourage manufactures and trade; so much so that were the corn laws abolished half the country shopkeepers would be ruined; that would be followed by the stoppage of many mills and factories; large numbers of the working classes would be thrown idle, disturbances would ensue, capital would be withdrawn, and no one could venture to say what would be the final consequences. By this formidable enumeration it was made to appear that the end of England was certainly at hand if the corn monopoly was disturbed. No country in the world can hope to put on record a more appalling set of consequences if protection is menaced. In England they exercised a commanding influence even over the working people, who were induced to believe that it was for their interest that bread was made dear. The learned as well as the ignorant, the aristocracy as well as the small-town shopkeeper, were under the same uninstructed terror. Even Sir James Graham declared in Parliament, when a fixed duty on corn instead of a fluctuating one was proposed by Lord John Russell, that "it would not be the destruction of one particular class in the state, but of the state itself." Sir Robert Peel at first met the efforts of the League by a sliding scale, varying with the price of wheat. This was a thoroughly English device, worthy the genius of a people who never preceptate themselves even into the truth. Had Moses been an English premier, instead of making the Commandments absolute, he would have proclaimed a slid-



ing scale of violation. The struggle of the League lasted seven years, and cost half a million of money. In the fourth year of their activity Mr. Paulton stated that the League employed upwards of 300 persons in making up electoral packets of tracts, and 500 other persons in distributing them amongst the constituencies. In England and Scotland alone they distributed to electors 5,000,000 tracts and stamped publications, while to non-electors of the working class they distributed 3,600,000 publications. In addition, the League had stitched up in monthly magazines and other periodicals 426,000 tracts. The entire number of tracts and stamped publications issued by the League in the single year 1845 was 9,026,000, weighing upwards of 100 tons. Such were the business features of this famous association. But its success came from its inspiration, and its inspiration came from its remarkable leaders. Ebenezer Elliott wrote fiery rhymes for it; Col. Thompson wrote its *Catechism*; George Wilson, the chairman of the League, admittedly the most efficient public chairman who appeared in England during his day, organized its popular action; James Noland, a vigorous speaker, acquainted with the people, was a sort of outrider to the League, going into market-towns on market-days on a white horse—perhaps as a pacific emblem, partly a means of conspicuousness. He took the fighting among the belligerent farmers, so that when Bright and Cobden came the strength of the enemy was known, and the local stock of turbulence being expended the great orators obtained a hearing. There was one R. R. Moore, with a voice that fell on a meeting like the bursting of a reservoir. It was not what he said, but the sound it made, that produced the effect. The maddest clamor was not hushed; it was overwhelmed by the new roar, which was always reserved to the end of the meeting. His function was to appeal for subscriptions, and he exactly answered that end, for when his astounding voice fell upon the meeting no one seemed to have the power of going away. In the hours of argument Mr. Villiers's mastery of the question was ever heard, and his high character lent influence to the cause. Mr. Milner Gibson, another Parliamentary voice, had a graceful and cogent eloquence which always commanded attention. Mr. W. J. Fox, a Unitarian minister, and subsequently M. P. for Oldham, surpassed all the orators of the League of that day in brilliance of speech. Shorter and more rotund than Charles James Fox, he notwithstanding produced effects of rhetoric transcending those of his great namesake, and which "brilliance" but weakly describes. Above all in renown were the great names of Cobden and Bright. Mr. Cobden, the "pale-faced manufacturer," whom the landowners believed, and the farmers were persuaded, was a Manchester enemy of all agriculture and paid emissary of the Socialist insurgents of the Continent, was himself the son of a Sussex farmer, and whose ambition was to die one of that class; and did, seeking and accepting no other distinction than that which his genius cast around his name. He was the logician of the League. As a master of lucid statement on the platform or in Parliament he left no equal at his death. When he had made a statement he looked at it and around it, as though he saw it in the air before him. What was deficient he supplied, what was redundant he withdrew, by putting the question in another way, in which he omitted any mischievous word or qualified any phrase he had used which might mislead, so that he could not be misunderstood by accident nor his meaning perverted by design. This contributed to give the League great ascendancy, since all its adherents could quote without fear of contradiction what he said, and his speeches of one day became the authority of the next. Mr. Bright's was a grander and more imposing order of eloquence, at once impassioned and colossal. Cobden presented the facts, Bright put fire into them. With the finest voice of any European orator, he displayed a measured vehemence on the platform which gave the impression of unknown power. He was the Vulcan of the movement, who forged at red heat and hurled the burning bolts which finally set protection in flames. These were the great propagandists of political economy who made conquest of the premier. Sir Robert Peel, who won for himself an imperishable name by repealing in 1846 the corn laws, thus "giving the people bread, no longer leavened," as he proudly said, "by a sense of injustice." Never was such a wreck of political reputations as took place within a few years of the abolition of protection in corn. Nothing happened which had been predicted by the prognosticators of disaster. Poor lands were more cultivated than before; no stoppage of imports by war has occurred; manufacturers and shopkeepers have thriven beyond all the dreams of prosperity; instead of rents of land falling, the aristocracy, the chief owners of it, have grown rich while they slept, and farmers have found "ruin" a very pleasant thing to them. The working classes have been better instead of worse employed, and

their wages in large districts now excite the jealousy of curates, while the agricultural laborers are at last able to insist upon improved provision for themselves. A stimulus, inconceivable heretofore, has been given to trade; fluctuations in the price of corn have decreased; apprehensions of insufficient harvests no longer excite dread, and the British race are physically much improved since the days before Cobden and Bright arose. The victory of the Anti-Corn Law League was the greatest ever won by reason in the history of human agitations. Neither in piety nor morals nor trade are men for trusting one another. Everybody is for protecting his neighbor from benefiting himself. Nobody is for leaving freedom free. The principle of progress in commerce and social life is not to limit liberty, but to limit injury. It was the establishment of this principle in trade that caused this League to be regarded as one of the historic forces of British civilization. GEORGE J. HOLYOAKE.

**League, Holy** [*Fr. La Sainte Ligue*], called the League *par excellence*, was entered into in 1576 at Péronne, by the heads of the Catholic party under the leadership of Guise, for resistance to the spread of Protestantism and opposition to the succession of the Calvinistic princes to the French throne. This led to the renewal of the bloody civil wars, which were not ended until 1590, when Henry IV. won the battle of Ivry.

**Leake**, county of Central Mississippi. Area, 576 square miles. It is undulating and fertile, and is traversed by Pearl River and its affluents. Cotton and corn are staple products. Cap. Carthage. Pop. 8496.

**Leake** (Sir JOHN), b. at Rotherhithe, England, in 1656; distinguished himself in the naval service during the war of the Spanish succession by taking Newfoundland from the French (1702), for which he was made admiral and knighted; relieved Gibraltar in Oct., 1704, and Mar., 1705, forcing the French and Spaniards to abandon the siege; took part in the reduction of Barcelona the same year; captured Carthage and Majorca in 1706; became commander-in-chief of the fleet in 1707; took Sardinia and Minorca in 1708; became rear-admiral of Great Britain and lord of the admiralty in 1709; represented Rochester in Parliament for some years, and d. at Greenwich Aug. 1, 1720.

**Leake** (STEPHEN MARTIN), F. S. A., b. in England in 1702; was an eminent authority upon heraldry and numismatics; became Clarenceux Herald in 1741, Garter Herald in 1754; published a manual of British coins, *Nummi Britannici Historia*, in 1726, and a *Life* of his uncle, Sir John Leake, in 1750. D. in London Mar. 24, 1774.

**Leake** (WILLIAM MARTIN), b. in London, England, in Jan., 1777; educated at the Royal Military Academy at Woolwich; obtained a commission in the artillery in 1794; served in the West Indies; sent in 1799 to Constantinople to instruct the Turks in the use of artillery; appointed in 1800 to advise the Turks in resisting the French, and proceeded through Asia Minor and Syria to Egypt; and in 1801 was engaged with William Hamilton in making a general survey of Upper Egypt. In 1804 he was appointed to survey the coasts and fortresses of European Turkey, and made a careful exploration of Greece. For many years he was frequently employed upon government commissions in the East, and gave the result of his researches in the learned works *Researches in Greece* (1814), *Topography of Athens* (1821), *Journal of a Tour in Asia Minor* (1824), *Travels in the Morea* (1830), *Travels in Northern Greece* (1835), *Peloponnesiaca* (1846), *Nunimata Hellenica* (1854), *Disputed Questions of Ancient Geography* (1857), and *Historical Outline of the Greek Revolution* (1826), and other minor political works. He attained the rank of colonel; retired from the army in 1823, and devoted himself thenceforth chiefly to geography. In 1838 he married Mrs. Marsden, widow of the historian of Sumatra and daughter of the learned Orientalist Sir Charles Wilkins, and she rendered him valuable assistance in his literary tasks. Filling important posts in the geographical and antiquarian societies of London, he was for many years a leading authority upon Eastern questions. He was an ardent sympathizer with the Greeks in their struggle for independence. D. at Brighton Jan. 6, 1860.

**Leakesville**, post-v., cap. of Greene co., Miss., on Chickasawha River.

**Leaks'ville**, post-tp. of Rockingham co., N. C. Pop. 2031.

**Leam'ing** (JEREMIAH), D. D., b. at Middletown, Conn., in 1719; graduated at Yale in 1745; was ordained to the Episcopal ministry in 1748; preached eight years at Newport, R. I., twenty-one years at Norwalk, and eight years at Stratford. During the Revolutionary war he was imprisoned as a Tory, contracting a disease of the hip which rendered him a cripple. On account of infirmity he declined in 1783 an election as first bishop of the American



Episcopal Church. He wrote a *Defence of the Episcopal Government of the Church* (1766), a *Second Defence* (1770), *Evidence of the Truth of Christianity* (1785), and *Dissertations on Various Subjects* (1789). D. at New Haven, Conn., Sept. 15, 1804.

**Leamington, or Leamington Priors**, town of England, 2 miles from Warwick, on the Leam, celebrated for its mineral springs, saline, sulphurous, and chalybeate, which attract a large number of fashionable guests during the season from October to May. It is wholly of modern growth, and is one of the handsomest places in England. Pop. 22,730.

**Leap Year.** See CALENDAR, by F. A. P. BARNARD.

**Lear** (TOBIAS), b. at Portsmouth, N. H., Sept. 19, 1762; graduated at Harvard University in 1783; became private secretary to Washington in 1785; was consul-general at Santo Domingo, 1802; and at Algiers (1804); was in 1805 commissioner to negotiate peace with Tripoli, and returning to the U. S. became accountant in the war department. D. at Washington, D. C., Oct. 11, 1816.

**Lear'ed** (Gen. EBENEZER), b. in Massachusetts about 1728; was a captain in the French war, 1756-63; raised the 3d Massachusetts regiment at the outbreak of the Revolutionary war; was appointed brigadier-general in Apr., 1777; took part in the relief of Fort Schuyler (Aug., 1777), and commanded the centre at the battle of Stillwater (Sept. 19, 1777); was at Valley Forge the ensuing winter, and was forced by broken health to retire from service in Mar., 1778. A pension was granted him in 1795. D. at Oxford, Mass., Apr. 1, 1801.

**Leas'burg**, post-v. and tp. of Caswell co., N. C. Pop. 1461.

**Lease.** See LANDLORD AND TENANT IN LAW, by PROF. T. W. DWIGHT, LL.D.

**Lease and Release.** See BARGAIN AND SALE, by PROF. T. W. DWIGHT, LL.D.

**Leather** [Sax. *lether*, from *lithe*, "soft;" Ger. *Leder*; Fr. *cuir*], the skins of animals prepared by processes which protect them from putrefaction and render them soft, pliable, tough, and non-transparent.

*History.*—Skins constituted the first clothing of man, and have been more or less perfectly prepared from the earliest times. Persian and Babylonian leather was long celebrated, and during the first centuries of the Christian era the Russians and Hungarians were most skilful tanners. The earliest method consisted undoubtedly in cleansing and drying the skins. Then fat, smoke, urine, sour milk, brains, etc. were in time found to be efficacious. Later, astringents—nut-galls in the East and oak-bark in the West—were introduced, giving rise to the process of *tanning*, and alum to *tawing*. It was not till the close of the eighteenth century that the true nature of the processes began to be understood, when the structure of the skin and the chemical nature of the agents employed had become known. In 1778, Macbride proposed raising skins with dilute sulphuric acid; in 1793, Deyeux recognized tannin as a peculiar body, and in 1796, Seguin showed that leather tanned with oak-bark was a compound of tannin with the animal tissue, and proposed his process of quick tanning. Banks in 1801 discovered the tanning properties of terra japonica, and Pelouze in 1834 investigated nut-galls and showed the acid character of tannin. Davy, Proust, Vauquelin, Chaptal, F. Knapp, Roller, and many other chemists contributed important investigations on the subject. Mechanism has done much more than chemistry to expedite the operations and improve the appearance of leather. It is an unfortunate fact, however, that in most cases the quality of the leather has deteriorated in proportion as the processes have been quickened.

The *Manufacture of Leather* is conducted in three entirely distinct ways: I. *tanning* by the aid of bodies containing tannin; II. *tawing* with alum and common salt; III. *tawing* with oil. The whole skin is not converted into leather, but only that portion known as the *corium* or *dermat*, which possesses a fibrous texture. This is covered on the hair or bloom side by the epidermis, consisting of nucleated cells, and on the flesh side by a fatty tissue, both of which are removed by the tanner.

1. *Tanning.* The skins of almost all quadrupeds may be converted into leather. In practice, the hides of bulls and oxen yield the best leather for soles, harness, and for belting; calves' skins furnish the best upper leather for boots and shoes; lamb, sheep, goat, and buck skins are generally tawed with alum or oil for the preparation of glove, wash, or bookbinders' leather. Most of the so-called *hackskin* is now prepared by tawing the skins of wild hogs from Africa. Alligators' hides have recently been introduced for boots and shoes. Horse, ass, pig, and seal skins are tanned for trunks and saddlery purposes.

Vol. 11.—107

*Preparation of the Skins.*—(1) Steeping or macerating in water is resorted to in order to soften the skin and to remove blood and dirt. Fresh hides are macerated two or three days, dried or salted hides eight or ten days. They are taken out of the water twice daily and put back again. (2) Cleansing the flesh side is effected by supporting the hide on a "tree" or "beam," a stout semicircular plank, and scraping it with a dressing-knife to remove the fatty tissue, etc. (3) Loosening the hair is effected by sweating, liming, or treatment with depilatories. Sweating is a putrefactive fermentation which is often resorted to for sole leather, as lime tends to render the leather brittle. The hides are piled up with the flesh side inward in a tank which can be closed to retain the heat generated by the fermentation. Some salt or wood vinegar is generally rubbed on them beforehand. When the smell of ammonia is perceptible the operation is completed. Similar results are obtained by hanging the hides in rooms heated to from 86° to 122° F., the air of which is kept moist by steam. Liming consists in placing the hides in vats with milk of lime, frequently transferring them from one vat to another, or taking them out and replacing them, to allow the lime to act equally on every part. When the hair is found to be properly loosened the hides are withdrawn. Depilatories are used for skins of the smaller animals, which will sustain neither sweating nor liming. Rhusma, a mixture of orpiment and two or three times its weight of slaked lime, has long been used. It is rubbed on the hair side of the skin, and allowed to remain in contact till the hair is sufficiently loosened. Sulphide of calcium, which is the active agent in the rhusma, has of late been substituted for it. The refuse lime of gasworks contains a considerable proportion of this compound, and may be used with advantage. In Germany sulphide of sodium is now used, either in solution (1 part to 100 of water), or as a paste with three times its weight of lime and a sufficient quantity of water. The paste is applied with a brush to the hair side, and the hides are then covered with damp matting, to prevent the drying of the paste; the process is complete in fifteen or twenty hours. Acid liquids possess some depilatory power, and are sometimes used. The Calnauck Tartars employ sour milk. The acid liquid resulting from the fermentation of barley or rye meal in water has been used. (4) Removing the hair is effected by scraping on the beam with the dressing-knife. The skins are then washed in water. (5) *Bating* is next resorted to for the purpose of removing the lime and the lime soaps which have been formed in the skin. The material employed is the dung of pigeons, fowls, or dogs, mixed with water. The skins are placed in this, and frequently handled to secure uniform action. The dash-wheel is used in large establishments to keep the contents of the vat in constant motion and save handling. Bating is very effective, but it is attended with some disadvantages. The putrefaction of the bate during the steeping injures the skins, renders them lighter, and diminishes their strength. The process must therefore be carefully watched and interrupted at the proper moment. Dilute hydrochloric acid, and even sugar solutions—4 or 5 pounds of sugar or molasses to 60 gallons of water—have been recommended as substitutes for dung. (6) Swelling or raising the hides is resorted to in order to swell the fibres, and make the skins more susceptible to the action of the tanning solutions. The swelling-bath may consist of (a) barley meal and one-tenth its weight of sour dough diffused in water, which yield by fermentation lactic and other acids; (b) of spent tan-liquor, which contains considerable lactic and butyric acid; (c) dilute sulphuric acid, 1 part of acid to 1000 or 1500 of water. Considerable prejudice exists against sulphuric acid, on the ground that it injures the quality of the leather, but it is still extensively used. (7) *Tanning.*—The tanning materials are various astringent vegetable products which contain tannin (tannic acid). Those most used are oak, fir, and hemlock bark, sumac, divi-divi, Valonia nuts, myrobalans, catechu, gambir, catechu, and kino. (See article TANNIC ACID.) The impregnation of the hides with tannin is effected by (a) placing them between layers of coarsely crushed bark in a vat, which is then filled with water or old liquors; (b) immersing them in first a weak aqueous infusion of the tanning material, and afterwards in a stronger; (c) sewing two hides together into a sack and filling this with the tanning solution. The progress of the operation can be ascertained by examining the hide on a fleshy cut edge, which shows the depth to which the tannic acid has penetrated. When the appearance is uniform throughout the thickness the tanning is completed. Quick tanning may be accomplished by various means, some good, others objectionable. (a) The application of heat by means of pressure to force the liquor through the hide. (b) Circulation of the liquor among the hides, sewing the hides into sacks, filling with oak bark chips and water, and immersing in vats of



catechu infusion made dense by molasses; (d) motion of the hides in the liquor; (e) frequent withdrawal and working of the hides on rollers; (f) puncturing the hides with sharp needles to produce artificial pores; (g) treatment of the hides in vacuo. (8) *Currying* is the process by which the tanned skins, after being converted into leather, are prepared for use. For sole leather it consists in merely hammering the dried hide to render it more compact. For upper leather, used for boots and shoes, it consists of (a) paring with a knife to secure uniform thickness; (b) scraping for a similar purpose; (c) graining with the pommel or graining-beard; (d) finishing off with a flattening iron or horn to remove creases, etc.; (e) greasing, which consists in rubbing in a mixture of oil and tallow: the skins are previously mottled, and after the application of the grease are hung in warm rooms to dry it in; (f) blackening, which is effected by an application of a fresh solution of oak-bark, and then of copperas (ferrous sulphate) solution, to which some blue vitriol (cupric sulphate) has been added; (g) greasing again; (h) applying a solution of glue and tallow; (i) polishing with glass. (For details with regard to special varieties of leather see below, and also MOROCCO LEATHER.) Lacquered leather, commonly called patent leather, is made by applying a varnish to the leather, and then placing it in a stove heated to about 120° F. This causes the varnish to become thin, to spread out evenly, and dry to a smooth, polished surface. Cow or split skins are generally used for this purpose.

*Cordovan* differs from morocco in being prepared from heavy skins, and by retaining its natural grain. It is a soft, fine-grained, colored leather, usually dyed red, yellow, or black. It was originally prepared by the ancient Orientals. It was first introduced into Europe at Cordova in Spain, whence the name. The French name for shoemaker, *cordonnier*, is probably derived from this leather. The manufacture of this leather was established at Cordova, and for a long time European markets were chiefly supplied from this city. The best qualities of cordovan are now made at Constantinople, Smyrna, and Aleppo; Bremen supplies the best German.

*Yufts or Russia Leather* is a very strong, pliant, and watertight leather, usually colored red or black, which has a peculiar penetrating odor, due to the oil of birch with which it is impregnated. It was invented by the Bulgarians. The best is made in various Russian and Lithuanian provinces. The name *yufts* is derived from the Russian *yufiti*, signifying a pair, and probably due to the fact that two hides are sewed together in the form of a sack for the dyeing operation. The hides of young cattle are generally employed, but sometimes horse, sheep, goat, and calf skins are employed. The hides are cleansed with lime in the usual manner. They are swelled in an acid bath prepared with malt, exhausted tan-liquor, or *kanchka*, the dung of dogs rubbed up with water. Willow, fir, and birch bark are employed in the tanning. The hides are first submitted for some days to the action of partially exhausted bark; they are then placed in vats with fresh bark, or a warm infusion made from it. The tanning requires five or six weeks. The tanned hides are next impregnated with *digout* or *elanchet*, the oil of birch obtained from birch-wood by dry distillation. It is rubbed in on the flesh side, and when the hides are thoroughly impregnated, they are stretched till soft and supple. They are then rubbed on the hair side with alum solution, grained, and dried. The dry hides are sewed together in pairs, forming sacks which are filled with the dye-liquor, which for red is a decoction of sandal-wood. The dyed leather is dressed by the usual mechanical operations. Russia leather is specially useful for bookbinding, the oil of birch repelling insects.

II. *Tawing with Aluminous Salts* ("white tanning") is generally resorted to for sheep and goat skins, though it is also applied to cow and ox hides for moccasin and lace leather. The thick skins are prepared as for tanning; sheep and goat skins are more carefully cleansed and freed from hair and wool. Lime and fermented bran-liquor are used, however, as already described. The skins are then immersed in a solution of common salt and alum. After removal from the solution and drying the skins appear shrunken and stiff. In order to restore suppleness and flexibility they are dampened with water, and subjected to mechanical operations which stretch and knead them. If thin they are stretched on a frame to dry. Thick hides are greased as described under *Tanning*. Fine glove leather is tawed by a different process. The skins of kids or lambs are most carefully handled to avoid abrading or staining them. They are cleansed and unhaired by lime and bran-liquors as for ordinary tawing. The tawing is effected by applying a paste composed of wheat flour, yolks of eggs, alum, common salt, and water. As the yolks of eggs aid by furnishing the oil which they contain in the state of emulsion, which gives the kid leather its highly prized

suppleness and softness, they may be replaced by an emulsion of almond, olive, or fish oil. The skins are thoroughly soaked and kneaded in the paste, to which 2 or 3 per cent. of carbolic acid is often added to prevent putrefaction, and packed in heaps. They are then stretched by hand and rapidly dried in the air. They are then dampened, placed in linen cloths, and trodden to render them soft. They are then planed, dried, and planed again, polished by rubbing with a heavy glass disk or by the appreteur, simultaneously with the application of some white of egg, gum, or fine soap, to give a gloss to the hair side, which is afterwards dyed.

*Shagreen*.—Genuine Oriental shagreen (*saghir*, *sagiri*, *sagre*) is a variety of tawed leather which has long been celebrated for its hardness and strength. Its appearance is very peculiar, the grain side being covered with globular granules, which are produced by stamping the hard seeds of the wild orch (*Chenopodium album*) into the wet hide, and afterwards knocking them out. This leather originated in the East, and the best is now brought from Persia, Constantinople, Algiers, and Tripoli. The name shagreen is also applied to fish-skin prepared for covers and for polishing wood.

III. *Tawing with Oil* ("Samian tawing"), for the preparation of shammy (chamois) or wash-leather. For this leather the upper or exterior layer of the corium of the thick skins is cut away, as it is too compact and prevents the ready absorption of oil. Thin skins, as those of lambs and goats, are not deprived of the exterior layer. The skins are prepared with lime and the subsequent bran-bath, as in alum-tawing. They are then stretched and rubbed with oil, which is worked in by the fulling-machine. They are then hung in the air. Oiling, stamping in the fulling-machine, and exposure to the air are repeated till a sufficient quantity of oil has been worked into the skin. The skins are then heaped together in a warm room to produce a kind of fermentation, which must be carefully watched, and occasionally interrupted by airing to prevent overheating. The oil becomes rancid by these operations, and appears to combine with the animal fibres of the skin. The uncombined oil is then removed by a tepid bath of potash solution, and the skins are wrung out and dried. The softness and suppleness are restored by dressing. Cordovan or Turkey leather is oil-tawed, without having the hair side removed, while the flesh side is blackened in the usual way.

*Stearic Acid Tawing*.—According to Knapp's researches, a very good white kid leather is obtained by tawing the epidermis (*blössa*) from lamb or goat skins in a saturated solution of stearic acid in alcohol. The leather thus obtained is very soft, has a whiter color than ordinary glacé leather, and a beautiful gloss.

*Statistics*.—According to the report of the ninth census there were in 1870 in the U. S. 4237 tanneries, with a capital of \$42,720,505, employing 20,784 hands, and paying \$7,934,416 in wages per annum. The bark employed amounted to 1,255,346 cords, valued at \$9,089,303; 8,788,752 hides, 9,664,148 skins, and other materials of a value of \$1,631,234, were used, the total value of the materials being \$63,069,491. The products were 17,577,404 sides of leather and 9,794,148 skins, of an aggregate value of \$86,169,883. There were also 3083 establishments for currying leather, with a capital of \$12,303,785, employing 10,027 hands, and paying \$4,154,114 in wages. These consumed—

9,133,330 sides, value .....	\$33,784,271
4,084,980 skins, value .....	6,883,215
2,089,754 gallons oil, value .....	1,642,495
Other materials, value .....	1,305,612
Cost of all materials .....	\$43,565,593

and produced 9,133,330 sides of leather and 4,084,980 skins, the total value of which was \$54,191,167. New York and Boston are the great markets for all sorts of leather in this country.

*Literature*.—*The Arts of Tanning and Currying*, by Campbell Morfit; *A New and Complete Treatise on the Arts of Tanning, Currying, and Leather-Dressing*, by H. Dussauce; C. H. Schmidt's *Handbuch der Lohgerberei*; *Handbuch der Weissgerberei*; *Die Saffianfabrikation*; *Die Lederfärbekunst*; *Die Kürschnerkunst*; and Knoderer's *Neue Wichtige Erfindung in der Lohgerberei*; *Die Fabrication des Lohgerberei Leders in Deutschland*, by F. A. Gunther; *Lehrbuch der Sahlledergerberei*, by Von Bichon; *Natur und Wesen der Gerberei*, by F. Knapp; *Die Deutsche Gerberzeitung*; *Neues Journal der gesammten Gerberei*; *Gerber Courrier*; *Cuirs et Peaux*, by H. Villain; *Matériel des Industries du Cuir*, by J. P. Damouretti; *Cuirs et Peaux*, by M. Fauler; *Rapports du Jury International Exp. Univ. 1867*; *Ure's Dictionary of Arts, Manufactures, and Mines*; *Wagner's Technology*; *Watts's Dictionary*; *Muspratt's Chemistry*, especially last German edition. C. F. CHANDLER.



**Leather'-wood, Moose-wood, or Wic'opy**, the *Dicra palustris*, a shrub of the order Thymelacææ, is abundant in the northern parts of North America. Its tough bark was used by the Indians for thongs or cordage. The bark has irritant cathartic properties, and its decoction in small doses is recommended for the cure of sick headache. Its wood is very white, soft, and brittle.

**Leatherwood**, post-tp. of Henry co., Va. Pop. 3673.

**Leathes** (STANLEY, D. D., b. at Ellesborough, England, Mar. 21, 1859; educated at Cambridge; served as curate in several churches in London; became in 1863 professor of Hebrew in King's College, London, and has especially devoted himself to Christian evidences. He was Boyle lecturer from 1868 to 1870, Hulsean lecturer at Cambridge in 1873, and Baumpton lecturer at Oxford in 1874; is a member of the Anglican commission for the revision of the translation of the Old Testament, and was one of the delegates to the Evangelical Alliance in the session of 1873 in New York. His best known work is the *Witness of St. John to Christ*.

**L'Eau qui Court**, a former county of Nebraska, now called Knox (which see).

**Leav'el** (REV. HARMON, M. D., b. in Madison co., Ky., May, 1812; graduated at the University of Pennsylvania in 1833; practised medicine in Kentucky and Mississippi for several years, and in 1847 entered the ministry, in which he rose to eminence. He was pastor of the Methodist Episcopal Church, South, in Vicksburg, at the time of his death, Sept. 11, 1847. T. O. SUMMERS.

**Leav'en** [Fr. *levain*, from Lat. *levare*, to "raise"], a piece of sour dough used for raising bread. The principle of its action is the same as that of YEAST (which see).

**Leavenworth**, county of N. E. Kansas, bounded E. partly by the Missouri River and S. by the Kansas River. It has a rich and well-cultivated soil. Coal is found. Cattle, grain, and wool are staple products. Tobacco, carriages, and clothing are the most important articles of manufacture. The county is traversed by several railroads. Cap. Leavenworth. Pop. 32,444.

**Leavenworth**, post-v., cap. of Crawford co., Ind., on the Ohio River, 60 miles below Louisville, Ky. It has a graded school, a newspaper, and is a good shipping-point. The Great Wyandotte Cave is situated 5 miles E. of the town. Pop. 567.

**Leavenworth**, city and cap. of Leavenworth co., Kan., on the W. bank of the Missouri River, 39 miles from Kansas City, Mo., and 312 miles by land above St. Louis; E. terminus of the Kansas Central (narrow gauge) and the Kansas Pacific R. R.; N. terminus of the Leavenworth Lawrence and Galveston, and the W. terminus of the S. W. line of the Chicago Rock Island and Pacific R. R., which latter road crosses the Missouri at this point over a magnificent iron bridge constructed at a cost of \$1,000,000. The Atlantic and Pacific, known as the Missouri Pacific, and the Kansas City St. Joseph and Council Bluffs R. R., also pass through the city. Leavenworth contains 27 churches, 9 commodious school-buildings, several private seminaries, State normal school, the St. Mary's (Catholic) Academy, 2 orphan asylums, 4 daily and 6 weekly newspapers, 4 monthly periodicals, 2 insurance companies, 6 banks, a paid fire department, and 4 miles of street railway. The Kansas State penitentiary is situated 4 miles S. of the city. Fort Leavenworth military reservation adjoins the city on the N., and has a military prison. Leavenworth derives its chief importance from the manufacture of carpets, furniture, stoves, engines, mining machinery, and iron bridges. It is the largest city in the State, a great centre of trade with the Territories, and is noted among Western cities for its elegant residences and its many miles of shaded thoroughfares. The first house was built in 1854. Pop. 17,873. J. W. ROBERTS, Ed. "COMMERCIAL."

**Leavenworth**, post v. and tp. of Brown co., Minn., 17 miles S. W. of New Ulm. Pop. 433.

**Leavenworth** (ELIAS WARNER, LL.D., b. at Canaan, Columbia co., N. Y., Dec. 20, 1803; spent his childhood and youth at Great Barrington, Mass.; graduated at Yale College in 1824; began the study of law the same year in the office of William Cullen Bryant at Great Barrington; spent 2 years at the Litchfield (Conn.) law-school; admitted to the bar in Jan., 1827, in which year he removed to Syracuse, N. Y., where he practised law with success for many years until forced by ill health to abandon it. He was mayor of Syracuse in 1849 and 1859; member of assembly in 1850 and 1857; secretary of State 1854-55, to which office he was again nominated in 1859; president of the board of quarantine commissioners 1860; elected regent of the university Feb., 1861; appointed by President Lincoln in Mar., 1861, commissioner under the convention

with New Granada; was in 1865 president of a board of commissioners to locate the State asylum for the blind, and in the same year trustee of the State asylum for idiots, to which post he was twice reappointed; member for the fifth district of the constitutional commission 1872; published in 1873 the *Genealogy of the Leavenworth Family in the U. S.*, an elaborate work, the result of years of research and correspondence, and was elected 1874 a representative in the U. S. Congress. He is now (1875) president of the Syracuse savings bank, of the gaslight and waterworks companies of that city, and holds numerous other posts of trust and responsibility.

**Leavenworth** (Gen. HENRY), b. in Connecticut Dec. 10, 1753; studied and practised law; entered the army in Apr., 1812, as captain of the 25th New York Infantry; was made major of the 9th Infantry in Aug., 1813; commanded his regiment at the battles of Chippewa (July 5) and Niagara Falls (July 25, 1814), being wounded in the latter engagement; made lieutenant-colonel and brevet colonel for bravery in the above engagements; lieutenant-colonel 5th Infantry of the regular army in Feb., 1818; commanded expedition against Arickaree Indians on the upper Missouri River; made brevet brigadier-general in July, 1824; colonel 3d Infantry in Dec., 1825. He founded several military posts on the Western frontier, one of which, Fort Leavenworth, was the nucleus of the present flourishing city of Leavenworth, Kan. D. at Cross Timbers, Indian Territory, July 21, 1834.

**Leaves**. See LEAF, by PROF. ASA GRAY, M. D., LL.D.

**Leav'itt**, tp. of Oceana co., Mich. Pop. 316.

**Leavitt**, post-v. of Monroe tp., Carroll co., O., 7 miles W. S. W. of Carrollton. It has 1 weekly newspaper.

**Leavitt** (JOSHUA), D. D., b. at Heath, Franklin co., Mass., Sept. 8, 1794; graduated at Yale in 1814; studied law, and in 1819 was admitted to the bar; practised law in Heath, Mass., and Putney, Vt.; graduated in 1825 at the Yale Divinity School; was the highly successful pastor of a Congregational church at Stratford, Conn., 1825-28; editor of the *Sailor's Magazine* 1828-31; of the *New York Evangelist* 1831-37; of the *Emancipator* 1837-47; and in 1848 became connected with the *Independent*, which connection he retained till his death. Mr. Leavitt was always active in the cause of Sunday schools, temperance, seamen's aid, and the abolition of slavery. He was a zealous freetrader, and greatly influenced the political opinion of his time. D. Jan. 16, 1873, in Brooklyn, N. Y.

**Lebade'a** [Λεβάδεια], now LIVADIA, an ancient town of Boeotia, at the northern foot of Helicon, noted for the cave of Trophonius and a famous oracle.

**Leb'anon** [Heb., from *libanon*, "to be white;" Assyrian *Lubnana*; Gr. Ἀβανός; Lat. *Libanus*; Arabic *Jebel Libnan*], a celebrated range of mountains in Syria, extending about 110 miles along the sea-coast from the Nahr-el-Kibir (Eleutherus) River on the N. to the Nahr-el-Litany (Leantes) on the S.; i. e. from the great pass opening into the valley of Hamah (Hamath), lat. 34° 40', to the vicinity of Tyre, in lat. 33° 20', and separated by the elevated valley of El Bukaa (Orle Syria), 10 to 20 miles wide, from the parallel range of Anti-Libanos (which see), similarly extending from near Homs (Emesa) on the N. to the peak of Jebel esh Sheikh (Hermou), a few miles S. of Damascus. In the centre of the valley of El Bukaa are the majestic ruins of BAALBEK (which see), the ancient Heliopolis, near which rise the Aazy (Orontes) and Litany rivers, the former flowing N. to the Chæcian Gulf, the latter S. to the Mediterranean, above Tyre. Physically, the mountains of Lebanon are connected northwards through their prolongation, the Jebel Nusairik, with the great chain of Taurus in Asia Minor, and southward, through the lower mountains of Palestine and Moab, with the Sinaitic group and the coast range of W. Arabia; and some modern geographers employ the name in this wider sense. Lebanon was at the earliest recorded period the chief geographical feature and eastern limit of PHœnicia (which see), it was alternately subject to Assyria and Egypt, whose monarchs often employed its celebrated cedars to supply timber for their edifices, and was included within the boundaries of the Hebrew "land of promise" (Num. xxxiv.; Deut. xi. 24; Josh. i. 4), though it never came into their possession, unless in a very limited sense for a brief period, and may properly be considered as the northern boundary of the Holy Land. The books, prophetic, poetic, and historical, of the Old Testament abound in references to Lebanon, which supplied the timber for Solomon's magnificent temple and palaces; and the term usually, though not uniformly, includes both ranges. Lebanon proper was called by the early Arabian geographers Jebel Libnan, and by later writers Jebel el-Ghurby, "the west mountain," in distinction from Anti-Lebanon, called Jebel esh Shurky, "the east mountain."



These names, however, are now seldom heard in Syria, where, besides local names, the northern section is called Jebel-Akkar, the central Sunnin, and the southern Jebel-ed-Druze. Between the mountains and the sea the plain of Phenicia is of varying breadth, but never more than 10 or 15 miles, while spurs are several times thrown off which jut precipitously into the sea. The base of the range has an average breadth of 20 miles; the peak of Jebel Timarun attains a height of 10,533 feet, that of Dahar-el-Kudib 10,931, and Sunnin 5500 feet. The elevation decreases towards the S., and falls rapidly from the "twin-peaks" of Tomat-Niha (6500 feet) to the wild, abrupt ravine of the Litany, whose banks sometimes rise perpendicularly 1000 feet. The mass of Lebanon is a hard, partially crystallized Jurassic limestone, surmounted in many places by a grayish white cretaceous deposit, whence perhaps the name, more usually derived from the snows, which cover the main ridge from December to March. The southern section exhibits traces of violent volcanic action, and earthquakes are still frequent, that of 1837 having buried thousands of persons in Safed beneath the ruins of their homes. The inhabitants are chiefly Maronites, a Christian sect, in the N., and Druses, professing a corrupted Mohammedanism, in the S. These races are rivals, and have for centuries been at feud; a terrible massacre of Christians in 1860 resulted in European intervention. The district is subject to a Maronite governor, depending upon the pashalic of Damascus. There are more than 30 ruins of ancient temples within this region, which has still a considerable population. Cap. Nahr-ed-Dammur, formerly called Deir-el-Kamr. PORTER C. BLISS.

**Lebanon**, county of S. E. Pennsylvania. Area, 300 square miles. It consists in the main of the very fertile Lebanon Valley, and is bounded N. W. by a range of the Kittatinny Mountains. Its soil is a rich reddish clay loam. Live-stock and grain are staple products. Clothing, metallic wares, tobacco, furniture, carriages, flour, etc. are largely manufactured. The county is traversed by the Lebanon Valley, the North Lebanon, and the Lebanon and Fremont R. Rs. Cap. Lebanon. Pop. 34,096.

**Lebanon**, post-v., cap. of De Kalb co., Ala., on the Alabama and Chattanooga R. R. (Brandon's Station).

**Lebanon**, tp. of Sharpe co., Ark. Pop. 509.

**Lebanon**, post-tp. of New London co., Conn., contains several villages, and has important manufacturing interests. Pop. 2211.

**Lebanon**, post-v. of St. Clair co., Ill., 24 miles E. of St. Louis, on the Ohio and Mississippi R. R., has 7 churches, 4 hotels, 1 bank, 1 weekly and 1 semi-monthly newspaper, 1 machine-shop, 2 large mills, and a great variety of stores. It is noted for its educational advantages, being the seat of McKendree College (Methodist, founded 1835), the oldest institution of the kind in the West, and is quite a summer resort for residents of St. Louis. Pop. 2117.

T. W. ECKERT, ED. "JOURNAL."

**Lebanon**, post-v. of Centre tp., cap. of Boone co., Ind., at the junction of the Indianapolis Cincinnati and Lafayette with the Anderson Lebanon and St. Louis R. R., 26 miles N. W. of Indianapolis, has 2 weekly newspapers, 5 churches, 3 banks, 4 hotels, 3 mills, 3 stove-factories, an academy, and 47 stores. Pop. 1572.

T. H. HARRISON, ED. "PIONEER."

**Lebanon**, post-v., cap. of Marion co., Ky., 67 miles S. E. of Louisville, on the Knoxville branch of the Louisville Nashville and Great Southern R. R., at its junction with the Cumberland and Ohio, has 2 national banks, 8 churches, 2 hotels, 2 weekly newspapers, 3 high schools, 1 carriage and 1 furniture manufactory, and is the shipping-point for the productions of several counties. Pop. 925.

JAMES W. HOPPER, ED. "STANDARD."

**Lebanon**, post-tp. of York co., Me., on the New Hampshire line and on the Portland and Rochester R. R. It has 3 churches. Pop. 1953.

**Lebanon**, tp. of Clinton co., Mich. Pop. 1119.

**Lebanon**, tp. of Dakota co., Minn. Pop. 216.

**Lebanon**, tp. of Cooper co., Mo. Pop. 3316.

**Lebanon**, post-v. and tp., cap. of Laclede co., Mo., on the Atlantic and Pacific R. R., 185 miles S. W. of St. Louis. It is very pleasantly situated, contains 5 churches, 2 newspapers, a first-class seminary and a number of stores, and is the business centre of a large tract of surrounding country. Pop. of v. 1090; of tp. 3358.

J. G. LEMER, ED. AND PROP. OF "ANTI-MONOPOLIST."

**Lebanon**, post-v. and tp. of Grafton co., N. H., on the Connecticut River and Northern R. R., 65 miles N. W. of Concord, directly opposite White River Junction, Vt., has 3 churches, 1 national and 1 savings bank, 1 weekly newspaper, numerous stores, a fine park, extensive manufactures

of furniture, agricultural implements, iron castings, etc., and the only elastic sponge manufactory in the U. S. The West Village has a church, a hotel, railroad shops, and the Tilden Ladies' Seminary. Water-power is afforded by the Muscoma River, which falls 400 feet within the town. Principal industries, farming and wool-growing. Pop. 3094.

E. H. CHENEY, ED. "FREE PRESS."

**Lebanon**, tp. of Hunterdon co., N. J. Pop. 3561.

**Lebanon**, post-v. of Clinton tp., Hunterdon co., N. J., on the New Jersey Central R. R. It has important manufactures and trade.

**Lebanon**, post-tp. of Madison co., N. Y., on the Syracuse and Chenango Valley R. R. The Midland and the Utica Clinton and Binghamton R. Rs. also traverse the town. Pop. 1559.

**Lebanon**, tp. of Meigs co., O. Pop. 1823.

**Lebanon**, a v. of Bethel tp., Monroe co., O. (P. O. name, MASTERTON). Pop. 124.

**Lebanon**, post-v. of Turtle Creek tp., cap. of Warren co., O., 5 miles from the Little Miami R. R. and 30 m. N. E. of Cincinnati, has 7 churches, 2 weekly newspapers, 3 hotels, 2 planing-mills, a new town-hall, a public library, a national normal school with 1600 students, a county infirmary and orphans' home. Principal industry, farming. Pop. 2749. WM. C. MCCLINTOCK, PUB. "WESTERN STAR."

**Lebanon**, post-b., cap. of Lebanon co., Pa., beautifully located on the Lebanon Valley and the Philadelphia and Reading R. Rs., 25 miles E. of Harrisburg and 5 miles N. of the great Cornwall iron-hills. It has 15 churches, 1 daily, 1 semi-monthly, and 7 weekly (2 German) newspapers, and is well provided with banks, hotels, schools, factories, machine-shops, and stores. Copper, marble, and anthracite coal abound, the latter supplying 8 large furnaces. It is regularly laid out, well built of stone and brick, has a fine water and gas supply and other modern improvements. Situated on the Swatara Creek and Union Canal, it is the centre of an active trade. The original settlers were Germans, but English is now generally spoken. Pop. 6727.

T. T. WORTH, ED. "COURIER."

**Lebanon**, tp. of Wayne co., Pa. Pop. 628.

**Lebanon**, post-v., cap. of Wilson co., Tenn., 30 miles E. of Nashville, and 6 miles S. of the Cumberland River, at the E. terminus of the Tennessee and Pacific R. R. and of the Lebanon and Nashville telegraph line, has 7 churches, 2 national banks, 4 hotels, a large woolen-factory, flouring and other mills, a market-house, town-hall, Masonic and Odd Fellows halls, a business and telegraph college, 2 female seminaries, several public schools, 1 weekly newspaper and 1 quarterly (educational) periodical. It is the seat of Cumberland University, founded in 1842 by the Cumberland Presbyterian Church, which is now fully organized with six departments (including law, theology, and engineering), a library of 6000 volumes, 12 professors, and an average of 300 students, including the preparatory department. Pop. 2073. R. L. C. WHITE, ED. "HERALD."

**Lebanon**, post-v. and tp., cap. of Russell co., Va., in Clinch River Valley, 15 miles N. of Abingdon and 21 miles from the Atlantic Mississippi and Ohio R. R., has 2 churches, 1 weekly newspaper, a male and female academy, and several hotels, stores, and shops. Principal business, farming. Pop. of v. 209; of tp. 2246.

J. B. JONES, ED. "RUSSELL PROGRESS."

**Lebanon**, tp. of Dodge co., Wis. Pop. 1621.

**Lebanon**, tp. of Waupaca co., Wis. Pop. 657.

**Lebanon Springs**, post-v. of New Lebanon tp., Columbia co., N. Y. It is a place of summer resort. Here is a copious mineral spring, having a constant temperature of 70° F. The waters have nearly the taste of pure water, and are so abundant as to furnish a valuable motive-power. The hotel accommodations are ample, and the waters have a good reputation in many diseases. In the vicinity there are large manufactories of thermometers and of pharmaceutical preparations. (See NEW LEBANON and MOUNT LEBANON, N. Y.) Near at hand are several communities of Shakers. The scenery is delightful.

**Lebanon Valley College**, located at Annville, Lebanon co., Pa., on the Philadelphia and Reading R. R., 21 miles E. of Harrisburg. It was organized and chartered by the State legislature in 1867. From this time until 1871 it was under the supervision and jurisdiction of T. R. Vickroy. In June of this last-mentioned year the board of trustees assumed the control and reorganized the faculty, with L. H. Hammond, the present incumbent, as president. The growth of this institution has been gradual and constant, and though young it now has a respectable number of students in each of the college classes. Young ladies are admitted, and have equal advantages with young men. They may pursue the same course of study or the one es-



pecially arranged for them. In this institution the joint education of the sexes proves not only successful, but in many respects advantageous. There are cabinets of minerals and a museum well begun, and the trustees have ordered the procuring of a library and complete apparatus during the present year. L. H. HAMMOND.

**Lebas'** (JEAN BAPTISTE ADOLLAUME), b. in a village in the department of Var, France, Aug. 13, 1797; studied at the École Polytechnique; was employed since 1823 as an engineer in the French navy; became keeper of the naval museum in 1839, and d. in Paris in 1873. His name became quite famous on account of his success in transporting the obelisk of Luxor, weighing 506,000 pounds, from Thebes in Egypt to Place de la Concorde in Paris, which he has described in his *L'Obélisque de Luxor, histoire de sa translation à Paris*, etc. (1837).

**Le Bas** PHILIPPE, b. at Paris June 18, 1794; served first in the navy, then in the army, at last in the office of the prefect of the Seine, and was appointed by Queen Hortense governor to Prince Louis Napoleon in 1820. In 1827 he returned to Paris; was appointed professor in Greek at the Lyceum in 1829; and made a scientific journey in Greece and Asia Minor in 1842 at the expense of the government. His principal writings are *Explication des Inscriptions grecques et latines recueillies en Grèce* (1835), and *Voyage archéologique en Grèce et en Asie Mineure* (1847). D. at Paris in 1861.

**Lebeau'** (JEAN LOUIS JOSEPH), b. Jan. 2, 1794, at Huy, in the province of Liège, Belgium; studied law, practised as an advocate with great success; founded in 1824 the *Journal Politique de Liège*; brought about that alliance between the clerical and liberal parties which made it possible for the Belgian provinces to dissolve the union with the Netherlands; opposed, as member of the congress of 1830 and minister of foreign affairs 1831, the annexation to France and the election of the duke of Nemours as king; served under King Leopold as minister of justice to 1834; was called once more in 1840 to the ministry of foreign affairs, but retired before the violent opposition of the clerical party. D. in his native city Mar. 19, 1865. He wrote *Observations sur le Pouvoir Royal dans les États Constitutionnels* (1830). (See *Les Fondateurs de la Monarchie Belge*, by Juste, 1865.)

**Lebedin'**, town in Russia, in the government of Khar'kov, with considerable local trade and manufactures. Pop. 13,777.

**Leblanc'** (URBAIN), b. at La Commanderie, Deux Sèvres, France, Nov. 26, 1796; studied veterinary science at the school of Alfort, where he afterward became professor; was appointed surgeon to the prefecture of police at Paris in 1832, and elected member of the Medical Academy. Besides a great number of minor essays, communicated to various medical periodicals, he published, together with Trousseau, *Atlas du Dictionnaire de Médecine et de Chirurgie vétérinaires*, and, together with Follin, *Traité de pathologie comparée* (2 vols., 1853).

**Le Beuf**, post tp. of Erie co., Pa., on a branch of the Philadelphia and Erie R. R. Pop. 1748.

**Le Boeuf** EDMOND, marshal of France, b. at Paris Dec. 6, 1809; received his military education in the École Polytechnique; entered the artillery in 1822, and distinguished himself as officer in the staff during the expedition against Constantine. From 1847 to 1849 he served in Algeria; returned then to France; became second commander of the École Polytechnique in 1848, and went in 1854 to Crimea as colonel and chief of the staff of the artillery. Here he distinguished himself greatly, both in the battle of Alma and at the artillery attack on Sebastopol, which he partly led; in Nov., 1854, he was made a brigadier-general. After the close of the Crimean campaign he was sent to Kinboorn as commander in chief, and remained there to 1856. He then received the command of the artillery of the guard; was made a general of division in 1857, and took an important and brilliant part in the Italian war of 1859. In 1869 he was commander of the 6th corps, stationed at Toulouse. Unfortunately for him, Nél d. Aug. 14, 1869, and he was called upon to succeed him as minister of war, for, although an excellent officer, he was unable to master an administration of such dimensions. Mar. 24, 1870, he was created a marshal, and four months afterward the war with Germany began. Since the last victorious wars the organization of the French army had made great progress under the talented and energetic government of Niel; thus Le Boeuf believed that the army was fully prepared for war. But he had not been able to understand how much superior was the organization of the German army. He received the eminent position as chief of the staff of the emperor—that is, of actual commander of the army, as the emperor, even bodily, was unable to command in person.

But this task was too heavy for the marshal. The dispositions of the French army at the end of July, 1870, and the first strategical measures against the invading German army, showed the greatest lack of preparation and a fatal weakness in the command. A short time after (Aug. 12, 1870) Bazaine was made commander-in-chief, and Le Boeuf received the command of the 3d corps. In this position he took an active and brilliant part in the battles of Vionville and Gravelotte—Aug. 16 and 18; and fought at Neisseville (Aug. 31 and Sept. 1) with such a furious stubbornness that the French army probably would have succeeded in breaking through the German lines if the other generals, and especially Bazaine himself, had shown an equal valor. At the surrender of Metz he became a prisoner of war. He lived in Cassel, where Napoleon resided, and after peace was concluded went to the Hague. AUGUST NIEMANN.

**Lebon'** (JOSEPH), b. at Arras in 1765, was curate of Neuville when the Revolution broke out, and in 1792 was elected representative. Soon after he was chosen commissioner in his own department of Pas-de-Calais, and displayed an energetic violence against the reactionary party. When, after the 9th Thermidor, this party came into power, Lebon was tried for his alleged revolutionary excesses, sentenced to death, and guillotined Oct., 1793. His son published in 1861 a book, *J. Lebon in his Private and Political Life*, which attempts to exonerate his father from some of the atrocities attributed to him. FÉLIX AUCAGNE.

**Le Breton' Flats**, an important suburb of Ottawa, the capital of Canada, is situated on Chaudière and Victoria Islands and on the Canada Central Railway. It manufactures immense quantities of lumber, flour, castings, and other goods. Pop. about 2000.

**Lebrí'ja**, town of Spain, in the province of Seville, manufactures woollen cloths, hempen fabrics, pottery, brick, tiles, glass, and soap, and is celebrated for the excellent oil produced in its vicinity. Pop. 10,338.

**Le Brun** (CHARLES), b. at Paris Mar. 22, 1619; studied under Nicolas Poussin in Paris and Rome; was made a member of the Academy of Painting and Sculpture in 1648; first painter to Louis XIV. in 1661; director of the manufacture of Gobelins tapestry and president of the Academy, and d. at Paris Feb. 12, 1690. The most prominent of his works are a series of pictures of the history of France during the reign of Louis XIV., at Versailles, and another series of pictures illustrating the life of Alexander the Great, in the Louvre; but besides these a great number of historical, religious, and allegorical pictures is scattered through other French and European galleries. They represent in the art of painting the same taste, the same æsthetical ideal, as that which is represented in poetry by Corneille, Racine, and Boileau. They contain much which deserves to be admired—an inexhaustible invention, a refined sense for effect, perfect elegance in forms and arrangement, etc. But the feeling is generally tame and shallow, the allegories are often very superficial, and the inconsistencies of the costume are sometimes irresistibly ludicrous. In his time he exercised an enormous influence. Not only the painters and sculptors, but all artists, from the vase-maker and jeweller down to the sign-painter and job-printer, followed his taste, which for a generation or more was reigning absolutely.

**Lebrun** (CHARLES FRANÇOIS), duke of Piacenza, b. at St. Sauveur Lenduin, Normandy, Mar. 19, 1739; was for several years secretary to the chancellor, Maupeou. After the accession of Louis XVI. and the downfall of Maupeou he lived in obscurity until 1789, when his pamphlet, *La voix du citoyen*, attracted considerable attention. He was elected a deputy to the States General, and as a member of the Constituent Assembly he acquired both influence and authority by his moderation and by his insight in financial matters. Having been imprisoned during the Reign of Terror, he entered, under the government of the Directory, the Council of Five Hundred, and was chosen its president Feb. 20, 1796. He allied himself very closely to Gen. Bonaparte, and was made third consul by him Nov. 9, 1799. On the establishment of the empire he became minister of finances, or arch-treasurer, in 1806 governor of Liguria and duke of Piacenza, and in 1810, on the abdication of King Louis, governor of Holland, whence he was driven by the allies in 1814. After the first restoration he was made a peer of France by Louis XVIII., but having during the Hundred Days been of the title of grand master of the university from Napoleon, he was excluded from the Chamber of Peers on the second restoration. In 1819, however, he was allowed to take his seat, and in the debates he sided with the constitutional opposition. D. June 16, 1824. His *Mémoires* were published in 1829 by his son.

**Lecce**, the *Germania Tarentina*, a province of Italy, belonging to the division of Apulia. Area, 3293 square



miles. Pop. 493,594. It is traversed by the Apennines, and produces corn, tobacco, wine, olives, and in some places cotton, but often suffers from severe droughts.

**Lecce**, the ancient *Lycia* or *Lupia*, one of the most beautiful towns in S. Italy. It is situated in the province of Lecce, lat. 40° 42' N. and lon. 36° 40' E., on a plain between the Adriatic on the N., the Gulf of Taranto on the W., and the Ionian Sea on the S., precisely at the point which forms the heel of the Italian boot. The town is regularly built of a remarkably fine white stone, and has many interesting edifices, especially churches and convents, some of which contain admirable works of art. At the gate of St. Biagio stands a grand triumphal arch erected in commemoration of the entrance of Charles V. The royal manufactory of tobacco is an old establishment, but has recently been provided with the best modern machinery, and the first quality of Lecce tobacco is said to be equal to that of Seville. The public library contains 10,000 volumes, both day and evening schools are established, and the charitable institutions are numerous and well sustained. Lecce (probably of Cretan origin) was very flourishing during the Roman period, escaped the barbarians, and in 1000 A. D. was governed by its own counts, among whom were Tancred and Bohemond. Pop. in 1874, 23,247.

**Lec'co**, town of N. Italy, in the province of Como. It is delightfully situated on the Adda, near the point where it flows out from the S. E. arm of Lake Como, at the foot of the Resegone. Lecco already existed under the Romans, and continued a town of considerable importance through all the vicissitudes of the Middle Ages. It is now one of the most industrious and prosperous of the small towns of Lombardy. Its iron and silk manufactories are extensive. In its neighborhood stands the pretty villa in which Manzoni wrote a part of his remarkable romance *I Promessi Sposi*. A picturesque road on the E. bank of the lake connects it with Colico, while it has direct railway communication with Bergamo. Pop. in 1874, 7040.

**Lech**, a river of Southern Germany, rises in the Vorarlberg, runs N. through Tyrol and Bavaria, and joins the Danube after a course of about 140 miles. A little below Füssen it becomes navigable for small boats, and for larger from Augsburg, but it has generally no great commercial importance on account of the irregularity of its course, bottom, banks, etc. Many mills are worked by its waters.

**Lechevalier'** (JEAN BAPTISTE), b. at Trelly, Normandy, July 1, 1752; studied theology at the seminary of St. Louis in Paris, but did not take orders; accompanied in 1784 the count of Choiseul-Gouffier as secretary to Constantinople, and participated with great energy in his explorations of the plain of Troy; travelled much in Spain, England, Germany, and Scandinavia, and was appointed director of the library of Ste. Geneviève in Paris in 1805, which position he held to his death, July 2, 1836. His *Voyage de la Troade* (1797) and *Voyage de la Propontide et du Pont Euxin* (1800), in which he pretended to have made many great discoveries concerning the geography of the Homeric epics, made a great sensation at their first appearance, but are now generally put in the same class as his *Ulysse Homère* (1829), in which he proves that Ulysses wrote the *Iliad* and the *Odyssey*.

**Lech'ford** (THOMAS), a lawyer from London who settled at Boston, Mass., in 1638, the first to practise that profession in New England. He returned to England in 1641, much dissatisfied with his experience; published in 1642, *Plaine Dealing, or News from New England's Present Government*, etc., and in 1644 *New England's Advice to Old England*. He is said to have d. soon after. A new edition of the *Plaine Dealing*, with introduction and notes by J. Hammond Trumbull, was published in 1867. Though written in a spirit of hostility to New England, it contains valuable information.

**Lec'ithine** (Gr. *λεκιθος*, "yolk of an egg"), the *matière visqueuse* of Goble, a phosphuretted fatty body found in the yolk of eggs, the brain, bile, blood, and in the roe of fish. Diakonow gives it the formula  $C_{44}H_{90}NP_2O_9$ ; Strecker,  $C_{42}H_{84}NP_2O_9$ . (See *Watts's Dict.*, iii. 566, and *Suppl.*, 778.)

**Leck'y** (WILLIAM EDWARD HARTPOLE), b. near Dublin, Ireland, Mar. 26, 1838; graduated at Trinity College, Dublin, in 1859; published anonymously in 1861 *The Leaders of Public Opinion in Ireland* (new ed. 1872); travelled extensively on the Continent; settled in London, devoting himself to historical and philosophical researches; and surprised the learned world in 1863 by the *History of the Rise and Influence of the Spirit of Rationalism in Europe*, a work which united to an elegant style a judicial impartiality and a more than German erudition. It was speedily republished in the U. S., as was also his next work, a *History of European Morals from Augustus to Charlemagne*, which displayed the characteristics of its predecessor in a still higher degree. All these works were translated into German by Dr. H.

Jolowicz, and the *History of Morals* has become a textbook in more than one German university. Lecky is not known to have published anything else except a lecture before the Royal Institution on the *Influence of the Imagination in History*. He married about 1870 a maid of honor of the queen of Holland, has considerable fortune, and possesses a fine library.

**Le Claire**, post-v. and tp. of Scott co., Ia., on the Mississippi River, 15 miles below Clinton, and midway between St. Louis and St. Paul. It is at the head of the Upper Rapids, which extend 15 miles to Rock Island. It is a place of active trade. Pop. of v. 1093; of tp. 1940.

**Le Clear** (THOMAS), b. at Oswego, N. Y., Mar. 11, 1818; attempted at the age of nine years to execute a portrait on a pine board with lamp-black, Venetian red, and white-lead, and at twelve created a sensation by a St. Matthew, for which he filled several orders at two dollars and a half each. In 1832 his father removed to London, Upper Canada, where he took some portraits, and two years later was employed at Goodrich on Lake Huron to decorate the panels of a steamboat. He afterwards visited Green Bay, Wis., painting portraits of the Indians in that vicinity; returned to London, and after exercising his improvised art for brief periods at Elmira and Rochester, in the midst of privations and discouragements, made his way to New York, where in 1839 he opened a studio in Broadway, and soon gained an honorable position in the artistic fraternity, his picture of *The Reprimand* having been purchased by the Art Union during the palmy days of that institution. From 1844 to 1860 he successfully practised his art in Buffalo, and painted, among others, the admired pictures *The Marble Players* and *Young America*. Returning to New York, he has since enjoyed popularity as a colorist, and exhibits great power over details. He has produced striking portraits of ex-President Fillmore, Hon. D. S. Dickinson, T. B. Thorpe, and Booth as Hamlet; his *Itinerants*, exhibited at the National Academy in 1862, was praised.

**Leclerc'** (JEAN), b. at Geneva Mar. 19, 1657; studied theology, and accepted the Arminian doctrines; travelled much in France, England, and Holland; was appointed professor of ecclesiastical history at the Remonstrant college of Amsterdam in 1684; retired in 1728, and d. at Amsterdam Jan. 8, 1736. The most prominent part of his comprehensive and varied literary activity was his editorship of *Bibliothèque Universelle et Historique* (26 vols., 1686-93), *Bibliothèque Choisie* (28 vols., 1703-13), and *Bibliothèque Ancienne et Moderne* (28 vols., 1714-27).

**Leclerc** (VICTOR EMMANUEL), b. at Pontoise, near Paris, Mar. 17, 1772; enlisted in the army in 1791; distinguished himself at Toulon in the armies of the Ardennes and the Alps; was appointed military commander of Marseilles in 1793, and made a brigadier-general in 1797; married in the same year Napoleon's eldest sister, Pauline, and went in 1801, with a large fleet and an army of 30,000 men, to Santo Domingo to vindicate the authority of France over the colony. After a contest of some months a truce was made, but when Toussaint l'Ouverture was sent as a prisoner to France, a new rising of the colored population under Dessalines took place, and at the same time the French army was attacked and more than decimated by yellow fever. Leclerc himself fell a prey to the disease Nov. 2, 1802. His wife, who had accompanied him to Santo Domingo, and behaved with great courage and fortitude, married in 1803 the Prince Borghese.

**Leclercq'** MICHEL THEODORE, b. at Paris Apr. 1, 1777; held from 1810 to 1819 a subordinate place in the civil service, but lived else on an independent fortune. D. at Paris Feb. 15, 1851. His works consist, besides a couple of novels, of 8 vols. of *proverbes dramatiques*, small dramas not destined for the theatre, but for private performance in the salons. They are rich in the finest and most striking psychological observations, and many of them belong, on account of their humor and elegance, to the most exquisite productions of French literature. They were received with extraordinary applause, and exercised great influence on the development of the French drama.

**Lecocq'** (CHARLES), b. in Paris, France, about 1835, is regarded as the best successor of Auber in comic operas, of which the most successful have been *Fleur de Thé*, *La Fille de Madame Angot*, and *Giroflé-Girofla*, each in three acts. *Les Près Saint Germain*, with libretto by V. Sardou and Gille, was brought out in Paris and London in Nov., 1874.

**Lecomte'** (LOUIS), b. at Bordeaux, France, about 1655; was one of the six Jesuits selected for their mathematical attainments to undertake a semi-scientific mission in China. They embarked at Brest Mar. 3, 1686, with the Chevalier de Chaumont, ambassador to Siam, where they arrived in September, and were detained two years by the reigning monarch, Phra Narai, who prided himself upon his knowledge of mathematics. Arrived at Peking in Feb., 1688,



they made astronomical observations in various parts of the empire for several years, and became well acquainted with the condition of the country and people, and had considerable success in making proselytes to Catholicism—a success much facilitated by their tolerance of many pagan ceremonies which the missionaries of other orders condemned as idolatrous. Lecomte was sent to Rome in 1692, became soon afterward confessor to the duchess of Burgundy, and wrote a work, *Nouveaux Mémoires sur l'Etat présent de la Chine* (3 vols., 1696-97-1701), combining much information with an exaggerated panegyric upon the Chinese, who were represented as having always retained a knowledge of the true God. This work, together with *Sur les Cérémonies de la Chine*, 1700, was censured by the faculty of theology at Paris and by the Congregation at Rome. Lecomte d. at Bordeaux in 1729.

**Lecompton**, post-v. and tp. of Douglas co., Kan., 10 miles N. W. of Lawrence. It is on the S. bank of the Kansas River, opposite Perry Station on the Kansas Pacific R.R. It was for a time the Territorial capital of Kansas. It is the seat of Lane University (United Brethren). Pop. 971.

**Le Conte** (JOHN), M. D., son of Lewis, b. in Liberty co., Ga., Dec. 4, 1818; prepared for college under the tuition of the undersigned; graduated in 1838 with high honors at Franklin College, Athens (now University of Georgia); studied medicine, taking his degree in 1841 from the New York College of Physicians and Surgeons; married the same year, and in 1842 began practice at Savannah, Ga., and from that time forward contributed largely to the prominent medical journals of the U. S.; elected in 1846 to the chair of natural philosophy and chemistry in Franklin College, and resigned in 1855 to become lecturer on chemistry in the College of Physicians and Surgeons, N. Y.; accepted in 1856 the new professorship of natural and mechanical philosophy in the South Carolina College, Columbia; in 1869 became professor of physics and industrial mechanics in the new University of California at Oakland, and president after the resignation of Pres. D. C. Gilman in Apr., 1875; is a member of the leading American scientific societies, to whose proceedings and various scientific journals he has contributed important papers on physical science; has published his addresses of *Philosophy of Medicine* (1849) and *Study of the Physical Sciences* (1858); and contributed *The Solar Hypothesis to the Popular Science Monthly* for Apr., 1873. In Dec., 1867, delivered a course of lectures on the "Physics of Meteorology" at the Smithsonian Institution, Washington, and in Nov., 1867, one of four lectures on the "Stellar Universe" at the Peabody Institute in Baltimore. By the burning of Columbia, S. C., in Feb., 1865, he lost the nearly completed manuscript of a treatise on *General Physics*. A. H. STEPHENS.

**Le Conte** Maj. JOHN EYRES, brother of Lewis, b. near Shrewsbury, N. J., Feb. 22, 1784; entered the engineer corps of the U. S. army in 1813; was long employed in surveys and fortifications, and retired with the rank of major in 1831. He was a successful cultivator of natural science, especially botany and zoology. He published *Monographs of the North American Species of Arviculæ, Crinæ, and Rallæ*, *Observations of the North American Species of Vicia*, and *Descriptions of the Species of North American Testaceous in the Annals of the New York Lyceum of Natural History*, vols. i., ii., iii.; *A Monography of North American Heterosterns in the Boston Journal of Natural History*, vol. v., and *Descriptions of three new Species of Arviculæ, with Remarks upon other North American Rodents, in the Proceedings of the Academy of Natural Sciences of Philadelphia*, in several of which he had the benefit of the scientific observations of his brother Lewis. D. at Philadelphia Nov. 21, 1869.

**Le Conte** JOHN LAWRENCE, M. D., son of John E. Le Conte, b. in New York May 13, 1820; graduated in 1846 at the New York College of Physicians and Surgeons; made several scientific excursions in the Western States while a student, and subsequently extended his travels to Central America, the results of which were communicated to scientific societies and journals. His specialty is the study of North American Coleoptera, on which subject he is recognized as a high authority. The Smithsonian Institution published in 1861-62 his *Classification of the Coleoptera of North America*, and in 1863-66 his *List of the Coleoptera of North America*. Dr. Le Conte entered the army in 1862 as surgeon of volunteers, and became a medical inspector of the regular army. He is a member of the National Academy of Sciences, and was in 1873 elected president of the American Association for the Advancement of Science.

**Le Conte** (JOSEPH), M. D., son of Lewis, b. in Liberty co., Ga., Feb. 20, 1823; studied at a private school under the charge of the undersigned; graduated with distinction at Franklin College, Ga., in 1841, and in medicine in New York in 1845; settled in 1848 as a physician in Mason,

Ga.; studied natural history under Agassiz at Cambridge in 1850; became in 1853 professor of natural history at Franklin College, and of chemistry and geology in the University of South Carolina from 1856 to 1863, accompanying his brother John in 1869 to California, where he took the chair of geology in the University of California. Besides numerous scientific papers, he has written on art and education, and published a work on *The Mutual Relations of Religion and Science* (1874). A. H. STEPHENS.

**Le Conte** (LEWIS), M. D., b. near Shrewsbury, Monmouth co., N. J., Aug. 4, 1782; descended from a French Huguenot family that settled about the close of the seventeenth century at New Rochelle, N. Y.; graduated in 1799 at Columbia College; studied medicine in the office of Dr. David Hosack, but never practised, and soon settled in Liberty co., Ga., taking charge of his father's estate, establishing a botanical garden, especially rich in bulbous plants from the Cape of Good Hope, where he produced large camellias and the hybrid *Amaryllis Johnsonii*. In his laboratory he tested the discoveries of chemists, the fruits of which, averse to publishing, he communicated to his friends. Stephen Elliott and other botanists acknowledged their obligations to him, and by his observations he enriched the monographs of his brother, Major John E. Le Conte. Besides occasional rambles in the adjoining counties, he made two scientific excursions to the region of the Altamaha River, the earlier in company with the botanist Dr. William Baldwin, U. S. N., and the later with Mr. Gordon, the Scotch collector and botanist, who gave an account in *London's Gardener's Magazine* of the result of many months' residence with him. Dr. Le Conte devoted much attention to mathematical studies, and manuscripts on this subject and on native animals and birds, which were in the custody of his son, Prof. John Le Conte, were lost by the burning of Columbia, S. C., in Feb., 1865. His death, Jan. 9, 1828, resulted from poison taken into his system by dressing a wound for a member of his family. By his wife, Ann Quarterman, whom he married in 1812, and who died in Dec., 1826, he had four sons and three daughters, of whom two sons, the scientists Profs. John and Joseph Le Conte, still survive (1875), as well as one daughter. A. H. STEPHENS.

**Lecourbe** (CLAUDE JOSEPH), COUNT, b. at Lons-le-Saulnier, France, in 1759; spent eight years in the army in early life, without securing any advancement, but at the organization of the National Guards at the outbreak of the French Revolution became commander of those raised at Lons-le-Saulnier, and soon after joined the army of the Upper Rhine at the head of a battalion from the Jura. He distinguished himself repeatedly in the battles in the Netherlands, especially at Fleurus (June, 1794), where he had command of a brigade, and held his position for seven hours against 10,000 Austrians. The same qualities were displayed in the campaigns on the Rhine, the Danube, and in Switzerland, and made him general of division in 1796. For partisanship in favor of Moreau, Napoleon struck his name from the roll of officers (1801), and he lived in retirement at Bourges during the Empire. Louis XVIII. restored him his rank, and made him grand officer of the Legion of Honor and count in 1814. He opposed Napoleon on his return from Elba, but finally accepted a command under him in the Jura, with head-quarters at Belfort, where he d. Oct. 23, 1815. His statue was erected at Lons-le-Saulnier in 1837.

**Lecouvreur** (ADRIENNE), b. at Damery, near Epernay, France, Apr. 5, 1692. In 1702 her parents settled at Paris, and after receiving some instruction from the actor Legrand, she entered the stage at Strasbourg in 1716. Next year (May 14, 1717) she made her debut at the Théâtre Français in Paris, where she very soon attained the first place both in comedy and tragedy. Her character as an actress was not so much the grand as the touching, and her principal power was a most wonderful mimicry. Her death was very sad. Maurice of Saxony was her lover; not the only one she ever had, but she loved him deeply, and when he was made duke of Courland she sold her diamonds in order to furnish him with the money necessary to take possession of the country. It was alleged that another of his mistresses, the duchess of Bourbon, possessed her from jealousy, and she d. Mar. 20, 1740. Her remains were not allowed to rest in consecrated ground, but were buried secretly in a private place. Roused by indignation, Voltaire wrote an ode on her death, but public opinion was so fixed on this point that he had to leave the city. In modern times her tragic history was made the subject of one of the most successful dramas of Seribe and Legouvé, in which Rachel achieved celebrity in the rôle of Adrienne.

**Lectionary** [Lat. *lectionarius*], a service book containing the lessons (lessons) of Scripture to be read in the church, or in other cases a list and setting what lessons are appointed for different days in the calendar.



**Lectoure**, town in France, in the department of Gers, on the right bank of the Gers. It has a brisk trade in grain, wine, brandy, mules, and cattle. Pop. 6122.

**Lec'turn** [Lat. *lectrum*, from *legere*, *lectum*, "to read"], or **Ambo**, the reading desk of a church; the stand at which the lesson for the day is read. These names are used in Roman Catholic and in some Protestant churches. The form is various, and the lecturn itself is either fixed or movable.

**Lec'da**, in Grecian mythology, was the wife of Tyndareus, king of Sparta, and by Zeus, who surprised her in the shape of a swan, she was the mother of Castor and Pollux. There are many versions of the myth, but the above is the most common.

**Led'ger** **JOHN**, known only as an early explorer of the mountain-region of Virginia, wrote in Latin an account of his travels, which was translated and printed in 1672 by Sir William Talbot, Bart., under the title *The Discoveries of John Lederer in three several marches from Virginia to the West of Carolina and other parts of the Continent, begun in March, 1669, and ended in September, 1670* (quarto, 27 pp., with a map). Sir William states in the preface that Lederer was driven out of Virginia by ill-treatment from the populace—that he made his acquaintance in Maryland, and induced him to write this treatise as a vindication. He was probably a German.

**Ledg'er-Lines**, in music, short lines added above and below the five regular lines of the staff. As the staff affords room only for a limited number of the notes now in use, the ledger-lines, with the spaces between, are equivalent to a temporary extension of the scale, thereby furnishing as many new degrees above and below as may be required. These short additional lines are also a convenience to the eye of the performer, as the notes placed on or between them can be read with great facility; whereas, if the lines were continuous and permanent (forming a staff of eight or ten lines), the same notes could not be read without difficulty and constant risk of error. (See **NOTATION AND SCALE**.) **WILLIAM STANFORD.**

**Ledochow'ski, de** (Cardinal **MIETSLAS HALKA**), Count, b. Oct. 29, 1822, at Ledochow, Galicia; studied theology at Warsaw, Vienna, and Rome; became domestic prelate and protonotary apostolic to Pope Pius IX.; and entering the papal diplomatic service was auditor of the nunciature successively at Madrid, Lisbon, Rio de Janeiro, and Santiago de Chili, nuncio at Brussels, and archbishop of Thebes in *partibus infidelium* in 1861; and at the request of the king of Prussia appointed in Jan., 1866, archbishop of Gnesen and Posen, becoming thereby *ex officio* primate of Poland. On May 26, 1873, he led in the protest signed by the clergy against the new Prussian ecclesiastical laws, which placed the choice of bishops and priests in the hands of the people of the diocese or parish. Persistently refusing to appear before the courts to justify his action, his property was taken in payment of fines, and he was confined in prison at Ostrowa, where he has since remained, having been exhorting to constancy by a papal brief of Nov. 3, 1873, and elevated to the cardinalate in the secret consistory celebrated Mar. 13, 1875.

**Ledru-Rollin'** (**ALEXANDRE AUGUSTE**), b. at Paris Feb. 2, 1807, began to be known soon after the revolution of July, 1830, by acting as an "avocat" for the political men prosecuted by the government of Louis Philippe, or by writing pamphlets and memoirs in which he indicted in a legal and technical argumentation the repressive measures ordered against individuals or public liberties. He was at the same time a favorite and celebrated lawyer in ordinary lawsuits, and published dogmatic works and periodical reviews on jurisprudence. In 1861 he was elected member of the Chamber of Deputies, and upheld openly the pure doctrines of republicanism in the chamber. In 1848 he was, as minister of the interior, one of the provisional government of the republic, and put in practice his theory of universal suffrage. When Cavaignac, and afterwards Louis Napoleon, took the power into their hands, Ledru-Rollin continued to fight for liberty as a member of the National Assembly. On June 13, 1849, he was the leader of an insurrection attempted to prevent Louis Napoleon from sending the French troops to help in the re-establishment of the pope at Rome. The insurrection collapsed, and Ledru-Rollin escaped to England. There, though he kept quiet and exclusively busy with writing books, his extradition was asked by Napoleon III., under the pretext that he had been participant with Mazzini in the insignificant plot of Tibaldi against the life of the emperor. But the extradition was not granted, and Ledru-Rollin returned to France in 1870. He did not wish to enter again the political arena; still, the republicans elected him deputy in 1873, and he was one of the members of the extreme Left in the Versailles Assembly. He only delivered

one speech, in favor of universal suffrage, which was worthy of the great orator, and was his "chant du cygne," for he died soon after (Jan. 1, 1875), and was accompanied by thousands of Parisians to the cemetery of Père la Chaise.

**FÉLIX AUCAIGNE.**

**Led'um, Oil of** [Gr. *λεῖδον*, the "ledum"], an essential oil obtained by distilling the leaves of marsh tea, *Ledum palustre*. It is reddish-yellow, has an acid reaction, smells like the plant, and consists of a hydrocarbon isomeric with oil of turpentine, and an oxygenated oil having the composition of ericinol,  $C_{10}H_{16}O$ .

**Led'um Palus'tre** [Gr. *λεῖδον*] [*Marsh Tea, Rosmarinus Sylvestris*], a small evergreen shrub growing in swamps and other wet places in the northern parts of Europe, Asia, and America, and in mountainous regions of more southern latitudes. The leaves have a balsamic odor and an aromatic, camphorous, bitter taste, and contain, among other ingredients, a volatile oil and tannin. They are thought to possess narcotic properties, and have been employed to allay irritation in whooping-cough, dysentery, leprosy, and scabies. (*U. S. Disp.*) They are said to protect clothes from moths, are sometimes used as a substitute for hops in beer, and are employed in Russia to tan goat, calf, and sheep skins into a reddish leather of an agreeable smell, as also in the preparation of oil of birch, for making what is generally called Russia leather. **C. F. CHANDLER.**

**Led'yard**, post-v. and tp. of New London co., Conn., on the E. side of the navigable river Thames, 8 miles S. of Norwich. The township is traversed by the Norwich and Worcester R. R., and has a public library and important manufactures. Pop. 1392.

**Ledyard**, post-tp. of Cayuga co., N. Y., on the E. shore of Cayuga Lake. It contains the village of **AURORA** (which see). Pop. 2221.

**Ledyard** (**JOHN**), b. at Groton, Conn., in 1751; lived for a time among the Six Nations, to whom he intended to become a missionary, and studied in Dartmouth College with a view to that work; but his restless spirit prompted him to embark alone in a log canoe upon the Connecticut River and leave college for ever. He shipped as a sailor to Gibraltar; enlisted as a British soldier, but was soon discharged; returned to America during the Revolutionary war; went to London, and sailed as a corporal of marines under Capt. James Cook on his last voyage, of which Ledyard kept a diary, an abstract of which was published at Hartford, Conn., 1787. In 1782 he deserted from the British service when off Long Island. Assisted by Sir Joseph Banks and others, he started, after many vexatious hindrances, from St. Petersburg (whither he had walked from Stockholm, through Lapland and Finland) for the Pacific Ocean. At Irkutsk in Siberia he was arrested, and was hurried back to the Polish frontier and expelled from Russia for some unknown reason. In 1788, immediately after his return from Russia, he started under the auspices of Sir Joseph Banks and others for the exploration of Africa, but was attacked at Cairo, Egypt, by an acute febrile disorder, of which he died Jan. 17, 1789.

**Ledyard** (Col. **WILLIAM**), b. at Groton, Conn., in 1738; was in Sept., 1781, commander of Fort Griswold, near New London, which he defended with great courage against an overpowering British force until it was taken by storm, when, with more than 100 of his soldiers, he was massacred by the exasperated enemy, Sept. 7, 1781. A monument now commemorates the event.

**Lee**, county of Alabama, bounded E. by Georgia. Area, 620 square miles. It is hilly, but fertile. Cotton and corn are staple products, and flour is the leading article of manufacture. The county is traversed by the East Alabama and Cincinnati and the Savannah and Memphis R. Rs., and branches of the Western R. R. of Alabama. Cap. Opelika. Pop. 21,750.

**Lee**, county in Eastern Arkansas, formed in 1873 from portions of Crittenden, Monroe, Phillips, and St. Francis, bounded on the E. by the Mississippi and traversed by the St. Francis and L'Angeuille rivers. The surface is for the most part level, well timbered, and fertile, and yields very abundant crops, chiefly of cotton and corn. Cap. Mariana.

**Lee**, county of S. W. Central Georgia. Area, 350 square miles. It is level and fertile. Cotton and corn are the staple products. It is traversed by the South-western R. R. of Georgia. Cap. Starkville. Pop. 9567.

**Lee**, county of N. Illinois. Area, 720 square miles. It is level and very fertile. Cattle, grain, and wool are the staple products. The county is traversed by Rock and Green rivers, and by various railroads, centering at Dixon, the capital. Pop. 27,171.

**Lee**, county of S. E. Iowa. Area, 500 square miles. It is bounded E. by the Mississippi and S. W. by the Des

Moines. It is extremely fertile, rolling, and well cultivated. Cattle, grain, and wool are staple products. Carriages, furniture, harnesses, tobacco, metallic wares, cooperage, lumber, brick, etc. are among the leading articles of manufacture. The county is traversed by the Burlington and South-western and the Des Moines Valley R. Rs. and a branch of the Chicago Burlington and Quincy R. R. Cap. Fort Madison. Pop. 37,219.

**Lee**, county of E. Kentucky. Area, 300 square miles. It is mountainous, with fertile valleys. Corn is the staple product. The county is traversed by the Kentucky River. Caps. Beattyville and Proctor. Pop. 30,555.

**Lee**, county of N. E. Mississippi. Area, 520 square miles. It is undulating and very fertile. Live-stock, corn, and cotton are leading products. The county is traversed by the Mobile and Ohio R. R. Cap. Tupelo. Pop. 15,960.

**Lee**, county of S. W. Virginia. Area, 375 square miles. It is bounded N. W. by the Cumberland Mountains of Kentucky and S. E. by Powell Mountains. The surface is high and partly mountainous. Coal is found. The soil is excellent. Live-stock, grain, and wool are leading products. The county is traversed by Powell's River, and contains much fine scenery. Cap. Jonesville. Pop. 13,268.

**Lee**, tp. of Fayette co., Ala. Pop. 389.

**Lee**, tp. of Sacramento co., Cal. Pop. 376.

**Lee**, tp. of Brown co., Ill. Pop. 1560.

**Lee**, tp. of Fulton co., Ill. Pop. 1296.

**Lee**, tp. of Buena Vista co., Ia. Pop. 302.

**Lee**, tp. of Madison co., Ia. Pop. 426.

**Lee**, tp. of Polk co., Ia. Pop. 729.

**Lee**, post-tp. of Penobscot co., Me., 60 miles N. E. of Bangor. Pop. 960.

**Lee**, post-v. and tp. of Berkshire co., Mass., on the Housatonic River and R. R., 99 miles N. of Bridgeport, Conn., and 10 miles S. of Pittsfield, E. terminus of the Lee and Hudson R. R. (in construction) and N. W. terminus of the Lee and New Haven R. R. (surveyed); has 1 national and 1 savings bank, 1 weekly newspaper, 7 churches, 3 hotels, a public library, excellent schools, 25 paper mills, 2 iron-foundries, 3 machine-shops, extensive woollen-factories, a trotting park, and fine marble-quarries which supplied materials for the Capitol extension at Washington and for the Catholic cathedral in New York. First settled in 1760, incorporated in 1777, and named for Gen. Charles Lee; first paper-mill erected in 1806 by Samuel Church. Pop. 3866. (See *History of Lee*, by Amory Gale, 1851.)

J. A. ROYCE, ED. "VALLEY GLEANER."

**Lee**, tp. of Allegan co., Mich. Pop. 249.

**Lee**, tp. of Calhoun co., Mich. Pop. 1123.

**Lee**, tp. of Platte co., Mo. Pop. 2290.

**Lee**, post-tp. of Strafford co., N. H., 33 miles E. by S. of Concord, has manufactures of leather and lumber. Pop. 776.

**Lee**, post-tp. of Oneida co., N. Y. Pop. 2656.

**Lee**, post-v. and tp. (the former called also ALBANY) of Athens co., O. It is the seat of Atwood Institute (Free Baptist). Pop. 1146.

**Lee**, tp. of Carroll co., O. Pop. 901.

**Lee**, tp. of Monroe co., O. Pop. 1114.

**Lee**, tp. of Williamsburg co., S. C. Pop. 1181.

**Lee**, tp. of Accomac co., Va. Pop. 6183.

**Lee**, tp. of Fairfax co., Va. Pop. 1316.

**Lee**, tp. of Shenandoah co., Va. Pop. 2698.

**Lee**, tp. of Calhoun co., W. Va. Pop. 608.

**Lee**, tp. of Clark co., Wis. Pop. 203.

**Lee** Rt. Rev. ALFRED, D. D., b. at Cambridge, Mass., Sept. 9, 1807; graduated at Harvard in 1827; was admitted to the bar in 1830, and practised law at Norwich, Conn., 1831-33; studied in the General Theological Seminary, N. Y.; was ordained a deacon of the Protestant Episcopal Church in 1837, and a priest in 1838; rector of Calvary church, Rockdale, Del., 1838-41; consecrated bishop of Delaware in 1841, and became also rector of St. Andrew's, Wilmington, Del. He is author of *Life of St. Peter* (1862), *Life of St. John* (1864), *Discourse on Baptism* (1864), *Ministry of Susan Alcham* (1866), *Harrowing of Christ* (1867).

**Lee** (ASS), b. at Manchester, England, Feb. 29, 1736; worked in a cotton mill, and afterwards became a cook; was married to a man named Stanley, and soon began to take part in the conventicles of John and Jane Wadley, the original "Shaking Quakers," whom she succeeded as the leader of the sect in 1771, soon after which she was for a time confined in a jail, and then in a mad house. After her release she was acknowledged as a "mother in Christ,"

and assumed the title of "Ann, the Word." In 1774 she went with a few followers to New York, and in 1776 settled at Watervliet, near Albany. Here she was charged with high treason and witchcraft, and imprisoned for some time at Albany and Poughkeepsie. This imprisonment, regarded as a persecution, brought her many followers. (See SHAKERS.) D. at Watervliet, N. Y., Sept. 8, 1784.

**Lee** (ARTHUR), M. D., LL.D., b. in Westmoreland co., Va., Dec. 20, 1740, son of Thomas Lee; educated at Eton and Edinburgh, where he graduated as M. D. in 1765, and practised at Williamsburg, Va.; returned to Europe; studied law, and was admitted to the bar in 1770; became prominent in public affairs in London, and in after years served as commissioner of Massachusetts, Virginia, and finally of the General Congress, in London, Paris, Madrid, and Berlin successively. While in Paris he and Mr. Izard were involved in serious differences with Franklin and Silas Deane. In 1781 he was in the Virginia assembly; was in Congress 1782-85, and held other positions of importance. D. Dec. 14, 1792. Mr. Lee's mission in Europe was very fruitful of good to the U. S. Personally, he was a truthful, straightforward, and decided man, a hearty lover of freedom, and was never married. (See his *Life*, by R. H. Lee, 1829.) He was a brother of Francis Lightfoot, Richard H., Thomas L., Philip L., and William Lee, all eminent patriots.

**Lee** (CHARLES), b. at Dernhall, Cheshire, England, in 1731, and was the son of a colonel in the British army. When eleven years old he entered the service; was in Braddock's expedition, and was wounded at Ticonderoga in 1758; distinguished himself in Portugal, but never rose higher in the British service than a half-pay lieutenant-colonel, his meddlesome disposition, quarrelsome temper, and sarcastic speeches about his superiors interfering with his promotion. He became later a soldier of fortune; aide-de-camp to the king of Poland and a major-general; entered the Russian service against the Turks, and became notorious as a duellist. In 1773 he came to America, purchased an estate in Berkeley co., Va., and became an ardent Whig. In 1775 he was chosen major-general of the Continental army; took part in the defence of Charleston; and in 1776 was taken prisoner at Baskingridge, N. J. While in prison it is now considered certain that Lee made treasonable propositions to the enemy. In 1778 he was exchanged, and at the battle of Monmouth his insubordination nearly lost the day. He was court-martialed, and suspended for one year from command, and soon after was wounded in a duel by Col. John Laurens, who challenged him in consequence of disrespectful language used to Gen. Washington. He then retired to Virginia, where he led the life of a hermit; and a disrespectful letter sent by him to Congress caused his dismissal from the service. D. while on a visit to Philadelphia Oct. 2, 1782. (His *Life* has been written by Sir H. Bunbury, by Edward Langworthy, by J. Sparks, and by G. H. Moore, 1861.)

**Lee** (CHARLES ALFRED), M. D., b. at Salisbury, Conn., Mar. 3, 1801; graduated at Williams College, and took his medical degree at Pittsfield, Mass., in 1825; settled in 1826 in New York, where he was one of the founders of the Northern Dispensary. He held at various times professorships in no less than ten medical schools, and aided in founding the medical college of the University of New York City and that of Buffalo, N. Y. He wrote much on medical and other subjects, and was at one time editor of the *N. Y. Journal of Medicine*. He bestowed much attention upon the colonization or Ghcei-system of the treatment of the insane. D. at Peekskill, N. Y., Feb. 14, 1872.

**Lee** (ELEANOR PERCY), b. near Natchez, Miss., in 1820, was the daughter of Maj. N. A. Ware; resided in Philadelphia and Cincinnati, and became the wife of H. W. Lee of Vicksburg, Miss. With her sister, Mrs. C. A. Warfield of Kentucky, she published *Poems by Two Sisters* (1843) and other works. D. in 1850.

**Lee** (ELIZA BUCKMINSTER), b. in Portsmouth, N. H., about 1794, daughter of Rev. Dr. Joseph and sister of Rev. J. S. Buckminster, married Mr. Thomas Lee of Boston; wrote *Sketches of a New England Village* (1817), a *Life of Richter* (1812), translated from the German *Heart and Vale* (1845) from the German of Richter, *Visions of Boston Two Hundred Years Ago* (1848), *Memories of Rev. Dr. Buckminster and Joseph S. Buckminster* (1849), *Flowers of the Parish of Chelsea* (1850), *Prayers of the Last Days of Popanism* (1858), and *The Reconverted Man*, from the German of B. Auerbach. D. in Brookline, near Boston, June 22, 1864.

**Lee** FRANCIS LIGHTFOOT, son of Thomas, b. at Stratford, Westmoreland co., Va., Oct. 11, 1731; received a careful classical and English education from a private tutor, inherited an ample estate; served in the house of burgesses



from 1765 to 1772, and four terms as delegate in the Continental Congress from 1775 to 1779; was a signer of the Declaration of Independence; member of important committees, and frequently chairman of the committee of the whole. He rendered important services in framing the old Articles of Confederation, and insisting, as conditions of peace with England, upon the right to the navigation of the Mississippi, and to the Newfoundland fisheries, thereby justly earned the gratitude of New England. He seldom spoke in Congress, but exercised great influence, and was a consistent friend and supporter of Washington in the most critical times. Retiring from Congress in 1779, he resumed the life of a country gentleman, distinguished for geniality and wit, but averse to politics, in which he did not again figure except by a brief service in the Virginian senate. D. at Monocan, Richmond co., Va., in 1797.

**Lee (FREDERICK GEORGE), D. C. L., b.** at Thane Vicarage, Oxfordshire, England, Jan. 6, 1832; graduated at Oxford with high honors in 1854; took holy orders in 1856; was successively curate of Summingwell, assistant minister of Berkeley chapel, incumbent of St. Mary's, Aberdeen, and vicar of All Saints', Lambeth, which post he now fills (1875). Dr. Lee was from 1857 to 1869 a secretary of the Society for the Promotion of the Union of Christendom, founded the *Union Review* in 1863 and conducted it until 1869, and has been a frequent contributor to the *Church Magazine*; has written several volumes of poems and many theological essays, of which *Glimpses of the Supernatural* and *Lyrics of Light and Life*, both published in 1874, attained considerable popularity. Dr. Lee is a writer of undeniable ability, but his avowed belief in the ecclesiastical miracles of the fourth century and in many modern marvels has exposed him to sharp criticism.

**Lee (FREDERICK RICHARD), R. A., b.** at Barnstaple, England, in June, 1798; served in the Netherlands at an early age as an officer of the 56th Foot; studied painting and acquired a high reputation for landscapes, especially of English and Scotch scenery, his pictures having been purchased for the most celebrated private galleries of England. He began exhibiting at the Royal Academy in 1824; was elected Associate in 1834 and Academician in 1838. He has executed notable joint works with Thomas Sidney Cooper, R. A.

**Lee (HANNAH F.), b.** in Newburyport, Mass., in 1780, daughter of Dr. Sawyer, and became the wife of George G. Lee of Boston, Mass. She was the author of many excellent books, among which are *Three Experiments of Living* (1838), *The Old Painters* (1838), *The Huguenots in France and America, History of Sculpture and Sculptors* (1854), *Memoir of Pierre Toussaint* (1853). D. in Boston, Mass., Dec. 28, 1865.

**Lee (HARRIET), b.** in London, England, in 1756; published in 1786 a novel in 5 vols., *The Errors of Innocence*, and in 1787 a drama, *The New Peerage*; followed at much later dates by two other dramas and another novel. She is best known as associated with her sister (see LEE, SOPHIA) in the authorship of the *Canterbury Tales* (5 vols., 1797-1805), once extremely popular, and reprinted in New York in 1857. Eight of the ten tales were from Harriet's pen, the most remarkable being *The German's Tale*; and *Kruitzner*, which supplied Byron the plot, the machinery, and some of the language of *Werner*. D. at Clifton Aug. 1, 1851.

**Lee (Gen. HENRY), the father of Robert E. Lee, and a relation of R. H. Lee, b.** in Westmoreland co., Va., Jan. 29, 1756; graduated at Princeton in 1773; in 1776 entered the army as a captain of horse, and served afterwards both in the North and South in command (as major and afterwards as lieutenant-colonel) of a partisan corps known as "Lee's Legion," while Lee himself was familiarly known as "Lighthouse Harry." He became renowned for boldness, activity, and efficiency. He retired from the army soon after the battle of Eutaw, in which he distinguished himself greatly. He was in Congress in 1786; was governor of Virginia 1792-95; commander-in-chief of the expedition against the whisky insurgents 1794; and again a member of Congress in 1799. In his celebrated eulogy on Washington, prepared by direction of Congress, occur the words, "First in war, first in peace, and first in the hearts of his countrymen." In 1809 he was confined for debt in Spotsylvania co., Va., and wrote his *Memoirs of the War in the Southern Department* (1809). In 1814 he was in Baltimore, the guest of Mr. Alexander C. Hanson, at the time when the house of that gentleman was attacked by a mob. Gen. Lee took part in the defence of the house, and was afterward put into the city jail for safety, but the mob entered the jail, and killed or cruelly maimed the whole party. Gen. Lee never recovered from his injuries. He went for his health to the West Indies, and d. on the return journey, on Cumberland Island, Ga., where he was the guest of Mrs. Shaw, a daughter of Gen. Greene, Mar. 25, 1816. He was frank,

generous, and impulsive; and in the opinion of Gen. Greene did more than any other man to bring about the triumph of the American arms in the Southern department.

**Lee (HENRY), a brother of Gen. R. E. Lee, b.** at Stratford, Westmoreland co., Va., in 1787; graduated in 1808 at William and Mary College; became major 36th Infantry in 1813. He was author of *The Campaign of 1781* (1824), *Life of Napoleon* (vol. i., 1835), *Observations on the Writings of Thomas Jefferson* (1832). D. at Paris Jan. 30, 1837.

**Lee (HENRY W.), b.** at Hamden, Conn., July 26, 1815, and d. in Davenport, Ia., Sept. 26, 1874; received deacon's orders in 1838; in 1840 became rector of a church which he had built up at Springfield, Mass.; in 1848 received charge of St. Luke's church at Rochester, N. Y., where he remained till 1854, when he was chosen bishop of Iowa, which position he held at his death. J. B. BISHOP.

**Lee (JESSE), b.** in Prince George's co., Va., Mar. 12, 1758; joined the Methodist Church in 1773; in 1783 was received into the conference; in 1787 penetrated New England, and preached from the Connecticut to the farthest settlements in Maine. He formed the first Methodist "class" in New England at Stratfield, Conn., Sept. 26, 1787, and the first in Boston, Mass., July 13, 1792. He was three times elected chaplain to the U. S. House of Representatives and once to the Senate. In 1807 he published at Baltimore, Md., his *History of Methodism in America*. D. Sept. 12, 1816. ABEL STEVENS.

**Lee (JOHN), LL.D., F. R. S., b.** in London Apr. 28, 1783; graduated at St. John's College, Cambridge, in 1806; became fellow, and travelled extensively in the East, making collections of antiquities. In 1815 he took the name of LEE (his original name having been FIOTT) upon inheriting the property of an uncle, and devoted himself to science. He was a member of fifteen or twenty learned societies, and was for two years president of the Royal Astronomical Society. He erected a magnificent observatory at his residence near Aylesbury, Bucks, and engaged competent astronomers to conduct the observations. D. at Hartwell House Feb. 25, 1866.

**Lee (LEROY MADISON), D. D., b.** in Petersburg, Va., 1808; joined the Virginia Methodist conference in 1828; in 1836 was appointed editor of the *Richmond Christian Advocate*; in 1859 resumed the pastoral office. He has published *Life and Times of Jesse Lee, Advice to a Young Convert*, etc. ABEL STEVENS.

**Lee (LUTHER), D. D., b.** at Schoharie, N. Y., Nov. 30, 1800; became a Methodist travelling preacher of the M. E. Church in 1827; lectured in favor of temperance and the abolition of slavery, being mobbed several times; succeeded on account of slavery from the M. E. Church in 1842; joined the new body of "Wesleyan Methodists," became pastor of a church in Syracuse (1843); president of the first Wesleyan Methodist general conference in 1844, and editor in New York of the organ of that Church, the *True Wesleyan*. In 1856 he was chosen president of Michigan Union College at Leoni, Mich.; resigned and spent several years in Ohio; became in 1864 professor at Adrian College, Mich.; returned to M. E. Church in 1867, and has since been a member of the Michigan conference. Dr. Lee has edited several papers and written various religious and controversial works.

**Lee (MARY ELIZABETH), b.** at Charleston, S. C., Mar. 23, 1813, was a niece of Judge Thomas Lee. She contributed much prose and verse to periodical literature, and was author of *Tales from History*. D. at Charleston Sept. 23, 1849. (See a *Memoir*, with selections of her poetry, by S. Gilman, D. D., 1851.)

**Lee (NATHANIEL), b.** at Hatfield, Hertfordshire, Eng., about 1657; educated at Trinity College, Cambridge; became an actor and afterwards a dramatic author, producing a new play every year from 1675 to 1681; was several years confined in an insane asylum; aided Dryden in writing *Edipus* and the *Duke of Guise*. He was killed in an affray in London in 1690. Two of his eleven tragedies, *Theodosius* and *Alexander the Great*, were successful acting dramas throughout the eighteenth century.

**Lee (RICHARD HENRY), signer of the Declaration of Independence, son of Thomas, b.** at Stratford, the family-seat of the Lees, in Westmoreland co., Va., Jan. 20, 1732. He was educated in England, and after his return marched with a company to join Braddock, who rejected his services with an ill-judged expression of contempt for the "provincials." He was early chosen to the house of burgesses, where he at once took a commanding position on the side of popular rights. He was in Congress 1774-77, 1784-85, and 1786-87. He was the author of the famous motion of June 7, 1776, "That these United Colonies are, and of right ought to be, free and independent States," etc., and advocated the Declaration of Independence in a bold and



brilliant speech. During 1780 he was for a portion of the time in the field at the head of the militia of Westmoreland co. He was a Senator from Virginia 1789-92, and, though not a Federalist, supported the administration of Washington with zeal. D. at Chantilly, Va., June 19, 1791. He was a man of amiable and noble character, of commanding presence, excellent abilities, and self-sacrificing patriotism. (See his *Life and Correspondence* (1825), by R. H. Lee, his great-grandson.)

**Lee (Robert), D. D.**, b. at Tweedmouth, North Durham, Eng., Nov. 11, 1804, entered the University of St. Andrew's in 1824; was ordained in the Church of Scotland in 1832; was minister at Arbroath (1833) and at Campsie (1836), and in 1843, on the disruption of the Scottish Church, was appointed by the town council of Edinburgh to the pastorate of the Old Grey Friars' Church. In 1844 he published a translation, with a preface, of *The Theses of Erastus touching Excommunication*, as a reply to the writers of the "Secession Church," who charged the adherents of the establishment with "Erastianism." In 1846 he became regius professor of biblical criticism in the University of Edinburgh, and devoted himself at once to a course of minute investigations upon the text of the Bible, which resulted in the great work of his life, *The Holy Bible, with about 60,000 Marginal References and Various Readings, revised and improved*, published at Edinburgh, Glasgow, and London in 1854. He was charged by the *Witness* newspaper with inculcating heresy in regard to universal salvation, and vigorously defended himself in the columns of the *Scotsman*. In 1858, Dr. Lee was a member of a deputation sent to London to appeal before a parliamentary committee on the subject of university reform, and his suggestions were embodied in the measure as finally passed. In 1857 he published a volume of *Prayers for Public Worship*, and having employed them in his own parish, was arraigned in 1859 before the presbytery of Edinburgh, and later before the General Assembly, on a charge of introducing into public worship a liturgy and certain forms and postures unknown to the Church of Scotland. Dr. Lee argued his own case in a speech of great eloquence, and obtained a verdict in his favor. In 1860 he published *The Reform of the Church of Scotland in Worship, Government, and Doctrine*, in which he discussed liturgy, postures in worship, instrumental music, and the propriety of observing certain festivals and fasts, with a tendency towards bringing the Church of Scotland into greater harmony with the age. The General Assembly of 1863-64 reported favorably upon these views, and on the 22d of Apr., 1865, an organ was first opened in his church of Grey Friars—an event which marked an era in the national Church, and has been frequently imitated. The action of 1864 was, however, reversed by the General Assembly of 1865, and Dr. Lee was preparing to contest his favorite views before the civil courts when he was attacked with paralysis, and d. at Torquay Mar. 12, 1868. Dr. Lee was the acknowledged leader of the liberal party in the Scottish Church. (See his *Life and Remains*, by Rev. R. H. Story, 1870.)

**Lee (Robert Edward), b.** at Stafford House, Westmoreland co., Va., on Jan. 19, 1807. Having been entered as a cadet at the U. S. Military Academy at West Point in 1825, he was graduated, second of his class, in 1829, and attached to the army as a second lieutenant of engineers on the 1st of July of that year. Habitually employed upon the most important duties of his corps in time of peace, he had also, previously to 1846, been specially detailed to aid in establishing the boundary-line between Ohio and Michigan, and from 1837 to 1841 was superintending engineer of the improvements in the harbor of St. Louis and of the Missouri and upper Mississippi rivers, to which was added, from 1840 to 1841, the supervision of the improvements in the navigation of the Ohio below Louisville, and of the lower Mississippi. Already a captain of engineers since July 9, 1838, he first saw field service in the war with Mexico as chief engineer with Gen. Wool. But when Gen. Scott took command for the principal operation against the Mexican capital in Mar., 1847, he called Capt. Lee to his side. In that brilliant campaign he was conspicuous for professional ability as well as for gallant and meritorious conduct, winning in quick succession the brevets of major, lieutenant-colonel, and colonel for his part in the battles of Cerro Gordo, Contreras, Churubusco, Chapultepec (in which latter action he was wounded), and in the capture of the city of Mexico. By the close of the war he had come to be generally regarded in the army as the one officer best fitted ultimately to succeed Gen. Scott in the chief command. Called to Washington for a time as assistant to the chief engineer of the army, he resumed his place on the board of engineers charged with the defence of the Atlantic coast. From Sept. 1, 1852, to the end of Mar., 1855, he was superintendent of the Military Academy, a position which he

gave up to assume the duties of lieutenant-colonel of the 2d Cavalry, to which he had been appointed on Mar. 3, 1855, at the formation of that regiment. For several years he now served on the Texas border; but happening to be on leave of absence, near Washington, at the time of the raid of John Brown (Oct. 17 to 25, 1859), Col. Lee was placed in command of the Federal forces employed in its repression. Having soon after returned to his regiment, he fell in command of the department of Texas during the greater part of 1860. On Mar. 16, 1861, he became colonel of his regiment by regular promotion, but resigned that commission three weeks later (Apr. 25) upon the secession of Virginia. Repairing to Richmond, he tendered his services to the governor of the State, and by acclamation was appointed commander-in-chief of its forces, with the grade of major-general. Extracts from his letters at the time show the character of the man. Writing to Gen. Scott, he said: "Since my interview with you on the 18th inst. I have felt that I ought not longer to retain my commission in the army. I therefore tender my resignation, which I request you will recommend for acceptance. It would have been presented at once, but for the struggle it has cost me to separate myself from the service to which I have devoted all the best years of my life and all the ability I possessed. . . . Save in defence of my State, I never desire to draw my sword." To his sister the same day he wrote: "I am grieved at my inability to see you. I have been waiting for a more convenient season, which has brought to many before me deep and lasting regret. Now we are in a state of war which will yield to nothing. The whole South is in a state of revolution, into which Virginia, after a long struggle, has been drawn; and though I recognize no necessity for this state of things, and would have forborne and pleaded to the end for redress of grievances, real or supposed, yet in my own person I had to meet the question whether I would take part against my native State. With all my devotion to the Union, and the feeling of loyalty and duty of an American citizen, I have not been able to make up my mind to raise my hand against my relatives, my children, my home. I have therefore resigned my commission in the army, and save in defence of my native State, with the hope that my poor services will never be needed, I hope I may never be called on to draw my sword. I know you will blame me, but you must think of me as kindly as you can, and believe that I have endeavored to do what I have thought right." Entering upon the duties of his new position, he set to work to organize and develop the defensive resources of his State, having assumed "command of the military and naval forces of Virginia" on Apr. 23, 1861. A month later he directed the occupation in force of the important strategic position of Manassas Junction, which he visited about the 1st of June and gave special directions for its defence. Meanwhile, Virginia having entered the Confederacy and Richmond become the capital, Lee was appointed third in rank of the five generals by virtue of an act of the Confederate Congress creating that grade—Samuel Cooper, lately adjutant-general of the U. S. army, and Albert Sidney Johnston, a brigadier in the same service, being his seniors. For the time he remained at Richmond, generally consulted by Mr. Jefferson Davis concerning military affairs, until the early autumn, when he was assigned to command the forces confronting Gen. Rosecrans, his former junior in the engineer corps. But practically reduced to inaction on that field, Gen. Lee was transferred to the command of the coast of North and South Carolina and Georgia about Dec. 1, 1861, with impaired reputation, which was not retrieved, in public estimation, on that theatre of operations. So the notion grew widespread that, wanting in decision and not a man of action, he was unfitted for practical warfare. The Confederate Congress, however, having created the office of commander-in-chief, Mr. Davis, regarding it as an encroachment upon the executive power, vetoed the law, but not long after, or about the end of Mar., 1862, called Gen. Lee back to Richmond, and nominally invested him with the functions in question, which were exercised without material influence or control over either the organization or operations of Confederate armies. It was in this posture of affairs that Gen. Joseph E. Johnston was wounded at the battle of Seven Pines or Fair Oaks, May 31, 1862. Lee the following day was appointed to succeed him in the direct command of the army assembled for the defence of Richmond, and his first act was to draw all his troops back to their encampments near the city. Their casualties in the late engagements had been rising 6000, and their material gains some 10 pieces of artillery, 6700 rifles and muskets, with considerable subsistence and quartermaster's, medical, and ordnance stores; but Lee wisely stood, as yet, upon the defensive, while gathering all possible reinforcements from the southward, which Johnston declares had, in like need, been withheld from him. In this way, by the night of June 25, 1862, Lee



had added from 23,000 to 25,000 men to his forces, including Jackson's and Ewell's veterans, fresh from their recent successes in the Shenandoah Valley, and had at his disposition an army 80,000 strong, which he soon infused with the belief that he was equal to every emergency in the business of war, and that it was invincible under his lead. McClellan's position, meanwhile, was peculiarly strong: his left and centre, covered by a great morass (White Oak Swamp), extending southward from the Chickahominy nearly to James River; only his right (some 35,000 men) was at all exposed to attack, but well protected by intrenchments and artillery. Thus disposed, there was an army of at least 100,000 men, admirably equipped. His new adversary, now ready for the offensive, put Jackson in motion with three divisions (16,000), by a wide circuit around the Federal right to fall upon its rear with his now well-known vigor, and leaving Magruder with barely 25,000 men to shield Richmond from the mass of McClellan's force. Lee threw Longstreet with 40,000 men forward to a direct attack upon the Union right under Fitz John Porter, late in the afternoon of June 26. Under this attack Porter's corps was pressed back behind Beaver Dam Creek, where he found stable standing-ground; but retreating that night to the stronger position about Cold Harbor, where, reinforced, he successfully withstood all assaults until the full weight of Jackson's turning movement fell upon and overpowered him, driving his shattered divisions across the Chickahominy, with the loss of twenty cannon and many small-arms. The wise audacity of Gen. Lee's plan of attack gave him the field, but the nature of the ground enabled McClellan, in spite of the extreme demoralization of his troops following the disaster, to effect a consummate retreat, though hard pressed at every step in the several affairs of June 28, 29, and 30, to the shelter of naval support in James River and the almost impregnable position of Malvern Hill, the attack upon which was repulsed on July 1 with a heavy Confederate loss. But Richmond was now virtually relieved from the risk of an attack from McClellan and the quarter of James River. A fresh Federal army having been massed soon after in the vicinity of Culpeper Court-house, under Gen. Pope, in menace of an attack from that direction, Jackson was at once detached to confront and stay this fresh danger, and the battle of Cedar Run was won by him on Aug. 9. Ten days later, leaving a force to secure Richmond from a *coup de main*, Lee was in movement with his main army for a stroke at Pope—a movement of signal audacity in execution that ended in the complete discomfiture of his opponent in the notable actions of Aug. 29 and 30, 1862—or second battle of Manassas—with the loss of 30 pieces of artillery and large stores of war material. Following this brilliant success, Gen. Lee threw his victorious corps swiftly across the Potomac into Maryland as far as Frederick Town—an operation more boldly and skillfully conceived than thoroughly carried out in accordance with the offensive objects for which it was undertaken. For while the detached operation entrusted to Jackson resulted in the important capture of Harper's Ferry, so much of Lee's army was diverted to that end for so long a period that in the interval, thrown virtually on the defensive, the Confederate general gave McClellan time to concentrate his masses upon and fight him at Antietam (Sept. 17, 1862) when separated from a material part of his army, and with Jackson present, with two of the previously detached divisions, only under the stress of a severe forced march. Under these circumstances Lee was, therefore, unable to profit decisively from the advantage he gained at the close of that combat, and after standing in position awaiting attack from his now strongly reinforced opponent, he found it expedient to abandon the campaign and retire into Virginia, the major object of his movement having unquestionably been sacrificed to the minor. The Union army having been reorganized during the next month, and a new commander (Gen. Burnside) given it on the 7th of November, he took the offensive with Richmond again as the objective, but Aquia Creek as his base, and reached the N. bank of the Rappahannock at Fredericksburg on the 17th of that month, to find Gen. Lee in due season ready to dispute his further march. Then came the 13th of December, with the bloody conflict of Fredericksburg, which afforded another illustration of the high capacity of the Confederate general as a defensive soldier. With another change of Federal commanders came the battle of Chancellorsville (May 2-4, 1863). Lee, as habitual to him, forecasting his adversary's plan, was now able to give another victory to his supremely confident, trustful army, even though his strongest corps, or one-third of his force, was detached at the time. As the whole field or theatre of war stood, after that battle, for the Confederates in all quarters of their territory, it would seem clear that a comprehensive strategy must have indicated the employment of their available resources in a different

operation from that which Lee next essayed, as is alleged, entirely against his own judgment and advice, under the orders of his political superior—that is to say, the campaign ending in mortal disaster to the Confederate cause on the field of Gettysburg (July 1-3, 1863), from which he withdrew shorn of some 27,000 of the very élite of his army, as well as of its prestige of habitual success, which had made it wellnigh invincible. But, though beaten and foiled, he withdrew and repassed the Potomac with consummate method and skill, leaving his opponent wholly unwilling to seriously adventure the offensive in turn for ten months. By that time, however, Lieut.-Gen. Grant, made commander-in-chief of the armies of the U. S. with absolute powers, took the field against Gen. Lee with an army of over 140,000 men, thoroughly inured to war. To meet this formidable general and army Lee stood as resolutely ready as on all previous occasions, but his redoubtable corps were reduced to within 55,000 infantry and artillery. The object of Grant was to turn his adversary's position, and reaching an open field beyond the Wilderness, upon Lee's communications, force him to fight for their integrity at mortal disadvantage. But altogether too wary and far-sighted to be thus out-manœuvred, Gen. Lee became himself the assailant at the threshold of the operation, when his adversary was entangled and his corps dangerously separated in the dense recesses of the Wilderness, on May 5, 1864, and inflicted a loss of 20,000 men. On the next day, Grant essaying to move, Lee was again the assailant, with the advantage of the affair on his side. Assailed in turn, however, on May 7, 10, and 12, in tentative operations, Lee's position was found impregnable, so that at the close of the third week of the campaign the aggregate of Federal losses rose above 40,000 officers and men. Grant having skillfully crossed the North Anna on May 21, the gain was immediately so neutralized by the position in which he found his adversary awaiting his further march that the Union army had to retrace its steps, and, led by a wide circuit, was carried to the scene of McClellan's disaster at Cold Harbor within ten miles of Richmond. There, reinforced by Smith's corps, 16,000 strong, making the sum-total of reinforcements 97,000 men added to his army between the 12th and 31st of May, 1863, while the Confederates had been strengthened, all told, by less than 20,000 men. Gen. Grant on June 3 adventured a direct assault upon Lee's intrenched lines, and it may be said that the annals of war record no more sanguinary repulse than that which was then inflicted. It is noteworthy that by this time the casualties of the Union army reached 60,000, including 3000 officers; and it remained for Gen. Grant to seek a new line of approach to his objective: that is to say, throwing his army across the James and S. of the Appomattox on June 14 and 15, 1864, he opened a new campaign at Petersburg of 300 days. Looking at the force employed against him during all that period, and his own comparatively petty resources, Lee's stand at Petersburg has no parallel in war, and the details of that masterly defence, properly related, will form one of the most instructive lessons in the art of war. From the very outset, notwithstanding his great advantages in all war-resources, in the presence of such an adversary as Lee, Gen. Grant found it expedient to shelter his forces behind strong intrenchments. In the course of the ten months of struggle and combat which ensued, from a concurrence of adverse circumstances elsewhere than at Petersburg, Lee, foreseeing the ultimate issue, would have evacuated that position early in 1865, but his political superiors were unwilling to give up Richmond until forced away by Federal arms. Reduced to about 40,000 rifles in his trenches, on Mar. 25, 1865, the Confederate general, with that astute audacity which had come to be characteristic, essaying the offensive, delivered a strenuous, skillfully-aimed stroke in his finest manner at a vulnerable point in his opponent's lines; but at the critical moment the supports quailed, and the enterprise miscarried, with a loss which he could ill afford. Now Grant in turn massed two corps and all his cavalry for a counter-stroke at Lee's right flank. But before the blow fell, the Confederate general, concentrating 15,000 men, again smote his menacing adversary with wellnigh "his wonted success," Swinton states, as also that a Federal disaster was barely escaped. But the terrible blow fell soon after upon the Confederate lines at Five Forks, which made them untenable. So Lee, retreating, was pressed with such vigor and skill that his surrender at Appomattox was the absolute necessity of the campaign. And although that capitulation embraced only some 27,000 men, but 8000 of whom were armed, it brought the war of secession in all quarters to an immediate close so soon as the event was known.

Judged critically, it may be said that rarely has a commander been so sharp-sighted and quick to detect the purposes of an opponent as was Gen. Lee. Never surpassed,



if ever equalled, in the art of winning the passionate, personal love as well as admiration of his troops, he acquired and held an influence over his army to the very last instant, founded on a supreme trust in his judgment, presence, and skill, coupled with his cool, stable, equable courage, which enabled him to make it relatively the incomparable instrument of his plans. In the crisis of disastrous battle, as at Gettysburg, and also on that day at Petersburg when the whole Federal army seemed surging in upon him through the breach in his lines opened by the exploded mine, Gen. Lee was seen to be as placid and cheerful, as free from anxiety and clear-headed, as at the close of a day of victory. Strategically defective and ill-conceived, yet the Gettysburg campaign was executed by Lee with a masterly knowledge of the theatre of operations, unsurpassed celerity, and secrecy of movement, and with all possible care of his communications; but it must be added that in that battle, as also previously in the sanguinary assault upon McClellan in 1862 at Malvern Hill, there was a serious lack of that tactical concentration of his masses on the part of the Confederate general which was essential to success. It is also apparent that he was wanting in the talent of administration which distinguished Wellington; unlike whom also, with all his military virtues, Lee was careless of the discipline and training of his army. From temperament, likewise, he gave way, as no general so placed ever should consent to do in matters of supreme military concern, to his political chief, and hence not only undertook false campaigns, like that of the second invasion, and maintained too long a position, like that of Petersburg in 1865, but he failed to throw the decisive weight of his great personal and professional authority against that settled policy of wide dispersion of its forces which proved so fatal to the Confederate cause. For the proper measure of Gen. Lee's rank among the soldiers of history, however, seeing what he wrought with such resources as he had, under all the disadvantages that ever attended his operations, it were fair to suppose what he might have achieved in campaigns and battles with resources at his own disposition equal to those against which he invariably contended.

In person, Robert E. Lee was of remarkable manly beauty, with a distinguished martial appearance and carriage. Left at the close of the war without estate or profession, he accepted with alacrity the presidency of Washington College at Lexington, Va., to which simple employment he gave the same devotion, with the like high sense of duty, which had distinguished the captain of engineers and the commander of the chief army of one of the belligerents in a mighty civil war. At the same time, not un mindful of the large influence he had acquired over his section, he lost no opportunity to use that influence to soften and assuage the passions and animosities of his people. "Madam, do not train up your children in hostility to the government of the U. S.," are authentic characteristic words which he uttered to one widowed by the war, who in bringing her son to him for education had spoken bitterly. But sixty-three years of age, with apparent promise of prolonged health and a life of usefulness and influence, he was taken suddenly ill, and in a fortnight d. Oct. 12, 1870, at Lexington. THOMAS JORDAN.

**Lee (SAMUEL D. D., b. at Longnor, Shropshire, England, May 14, 1782;** received his first instruction at a charity school, and was at the age of twelve apprenticed to a carpenter. While laboring at this trade he acquired the chief classical, Oriental, and modern languages, and at the age of thirty was enabled to enter Queen's College, Cambridge, as a student, graduating in due course, taking orders in the Church, becoming in 1819 university professor of Arabic, and regius professor of Hebrew in 1821. He published a *Hebrew Grammar*, which had a wide circulation in England and America (1820), translations of the *Parables of Our Saviour* (1822), and of the *Book of Job* (1827), and a *Hebrew and English Lexicon* (1840). D. at Barley, Hertfordshire, Dec. 16, 1852.

**Lee (SAMUEL PHILIPS, U. S. N., b. Feb. 12, 1812, in Virginia;** entered the navy as a midshipman Nov. 22, 1825; became a passed midshipman in 1833, a lieutenant in 1837, a commander in 1839, a captain in 1852, a commodore in 1866, a rear admiral in 1870; retired from active service Feb. 12, 1873. Commanded the *Onondaga* with distinguished gallantry at the passage of Forts Jackson and St. Philip and capture of New Orleans, "driving off the assailants of the *Varuna*, and preventing her officers and crew from being captured by the Confederates." From 1862 to 1864 commanded the North Atlantic blockading squadron, and from 1864 to 1866 the Mississippi squadron. From 1866 to 1867 president of the board to examine volunteer officers for admission into the navy; 1868 to 1870 chief signal-officer of the navy; 1870 to 1873 in command of the North Atlantic fleet. FOXHILL A. PARKER.

**Lee (SARAH WALLIS, b. in Colchester, England, in 1791;** married Thomas Edward Bowdich, whom she accompanied to the Gold Coast of Africa in 1811, residing there until 1822. Mr. Bowdich was employed as a commissioner to conclude a treaty with the king of Ashantee in 1810, and with the aid of his wife published in 1819 a work entitled *A Mission to Ashantee*. He d. at Bathurst, Isle of St. Mary, Jan. 10, 1824. Mrs. Bowdich published in 1825 *Stories of Strange Lands*, in which she narrated with great effect her observations in Africa, edited three illustrated works on mammalia, birds, and shells, written by her late husband, and prepared other original works of the same character, which gave her an honorable name in the annals of British science. Mrs. Bowdich resided many years in Paris, where she enjoyed the friendship of Baron Cuvier and other distinguished naturalists, and married her second husband, Mr. Lee. D. in 1856.

**Lee (SOPHIA, b. in London in May, 1750,** daughter of an actor, and in 1780 wrote a comedy, *The Chapter of Accidents*, which was brought out with success at the Haymarket Theatre. The profits of this play enabled Miss Lee to establish at Bath (1781) a seminary for young ladies, which was for many years conducted by her along with her sister (see LEE, HARRIET), with whom her name is inseparably connected in the authorship of the celebrated *Canterbury Tales*. Two only of these tales, and the introduction, were written by Harriet. She wrote two novels and a tragedy, which were moderately successful, and another comedy, which proved a failure. D. at Clifton, near Bristol, Mar. 3, 1824.

**Lee (THOMAS), b. in Virginia about the beginning of the eighteenth century;** was third son of Richard Lee, a member of the council and grandson of Richard Lee, the founder of the family in America, who as a Cavalier played a distinguished part in Virginia along with Berkeley in securing the allegiance of that colony to the Stuarts. Thomas Lee succeeded to the ancestral estate at Stratford, Westmoreland co., on the "Northern Neck;" became president of the council; and his commission as governor had just been made out when he d. in 1750. He had married Hannah, daughter of Col. Philip Ludwell, a member of the council, and by her had six sons, all of whom were distinguished for their public services during the Revolution: Philip Ludwell, a member of the council; Thomas Ludwell, b. about 1730, member of the house of burgesses, of the conventions of 1775 and 1776, of the Committee of Safety, and one of the judges of the supreme court, d. soon after, aged 47; RICHARD HENRY, FRANCIS LIGHTFOOT, and ARTHUR (see those names); and William, the fifth son, b. about 1737; was agent of Virginia in England; elected sheriff of London in 1773 and alderman in 1775; afterwards diplomatic agent of the U. S. at the Hague, Vienna, and Berlin; recalled in 1779, and d. at Greenspring, Va., June 27, 1795. In the third and fourth generation from Thomas this family, allied by descent and intermarriage to the Lees of military celebrity, has produced several influential citizens.

**Lee (WILSON), b. in Sussex co., Del., in 1761;** became an itinerant Methodist in 1784; travelled and preached in Kentucky, and after 1794 went to New England, and shared with Jesse Lee in the founding of Methodism there. D. in Anne Arundel co., Md., Oct. 11, 1804. ABEL STEVENS.

**Lee Centre,** post-tp. of Leo co., Ill. Pop. 1028.

**Lee Centre,** post-v. of Leo tp., Oneida co., N. Y., 9 miles N. W. of Rome, has some manufactures. Pop. 335.

**Leech** [Ang.-Sax. *læce*], a name vaguely applied to various representatives of the order *Bdelodera* or *Sanguisugaria*, but especially employed for the species of the family *Hirudinidae*. This group has a number of genera and species, and all of them have in common an elongated, flattened, and transversely annulate body, which is narrowed anteriorly and obtuse posteriorly; the anterior extremity has an oval sucker, and within the mouth are three jaws converging backwards and denticulated in their margins; ten inconspicuous eyes are developed on the upper lip; the posterior extremity has a large round, obliquely-inserted sucker. The sexes are united in one individual. The best known species are the official leeches (*Hirudo officinalis*, *H. medicinalis*, and *H. tricolor*). Leeches afford the least painful means for the local abstraction of blood. They take from three to five times their weight in blood, six generally being applied for every fluid ounce of blood to be lost. To disgorge the blood, apply salt or squeeze them. The medicinal leech is cultivated in Europe, being kept in ponds in natural meadows, and increase rapidly, horses, cows, etc. being driven in to feed them, or the leeches immersed in warm blood deprived of fibrine. They are kept in clear salt water in jars, and are sensitive to change of weather. THOMAS COLE.

**Leech Jones, b. in London in 1817.** His father for many years kept the London Coffee-house on Ludgate Hill.



Leech was educated at Charter-house, and was a student at the Royal Academy. As an artist he was neglected. His genius appeared in sketches of character for *Bell's Life in London*; in 1847 he began to work as a designer for *Punch*, and for eighteen years made that journal famous among journals by the wit, originality, versatility, and humor of his pencil. In 1861 a rich Manchester firm enabled the artist to reproduce many of his drawings by a newly-invented mechanical process in large size and colored. These were exhibited at Egyptian Hall. Leech d. Oct. 30, 1864. O. B. FROTHINGHAM.

**Leech**, tp. of Wayne co., Ill. Pop. 1258.

**Leechburg**, post-b. of Armstrong co., Pa., on the Pennsylvania Central R. R. and Pennsylvania Canal, 35 miles N. E. of Pittsburgh, has 4 churches, 2 hotels, 1 weekly newspaper, 1 bank, an academy, a flouring-mill, 8 stores, a wagon and carriage manufactory, tin-factory and rolling-mill; the two latter use for fuel a natural gas obtained from a well 1200 feet deep. A fine school building is now (1875) being erected at a cost of \$20,000. Pop. 368.

J. F. ROBERTSON, ED. "ENTERPRISE."

**Leech Lake**, in Cass co., Minn., is 20 miles long, 16 miles wide, and discharges its waters into the Mississippi by the Leech Lake River. Elevation, 1330 feet. It is in a well-timbered region, inhabited by the Leech Lake Indians, a band of Chippewas.

**Lee Creek**, tp. of Crawford co., Ark. Pop. 654.

**Leeds**, municipal and parliamentary borough of England, and one of its leading manufacturing cities, situated in the West Riding of Yorkshire, on the northern bank of the Aire, here crossed by two stone and four iron bridges, which connect the city proper with its two large suburbs, Hunslet and Holbeck, situated on the southern bank of the river. Most of the streets are narrow and crooked, though generally well paved and well lighted. The western part of the city, however, contains several fine streets lined with elegant houses. The most remarkable of the public buildings are—St. Peter's church, rebuilt in 1838, and the largest of the thirty-six churches of the city; the town-hall, with several fine statues; the grammar school, the corn exchange, the cloth hall, the borough jail, etc. The city has many benevolent and educational institutions, such as the Mechanics' Institute, founded in 1824, with a library of 13,000 vols.; the School of Art, which annually gives instruction in drawing to 3000 persons; the Workingmen's Institute, numbering about 2000 members, etc. As a manufacturing place Leeds was conspicuous already in the sixteenth century, and the products of its industry were at that time nearly the same as now—namely, woollens, linens, and leather. But at first it was only the coarser kinds of woollens which were manufactured at Leeds, while now its cloths can compete in fineness and elegance with those of any other place. About 12,000 hands are employed in this kind of manufacture, and a similar number in that of linens. Of late the iron manufactures have grown very considerably; machinery is annually made to the value of about £2,000,000. Near the city are the beautiful ruins of Kirkstall Abbey. Pop. 151,850 in 1841; 171,805 in 1851; 207,153 in 1861; 259,212 in 1871.

**Leeds**, county of Ontario, Canada, bounded on the S. E. by the St. Lawrence River. Area, 805 square miles. It is in part united for judicial and other purposes with Grenville co. It is traversed by the Grand Trunk and the Brockville Railways. Cap. Brockville. Pop. of Leeds and Grenville cos., including Brockville, 57,918.

**Leeds**, post-tp. of Androscoggin co., Me., on the Maine Central and the Androscoggin R. Rs. It has 5 churches, good water-power, and some manufactures. Pop. 1288.

**Leeds**, post-v. of Northampton tp., Hampshire co., Mass., on Mill River and on the New Haven and Northampton R. R., 5 miles N. W. of Northampton. It was the seat of important manufactures, but was almost entirely destroyed, with several other villages, May 6, 1874, by the bursting of the Williamsburg reservoir.

**Leeds**, post-v. of Catskill tp., Greene co., N. Y., at the falls of Catskill Creek, which furnishes water-power. It has 2 churches and various manufactures. It is 4 miles N. W. of Catskill. Pop. 847.

**Leeds**, post-tp. of Columbia co., Wis. Pop. 1098.

**Leeds** (JOHN), b. in Bay Hundred, Talbot co., Md., May 18, 1705; was for forty years a clerk of the county court and a judge of the Provincial Court; received in 1760 a commission to supervise the returns of Mason and Dixon of the boundaries of Maryland and Pennsylvania; published in 1769 in *Philosophical Transactions*, *Observation of the Transit of Venus*, and while surveyor-general of Maryland d. at Wade's Point Plantation, in Mar., 1790.

**Leek** [Ang.-Sax. *leac*], the *Allium porrum*, a liliaceous

plant of the onion genus, the mildest in flavor of that whole group of plants. It is extensively cultivated in the kitchen gardens of Wales, Scotland, and other parts of Europe. There are many varieties, some of which are much esteemed. The lower part of the stem is the part eaten. The juice made into a syrup is a good diuretic and stimulant expectorant medicine, valued in domestic practice.

**Leek**, town of England, in the county of Stafford, on the Churnet. It has some silk manufactures and many good educational institutions. Pop. 10,045.

**Leelanaw**, county of Michigan, bounded W. by Lake Michigan and E. by Grand Traverse Bay. Area, 310 square miles. It is very level, and abounds in lakes and forests. Grain and potatoes are the chief products. Cap. Northport. Pop. 4576.

**Leelanaw**, tp. of Leelanaw co., Mich., on Lake Michigan. Pop. 830.

**Leemans** (CONRADUS), b. at Zalt Bommel, in the province of Gelderland, Apr. 28, 1809; studied from 1826, first theology and then archaeology, at the University of Leyden, and was appointed first conservator at the Museum of Antiquities of that city in 1835. He was eminently successful in gathering together all the archaeological treasures which the city possessed, and arranging them in proper order, and in 1839 he was made director of the museum. In 1859 he was furthermore commissioned by the government to found an ethnographical museum, with which Siebold's celebrated Japanese collection was incorporated. Most of Leemans's writings are critical and historical descriptions of objects of the museum, but more especially on Egyptian antiquities; among which are his critical edition of the *Hieroglyphica* of Horapollo (1835), and his *Egyptische Monumenten van het Museum van Aandheden te Leyden* (1835-65).

**Leepertown**, tp. of Bureau co., Ill. Pop. 387.

**Leer**, town of Prussia, in the province of Hanover, on the Leda, near its junction with the Ems, has several sugar-refineries, cotton-weaving and printing establishments, tobacco manufactures, breweries, distilleries, and a considerable boat-building business. Pop. 8932.

**Lee's**, tp. of Columbus co., N. C. Pop. 631.

**Lees** (FREDERICK RICHARD), b. at Meadow Hall, near Leeds, England, Mar. 15, 1815; devoted himself from an early age to the temperance cause, and worked with success both by lectures and writings. He published *The Metaphysics of Quærens Dissected* (1835-39), *The History of Alcohol* (1843), and *Treatise on Logic, or the Method, Means, and Matter of Argument*. In 1845 he started the *Truth-Seeker in Literature, Philosophy, and Religion*, a periodical which continued for several years. In 1853 he represented the British temperance associations of the N. of England at the world's temperance convention in New York, and in 1860 he was presented with a testimonial of 1000 guineas by the friends of temperance in Great Britain.

**Leesburg**, post-v. of Plain tp., Kosciusko co., Ind., on the Cincinnati Wabash and Michigan R. R. It has an active trade. Pop. 320.

**Leesburg**, post-v. of Harrison co., Ky. Pop. 144.

**Leesburg**, post-v. of Highland co., O., on the Marietta and Cincinnati R. R., 64 miles N. E. by E. of Cincinnati. Pop. 508.

**Leesburg**, tp. of Union co., O. Pop. 1410.

**Leesburg**, post-v. and tp., cap. of Loudon co., Va., on the Washington and Ohio R. R., 38 miles N. W. of Washington, D. C., lies in a fertile agricultural district near the E. base of the Kittoctan Mountain and 3 miles from the Potomac River; has 6 churches, 1 national bank, 2 hotels, 2 weekly newspapers, 1 male and 1 female seminary, several fine schools, a steam saw and planing mill, and the usual number of mercantile and industrial establishments. The streets are well paved and lighted, and the court-house square is a large and beautiful enclosure, laid out with walks and shade trees. There are numerous and flourishing lodges of benevolent societies. The battlefield of "Ball's Bluff" lies 2 miles from the town. Pop. of v. 1144; of tp. 4075. B. F. SHEETZ, ED. "MIRROR."

**Lee'ser** (ISAAC), b. in Neukirch, Westphalia, Dec. 12, 1806; came to Richmond, Va., in 1824; was at first engaged in commerce, but in 1829 became rabbi of the principal Jewish synagogue in Philadelphia, and wrote several works relating to Jewish history and doctrine, among which are *The Jews and the Mosaic Law* (1833), *Discourses, Argumentative and Devotional* (1836), *Portuguese Form of Prayers* (1837), *Descriptive Geography of Palestine*, from the Hebrew of Rabbi Joseph Schwartz, and a *Translation of the Holy Scriptures* (Old Testament) from the original Hebrew (1853). In 1843 he established a monthly maga-



zine, *The Occident and American Jewish Advocate*; retired from the ministry in 1850. D. at Philadelphia Feb. 1, 1868.

**Lee's Mill**, tp. of Washington co., N. C. Pop. 1522.

**Lees'port**, post-v. of Ontonagon tp., Berks co., Pa., on the E. side of the Schuylkill River, 8 miles N. of Reading. Its railroad station (Reading R. R.) is across the river in Bern tp.

**Lee's Summit**, post-v. of Jackson co., Mo., on the Missouri Pacific R. R., 2.9 miles W. of St. Louis and 24 miles S. E. of Kansas City, has 5 churches, 1 weekly newspaper, 1 hotel, 1 graded school, 1 grain elevator, and 20 business houses. It is one of the garden-spots of Missouri. Pop. about 1000. L. D. CARMLEY, P. O. "LEDGER."

**Leet**, tp. of Allegheny co., Pa. Pop. 629.

**Leete** WILLIAM, b. in England early in the seventeenth century; came to New England in 1637; was an early settler of New Haven, Conn.; a founder of the town of Guilford in 1639; was for many years chosen assistant and deputy governor, and was governor of Connecticut from 1661 to 1665. He was frequently a commissioner of the colonies between 1655 and 1679; befriended and entertained the regicides Goffe, Whalley, and Dixwell in Mar., 1661; was again chosen governor in 1676, and annually re-elected until his death, at Hartford Apr. 16, 1683.

**Leeto'nia**, post-v. of Salem tp., Columbiana co., O., at the junction of the Pittsburgh Fort Wayne and Chicago and Great Western R. Rs., 6.5 miles N. W. of Pittsburg, has 4 churches, 1 bank, 1 weekly newspaper, 3 hotels, numerous stores, 1 rolling and 1 planing mill, 4 blast furnaces, extensive coal-mines and coke-ovens, a nail and bolt mill, boiler-works, a foundry and machine-shop, lumber-yards, and a fine school building. It is situated in a rich farming country, and was incorporated in 1865. Pop. 1200. W. HARRY WATSON, ED. "REPORTER."

**Leeu'warden**, town of the Netherlands, in the province of Friesland. It is 10 miles distant from the sea, but in the fourteenth century it lay on the shore of a deep inlet of the sea, which by degrees has been filled with banks of sand and mud and become solid ground. The city is intersected by canals, and is neatly built, with many elegant houses. Among its educational institutions and scientific societies is particularly notable its society for Frisian history and language. Its trade in cattle, swine, butter, flux, and spirits, and its manufactures of linen and paper, are quite considerable. Pop. 25,450.

**Leeu'wenhoek, von** (ANTONIES), b. at Delft, Netherlands, Oct. 24, 1632; went in his sixteenth year to Amsterdam, and entered a merchant's office, but returned after the lapse of a few years to his native city, and devoted himself exclusively to the study of natural science. He manufactured optical instruments, especially microscopes, and these he applied with the most brilliant success to his researches in physiology. His principal discoveries were that of the red globules of the blood in 1673, that of the infusorial animalcules in 1675, and that of the spermatozoa in 1677. By these discoveries he attracted general attention, and established connections with all learned men and learned societies of his age, such as Leibnitz, the Royal Society of London, and others. His writings were published partly in book-form at Leyden, partly as communications to scientific journals, *Acta Erudita*, *Philosophical Transactions*, etc., and collected in 1724 in 4 vols. under the title *Opera omnia, sive arena naturae opae exactissimum microscopium detectum*. D. at Delft Aug. 26, 1723.

**Leeward Islands**. See ANTILLES.

**Lefebvre** (FRANÇOIS JOSEPH), duke of Dantzic, marshal of France, b. at Ruffach, Alsace, Oct. 25, 1705; enlisted Sept. 10, 1773, in the French guard, and distinguished himself greatly by courage and resoluteness on several occasions during the Revolution. In 1792 he was made captain of the 13th infantry regiment, and his talents now developed very rapidly: in 1794 he was made a brigadier general. Having been appointed commander of the 17th military division, to which Paris belonged, he supported Napoleon on Nov. 9, 1799, and was made a marshal of France at the establishment of the empire. In the war against Prussia he also distinguished himself, especially by the siege and capture of Dantzic (May 26, 1807), whence he derived his title of duke. But his most brilliant exploit was his campaign in Spain in 1808. He took Bilbao, and defeated the English under Blake, Nov. 7. In 1814 he commanded the left wing of the army opposing the invasion of the allies, but after the abdication of Napoleon he submitted to the Bourbons and was made a peer of France by Louis XVIII., June 4, 1814. D. at Paris Sept. 14, 1820. He had twelve sons, who all died before him.

**Lefebvre-Desnouettes** (CHARLES), COUNT, b. at Paris, France, Sept. 14, 1773; served in the French army in

Belgium under Dumouriez in 1792; was aide-de-camp to Napoleon at Marengo; distinguished himself at Austerlitz; became brigadier in 1806, and general of division in 1808; began the siege of Saragossa in Spain; was taken prisoner by the English; escaped from England; took a prominent part in the Austrian (1809), Russian (1812), and German (1813) campaigns, and in the defence of France from invasion (1814); was made a peer by Napoleon in 1815; fought at Fleurus and at Waterloo; was condemned to death by the royalists, but escaped to the U. S.; joined with Baron Lallemant in the attempt to found a colony of French refugees in Alabama; was in correspondence with Napoleon for the purpose of effecting his rescue from St. Helena, and received 150,000 francs by the will of that monarch, and while returning to Europe was lost at sea near Kinsale, Ireland, Apr. 22, 1822.

**Lefèvre** (PETER PIER), D. D., b. at Roulers, in Belgium, Apr. 30, 1804, and educated in Paris; came to the U. S. in 1828; was ordained a Roman Catholic priest at St. Louis in 1831; was stationed at New Madrid, Mo., and afterwards became a travelling missionary in the Northwest. In 1844 he became bishop of Zela in *partibus* and coadjutor of Detroit. He was active in the establishment of charitable, religious, and educational institutions. D. at Detroit, Mich., Mar. 4, 1869.

**Lefèvre** TANAGUI (commonly known as **Tanaquil Faber**, from the Latinized form of his name), b. at Caen in 1615; educated at the Jesuit College at La Flèche, where he devoted himself especially to philosophy and classical literature. Cardinal Richelieu appointed him inspector of the press of the Louvre. After the death of Richelieu his salary was irregularly paid, and he was obliged to sell his library. Having resigned his position, he retired to Langres, afterwards to Preuilly, where he embraced Protestantism; was soon after appointed professor in the Reformed academy of Saumur. His works were chiefly annotated editions of the classic authors, e. g., of Longinus, Ælian, Lucretius, Horace, Phædrus, Terence, Anacron, Sappho, and several others. He translated also into Latin iambs the *Fables of Lokman* (Saumur, 1673), and wrote *Vies des Poètes grecs* and *Méthode pour commencer les Humanités grecques et latines*. D. Sept. 12, 1672. He left one son and two daughters, one of whom was Madame Dacier. H. DRISLER.

**Iefkosi'a**, or **Nicosia**, the ancient *Leucosia*, the capital of Cyprus, and situated nearly in the middle of the island. It is surrounded with walls, and has many interesting and elegant buildings, chiefly Christian churches transformed into mosques. It has some manufactures of silk, cotton, and leather. Pop. 18,000.

**Le Flô** (ABOLPHE CHARLES EMMANUEL), b. at Lesneven, France, Nov. 2, 1804; received his military education at St. Cyr; distinguished himself at the siege of Constantine in 1837, and on the expedition against Medeah in 1840; was made a brigadier-general after the February revolution, and sent as the ambassador of the republic to St. Petersburg. Sept. 7, 1848, he was elected a member of the Constituent Assembly; returned in the beginning of 1849 to Paris, and was at first an adherent of Louis Napoleon, but became later on one of his adversaries. He was one of the members who in Nov., 1851, proposed that the command of the army should rest with the Constituent Assembly. The proposition was not adopted, and shortly after the *coup d'état* he was arrested. By a decree of Jan. 9, 1852, he was banished, but in 1859 he was permitted to return to France, where he lived in retirement till the fall of Napoleon, Sept., 1870. During the Revolution he became minister of war, and sat as a member for Brest in the National Assembly at Bordeaux, but resigned in June, 1871, his office in the ministry, and went again to Petersburg as ambassador. In spite of the high positions which he has held since 1870, the part he has played in public life is nevertheless not very important. AUGUST NIEMANN.

**Le Flore**, county of Mississippi, traversed by the navigable Yazoo River. Area, 614 square miles. Much of the surface is subject to overflow, but it is very fertile. It has been formed since the census of 1870. Cap. McNatt.

**Lefort** (FRANÇOIS), b. at GENEVA in 1696, of Scotch descent, and was early placed in a merchant's office in Hamburg. Thence he ran away in his fourteenth year, came to Marseilles, and enlisted in the Swiss guard in the French service. In 1674 he left France on account of a duel; entered the service of the Netherlands; distinguished himself at the siege of Audenarde, but, tempted by the golden promises of a Russian recruit, he went in 1675 through Archangelsk to Moscow, where he first held a position as secretary to the Danish ambassador, and then became a captain in the Russian army. In 1682 he became acquainted with the czar, Peter the Great, at that time only ten years old. He became his teacher, soon also his friend, and after



the revolution of 1689, which made Peter the Great sole ruler of Russia, and in which Lefort had done the czar great service, his influence became almost unbounded. To some extent the whole direction of Peter's remarkable reign was given by Lefort, and his influence can be distinctly traced out in many of the most important military and civil measures which the czar carried through. But he died early, Mar. 12, 1699, in consequence of the frightful dissipation which formed the czar's daily habits.

**Leftwich** (Gen. John), b. in Bedford co., Va., in 1759; was a soldier of the Revolution; fought at Germantown and Camden, and was severely wounded at Guilford; commanded a brigade under Harrison at Fort Mifflin in the war of 1812; became a major general of militia, and was often a member of the Virginia legislature. D. in Bedford co. Apr. 20, 1846.

**Legacy** [Lat. *legare*, to "bequeath"], a bequest or gift of personal property by will or testament. A legacy is to be distinguished from a devise, which is a gift or conveyance by will of real estate. Legacies are of three kinds—general, specific, and demonstrative. A legacy is said to be general when it does not amount to a bequest of any particular portion of, or article belonging to, the personal estate of the testator, as distinguished from all others of the same kind. A specific legacy, on the contrary, is a bequest of specified property, which is particularly designated or described, so as to be definitely distinguished from the rest of the testator's estate. Thus, a bequest of a sum of money, the amount of which is named, is a general legacy, while a bequest of all the money which is contained in a certain box or other particular receptacle is specific. A bequest of a horse, of silver plate of a certain named value, of a library, of clothing, or of any article described in this indefinite way, would be a general legacy; but a bequest of the horse in the testator's stable, of all the plate which should be in a certain house, of a library which the testator had in a particular room, of the clothing which he had worn, etc., would be a specific legacy. If there were a general legacy of a chattel, as of a horse, it would be valid, even though the testator had no property of the sort, and the executor would be obliged, if there were sufficient assets, to procure an article of the kind mentioned, in order to meet the bequest. But when a legacy is specific, only the particular property designated is to be given to the legatee, and if the testator owned no such property the legacy fails. General legacies are sometimes termed pecuniary legacies, but the designation is inaccurate, as specific legacies may also be pecuniary, as the examples already given indicate. A bequest of money will not, however, be a specific legacy because it is directed to be applied to a specific purpose, as for the purchase of particular articles for the legatee. That it may be specific there must be a sufficiently particular description in the will, so that the exact fund shall be given to the legatee or applied to his use which the testator allots to him. A demonstrative legacy is a bequest of a certain amount of money to be paid out of a particular fund; as, for example, a bequest of \$500 payable out of the proceeds of the sale of certain property. This form of legacy is intermediate between a general and a specific legacy, and partakes of the legal characteristics of both. The importance of distinguishing between these various kinds of legacies is principally with reference to the doctrines of abatement and ademption which are applicable to the subject of legacies. By *abatement* is meant a proportional reduction of the bequests to various legatees when there are not sufficient assets to make full payment. It is the duty of an executor under a will to discharge all the testator's lawful debts before paying the legacies, upon the principle that "a man must be just before he is generous." All the personal assets may be applied, if necessary, to the payment of debts, even though property bestowed in specific legacies be used for this purpose. But if there be any residue after the indebtedness is satisfied, it is to be first applied to the payment of the specific legacies, then the demonstrative legacies are to be satisfied, and finally the general legacies. If there be insufficient assets to satisfy the legacies in either of these three classes successively, those in the same class will be reduced proportionally by the law of abatement. But the specific legacies are to be paid, even though other legatees are entirely or partly deprived of a share in the assets. Neither specific nor demonstrative legacies will abate with general legacies, unless the testator particularly directs that certain general legacies shall have precedence of those which are specific. In some cases general legacies of a particular character will be preferred to others of the same class. Thus, if there be any valuable consideration for the testamentary gift, as where a general legacy is given in consideration of a debt owing to the legatee or of the relinquishment of any right or interest, as of her dower by a widow, such legacy will

be entitled to a preference of payment over the other general legacies. After all the general legacies are paid, any residue of assets will pass to the residuary legatee, if one be named in the will, and if not will be distributed among the next of kin. (See *KIN, NEXT OF*.) A residuary legacy is so termed because it is a gift or allotment of this remainder by the will to some designated person. General legacies are never subject to abatement for the benefit of residuary legatees, and are to be paid in full if there are sufficient assets, even though they exhaust the entire residue of the personal estate. *Ademption* is an extinguishment or destruction of a legacy as a result of some change or loss of the property bequeathed, or of its non-existence, or it is the substitution of some other provision for the person named as legatee which is deemed a satisfaction of the legacy. The first part of this definition applies more appropriately to specific, the latter to general legacies. Thus, if the subject-matter of a specific legacy were never in the possession of the testator, or were not owned by him at the time of death, the legacy fails entirely, and the legatee has no claim against the testator's estate. A legacy of this kind is also ademed when the specific property designated, though it formed a part of the testator's estate at the time of making the will, was subsequently sold or otherwise disposed of by him, or so altered by him in form as to change its identity. Thus, if the thing specified were a gold cup, and the testator should have it made into jewelry, or if a piece of cloth were made into a garment, the gift to the legatee would be extinguished. So if a debt specially bequeathed be received by the testator, the legacy is ademed because the subject of it is extinguished. Ademption may also occur as a result of a removal by the testator of the articles bequeathed from one place to another. Thus, if the testator should bequeath all his furniture as being situated in a particular house, and afterwards remove it to another house, the legacy would fail. This would not be the case, however, if the goods were removed by reason of a sudden emergency, as to save them from fire, or if the removal were effected by fraud or without the knowledge or consent of the testator. An ademption may be partial, as where a portion of the property bequeathed is found among the assets of the deceased, but not the whole. A pledge or mortgage of the property by the testator is generally held not to occasion an ademption. In regard to the rule of ademption, demonstrative legacies differ from those which are specific. If the fund out of which a demonstrative legacy is to be paid is not in existence at the testator's death, the legatee will have a valid claim for satisfaction out of the general fund of assets, and the bequest to him will rank among the general legacies. Demonstrative legacies therefore resemble specific legacies by not being subject to abatement with the general bequests, while they are distinguished from them by not being subject to ademption. The doctrine of ademption is applied in courts of equity to general legacies when a parent or other person in *loco parentis* (i. e. standing in the place of a parent) bequeaths a legacy to a child or grandchild, and afterwards in his lifetime gives a portion or makes a provision for the same child or grandchild, without expressing it to be in lieu of the legacy. If this portion or provision be equal to or exceed the amount of the legacy, be certain and not merely contingent, and be a gift of the same general nature as the legacy, it will be deemed a satisfaction or extinguishment of the legacy. This is on the ground of the presumed intention on the part of the testator to substitute one portion for another which he has already made.

Legacies are further distinguished as vested or contingent. A legacy is said to be vested at the time of the testator's death, when the legatee acquires an absolute present right of present or future enjoyment. It is said to be contingent when the right of enjoyment depends upon the happening of some contingency. Thus, a legacy given to a man if he reaches the age of twenty-one will not vest until he attains that age; but if it be given to be payable when he becomes twenty-one, it vests at the testator's death, the right being absolute, though the time of enjoyment is deferred. A conditional legacy is a bequest whose existence depends upon the happening or not happening of some uncertain event by which it is either to take place or be defeated. (See *CONDITION*.) A contingent legacy is one form of a conditional legacy, the condition being that the legatee shall be alive at a particular period. (See *Williams on Executors*, ii. 903.) A cumulative legacy is one additional to a previous legacy given in the same will. It is sometimes an important question of construction, in determining the effect of a will, whether a second legacy is intended to be cumulative, so that the legatee is entitled to both, or is merely a repetition of a previous bequest, so that only a single gift is bequeathed. The general rule is that when the testator has not plainly declared a different intention, two or more legacies of the same article or the same amount of money given to



the same person in the same instrument amount to but a single gift. But bequests of different articles or of different amounts of money, or of the same amount in different instruments, will be generally considered cumulative legacies. Other distinctions between legacies are not of sufficient importance to require specific mention.

As a general rule, all classes of persons may be made legatees. But in England and in several of the States of this country it has been provided by statute that a legacy given to any subscribing witness to a will shall be void. This enactment has been made on account of the danger of permitting a will to be supported by persons who are beneficially interested in its contents. In New York this rule is modified by the provision that if the witness would have been entitled to a share in the estate in case the will was not established, he shall receive so much of this share as does not exceed the value of the legacy. Alien enemies also, at common law, are incapable of taking legacies. In England bequests to uses declared by statute to be superstitious are void; as, for example, to maintain a chantry priest or to pay for the saying of masses for the testator's soul, etc. But bequests for "charitable uses," as for the endowment of hospitals or the foundation of institutions of learning, and for like purposes, are generally favored, and will be deemed valid. But if such bequests are charged upon land, in opposition to the policy of the statute of 9 Geo. II., ch. 36, they will be void. In the U. S. the right to make bequests for charitable uses in general exists, unless controlled by statute. (See TRUSTS.) In this way legacies may be given to trustees, though not incorporated for charitable uses. Corporations may take property by bequest, so far as is consistent with the general purposes for which they were formed and the provisions of their charters. The right of a corporation to take personal property by bequest must not be confounded with the power to take land by will. (See WILL, CORPORATION.) In New York it is declared that no person, having a husband, wife, child, or parent, shall bequeath to a corporation more than one-half of his personal estate after the payment of his debts. (In regard to capacity to make a will and convey legacies, see WILLS.)

At common law, legacies are not payable until the expiration of a year from the time of the testator's death. This period is allowed to the executor to ascertain the nature and value of the property, to collect the assets, to determine the extent of the testator's indebtedness, to satisfy charges against the estate, etc. In this country, where the subject is frequently regulated by statute, the same limit is generally adopted. As a general rule, interest is to be reckoned upon the amount of the legacy, for the benefit of the legatee, from the end of the year when the legacy becomes payable. But where the legacy is given in payment of a debt due, it will bear interest from the death of the testator. So when a bequest is given by a parent to his child by way of maintenance, or by a husband to his wife in lieu of dower, interest will run from the time of death. If a legacy be given to an infant, the executor will not be justified, by the rules of common law, in paying it to the infant, or to the father or to any other relative of the infant, without the sanction of a court of equity. If payment should be made without such sanction to the father or relative, the executor might be compelled to pay the legacy again to the infant when he became of age. But in England it is now provided by statute that the executor may relieve himself from responsibility in such a case by paying the legacy into the Bank of England for the benefit of the infant. In this country it is sometimes provided by statute that legacies to a minor, if not of greater value than a certain specified sum, may be paid to the father for the minor's use. Such a statute exists in New York when the bequest is of less value than \$50. When it is of greater value, there are provisions for its payment to the general guardian or for its investment. A legacy given to a married woman must at common law be paid to the husband, unless it be given for the wife's separate use. This is true, even though the husband and wife are divorced *a mensa et thoro*. But courts of equity may compel a husband, on receiving a legacy given to his wife, to make a suitable provision for her support. Until such support is provided the executor may decline to pay him the legacy. In a number of the U. S. it is provided by statute that married women may take property by bequest in the same way as if they were single. Legacies given to one person in trust for another should regularly be paid to the trustee. When a legacy is bequeathed by a testator to his creditor, it is a general rule in equity that it is to be deemed as given with a view to the satisfaction of the debt, if the bequest be equal to or greater than the amount of the debt. This rule, however, is not favored, and will not be applied except under these special circumstances, and when the legacy is of the same general nature as the debt.

It is a general principle applicable to all legacies that the legatee does not become fully entitled to the bequest, so as to obtain a right of action in a court of law, until the assent of the executor is obtained. He cannot, accordingly, take possession of the legacy without such assent, and if he does, may be sued by the executor, who may recover the value of the property. The assent of the executor may be express or it may be implied; as, e.g., where he acquiesces in the taking of the property by the legatee. This rule, however, does not affect the right of a legatee to proceed to recover his legacy before a court of equity or a probate court.

It sometimes happens in the administration of estates that legacies are paid by executors before all the debts are satisfied. Debts may subsequently be proved of which the executor had no knowledge, and if there are no assets remaining to discharge them, he may bring a suit in equity to compel the legatees to refund to an amount equal to this indebtedness if he acted prudently in paying the legacies. The residuary legatee would first be compelled to refund, and next the general legatees. They would refund proportionally so far as was necessary to satisfy the debt. So if one legatee received full payment of his share, and it afterwards appeared that there was an original deficiency of assets to pay all the legacies in full, the other legatees may compel him to refund, so that all in the same class may receive proportional amounts upon their respective shares. This would not be the case, however, if the insufficiency of assets were attributable to the negligence, default, or misconduct of the executor, and the executor would himself be solely liable to make up the deficiency. If there be a contingent claim against the testator's estate, the executor may retain the assets from the legatees, if necessary, to meet the demand when the contingency occurs. If, however, the legatee offers to indemnify the executor against the future claim, the indemnity must be accepted and the legacy paid over. If payment be made without requiring a bond of indemnity, the executor will be liable for the satisfaction of the demand, when it becomes due, out of his own estate. But it is frequently provided by statute in the States of this country that claims against the estate of a deceased person must be presented within a short period after the issue of letters testamentary, if the executor give due notice of his appointment. The effect of such a notice varies in the different States. The statutes must be consulted.

Jurisdiction in regard to legacies is vested in general either in probate courts or in courts of equity. The jurisdiction in equity, independent of statute, is exclusive where the bequest involves the execution of trusts charged upon land, or where remedies of a peculiarly equitable nature are sought. No suit will be maintainable in a court of law, as has been seen, to recover a legacy unless it has been assented to by the executor. But in all cases where actions at law may be brought upon legacies the jurisdiction of equity is concurrent. (For the rules of law in regard to *lapsed legacies*; see the article LAPSE. In regard to the interpretation of bequests, see INTERPRETATION AND CONSTRUCTION. See also WILLS, EXECUTOR. The following treatises may be consulted on this subject: Williams on *Executors*; Jarman on *Wills*; Redfield on *Wills*; Roper on *Legacies*; Redfield on the *Law and Practice of Surrogates' Courts*; GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Legaré**—HUGH SWINNEY, b. in Charleston, S. C., Jan. 2, 1797; educated at Rev. Dr. Moses Waddell's famous Willington School; graduated at the College of South Carolina at Columbia in 1814; went to Europe to further prosecute his studies, chiefly law and literature; returned in 1820, and practised law in Charleston. In 1830 he was honored with the office of attorney general of the State, and at the same time had charge of the *Southern Quarterly Review*, published at Charleston, of which periodical he was chief editor, and by the contributions of his pen elevated it to the first rank of publications of its character in the U. S. In 1832 he was chargé d'affaires from the U. S. to Belgium, and from 1837 to 1839 was member of Congress from South Carolina; in 1841-42 filled the office of attorney general of the U. S., and also part of the time was acting secretary of state. D. suddenly at Boston, Mass., June 16, 1843, where he had gone in company with the President to attend the Bunker Hill celebration. His fine taste as a writer, his eminent acquirements as a scholar, and his learning and eloquence as a lawyer, were known and appreciated throughout the Union. His writings were collected and published in 1846 in 2 vols. 8vo. His sister, MARY SWINNEY LEGARÉ, Mrs. Bullen, b. about 1800, attained considerable success as a painter. She removed in 1819 to West Point, Lee co., Va., where she founded and endowed Legaré College for women. A. H. STEPHENS.

**Leg'ates and Legation.** The Latin word *legatus* was used of persons commissioned or acting as delegates, and



especially of ambassadors, of adjutants or deputy commanders of an army usually appointed by the senate, occasionally by commanders themselves, and of the emperor's provincial governors. In international law "legation" denotes embassy, the right of legation, the right to send an ambassador, or the whole subject of the nature and powers of public envoys; and "legate," the envoy or minister himself. The popes, borrowing the word from the old Roman state, called their principal envoys to the Catholic nations *legates a or de latere*. These were cardinals, but nuncios (from *nuntius*, a "messenger," an "envoy") were not, and thus were a lower grade of papal envoys. T. D. WOOLSEY.

**Lega'to** [It.], in music, a graceful movement in which the notes are connected by a uniform and gliding motion.

**Le'gend** [Lat. *legendum*, from *legere*, to "read"] appears to have been originally applied in the ecclesiastical dialect to portions of Scripture, and at a later period also to other writings of religious instruction or edification, appointed to be not chanted, intoned, or recited, but read in church services, and it therefore nearly corresponded in signification to the modern *lesson*. In the authorized breviaries used in the Romish Church the term *lectio* is now applied alike to extracts from Scripture and to lives of saints of post-apostolic ages, which are introduced into the church services in precisely the same way. The primitive Christian community consisted of two classes of persons—the ordinary or secular clergy, whether parochial or missionary; and the laity or people. The Scriptures, including many books now regarded by all sects as apocryphal, together with exegetical and doctrinal essays and narratives of the lives and deaths of saints, sufficed for the instruction of both classes alike. But besides the clergy and the laity there were, in the earliest ages of the Christian Church, as in most other Oriental religions, a certain number of anchorites or hermits living in seclusion not only from the profane world, but from each other, who do not, however, appear to have been usually consecrated to a religious life by clerical ordination, but self-devoted to mortification of the passions, penance, and ascetic exercises. When these recluses became sufficiently numerous to attract attention as a peculiar class, they acquired the name of *monachi* (Gr. *monos*, "single" or "alone"), whence our word *monk*. For the sake of mutual supervision and discipline, and for greater security from persecution and disturbance, the monks gradually abandoned their individual solitudes, gathered together in small communities, and became *cenobites*, or "livers-in-common" (Gr. *κοινός βίος*). dwelling apart from the world, at first in desert retreats, and afterwards in cloisters or habitations in which each had his separate cell for repose and private discipline and meditation. A new literature, designed primarily for the instruction of persons thus severed from the general body of the faithful and devoted to a religious life, sprang up, and this literature was greatly enlarged in extent and modified in character after the establishment of regular orders or monastic institutions organized each under its own special rules, and recognized by the Church as permanent bodies corporate. This is the literature of the *legend*, the signification of which term was gradually changed, and the compositions embraced under it variously named according to their different purposes and character. Thus, there were the *lectiones*, collectively *legendarium*, *lectionarium*, or *liber lectionarius*, consisting of lives of saints and confessors, read at their festivals, and *passiones*, collectively *passionale* or *liber passionalis*, containing the passions of martyrs, read on the anniversary of their deaths. This latter term was sometimes applied exclusively to histories of the passion of the Saviour. There were also numerous treatises on *clean* or monastic life—such, for example, as the old English *Ancren Rible* for the instruction of nuns—which, though not now called legends, were sometimes included in that designation, because, like religious narratives, they were read aloud to the monks and nuns assembled for refection and on other special occasions. The nomenclature of all this literature is somewhat confused. The distinctions between its branches, which do not seem to have ever been very sharply marked, gradually become obsolete in common usage, and centuries before the invention of printing "legend" had come to signify any religious narrative not taken directly from the Old or New Testament, even if not designed for public reading, but rather for private study; and it was applied indiscriminately both to prose and to poetic compositions. There is, indeed, no critical distinction between the prose and the poetic legend, except in literary form, and it may be added that many mediæval narratives usually ranked with romances of chivalry—the *Holy Grail*, for example—are as truly religious in spirit and historic in character as most of the ecclesiastically accepted legends of the same period. Very many legends exist in both forms, but the Church does not favor verse except

when employed for strictly devotional purposes, as hymns and the like, and therefore the authorized legendaries embraced prose narratives alone.

As a general rule—subject, indeed, to some few exceptions—it may be said that even the most credible legendary annals now extant were not the work of eye-witnesses to the events they describe, or even of contemporary writers, but were compiled from popular narratives orally handed down, or from other sources now quite unknown. Hence, upon the whole, we cannot perhaps better define the legend of the Romish and other churches than as a professed history of sacred persons or miraculous events founded upon tradition, but practically or formally recognized by the Church as authentic, and entitled, if not to be received as matter of faith, at least to reverence. Legends are, therefore, to the churches which accept them what mythology was to the old pagan, and still is to many non-Christian religions.

At the first awakening of the spirit of historical criticism the palpably unhistorical character of the religious legends, and the intrinsic improbability, not to say absurdity, of very many of them, threw a shade of suspicion which soon ripened into utter discredit on this whole branch of ecclesiastical literature, and the term "legend" acquired the signification of superstitious tale or fictitious narrative, the adjective "legendary," that of fabulous, imaginary, or at best traditional. At present these words are frequently applied to the fragmentary annals and fantastic tales which make up the body of unwritten popular literature, or what is called the folk-lore, of European and Oriental nations. These latter legends are too diversified in origin and critical character to be considered under a single head, and for notices of them we refer to titles FAIRY and FOLK-LORE, confining ourselves in the present article to the religious legends of early and mediæval Christianity and of the modern Romish Church.

Apart from the few well-authenticated ancient ecclesiastical annals which have come down to us, the oldest extant legends which can with any confidence be affirmed to be genuine—that is, not spurious, however little entitled to credit—are some of the sketches of hermit-life in the *Vite Patrum*, which are referred, with reasonable probability, to known authors, though other parts of that collection are certainly later fabrications. The old Roman martyrologies, though often ranked among legends, and truly legendary or unhistorical in character, are catalogues rather than narratives. They were condemned by some of the early popes, and even by Gregory I., notwithstanding his appetite for the marvellous, as of totally unknown origin and unworthy of credit; and they may safely be rejected as of no historical authority whatever. The legends accepted by the early Church very generally have monks and monastic life for their subject and their object. They were composed for the purpose of holding up that life as the true Christian ideal, the type for the imitation of the aspirant to sanctification, and of guiding the votary to perfection in the realization of it. They were not intended for the world, but for those who had retired from it, or who were preparing to renounce it. Hence, in them the monkish virtues alone, not the social, are exemplified and exalted. In short, they were professional, not popular, didactic writings. Though the personal authorship of most old legends is unknown, they were evidently in general the work of monks, to whom the retirement and leisure of monastic life gave both opportunity and encouragement for this species of literary occupation. In their departures from historical fact they were by no means always intended to be received as true, and therefore to deceive, though numbers of the most extravagant have been accepted by the Church as authentic. They were sometimes, doubtless, honest statements of what was believed to be the literal truth, sometimes mere literary exertions, and sometimes religious romances exhibiting the writer's spiritual ideal in the form of an imaginary history. Writers actuated by these various motives would naturally take their images and illustrations from the most convenient sources. Hence heathen divinities, demigods, and heroes figure in them under various Christian disguises, and the legend of Barlaam and Josaphat, who to this day retain a place as saints in the Romish calendar, has been unequivocally traced to a Sanskrit religious romance as its original, and its heroes identified with Sakya-Muni, the founder of Buddhism, and one of his disciples. The early legends are often rich in poetical imagery, and even thought, and distinguished by an apparent truth of local color and an air of probability scarcely inferior to that of De Foe's apparition of Mrs. Veal. They are therefore of value as illustrations of contemporary life and opinion, notwithstanding the uncertainty of the periods to which they belong and of the extent to which they have been disfigured by later recensions.

But with the growth of the temporal power of the



Church, and more especially with the increasing influence of monastic corporations, the aim and character of the legend underwent an important change. Monachism had diverged more and more from the typical form of ordinary social life, and given birth to new and special interests peculiar to large, opulent, and powerful bodies of men, practically independent of the civil power, living in isolation from the pursuits and cares, the duties, the hopes, and fears of common humanity, and constituting a third estate which aimed at establishing a supremacy over the other two. For this new institution and its objects new instrumentalities were required, and the legend, as modified and adapted to a new public and to new purposes, became one of the most efficient of these. Legends began to be addressed not only to the regular but to the parochial clergy and to the laity, whom the dawn of intelligence which preceded the revival of classical learning was rendering accessible to literary influences. The simplicity and true-heartedness which, in spite of exaggeration and absurdity, make them attractive even in an age of culture and religious light, disappeared. They became what the Germans call *Fabelwesen*—tales designed for the diffusion and inculcation of particular doctrines or maxims, the catch-words or symbols of this or that party in the Church, and more especially for the glorification of particular religious orders, in whose hands they are at this day among the most potent means of action on the unreasoning classes which unhappily form a large proportion of the highest as well as the lowest circles in modern society.

Under the influence of the Reformation the legends of the Church were superseded by translations of the Scriptures in the popular reading of Protestant countries, and their circulation was much diminished even in those which continued to adhere to the Church of Rome. In the Catholic reaction which followed the triumphs of the Reformers strenuous and successful efforts were made to rehabilitate the old legendary literature by remodelling the ancient traditions through discreet omissions and the infusion of new elements into their composition, and to strengthen its influence by reports of modern miracles duly authenticated by ecclesiastical authority. These endeavors have been stimulated to new activity in the present generation, and in no age have supernatural wonders been more abundant, in no age have bolder experiments on popular credulity been tried, in none have more determined efforts been made to eliminate the spiritual and magnify the material element in religion, than in our own. The legends which have been rewritten or composed within the last three centuries, and especially in the present, are almost uniformly destitute of all merit except those of style and dexterous adaptation to purpose, and have rarely any literary or historical interest, unless as monuments of the aberrations of the human intellect.

A question of great and growing importance to the doctrine, the discipline, and the ethics, theoretical and practical, of the churches and peoples who accept religious legends is, whether and to what extent they are binding on the faith of believers? This question has been incidentally much discussed in reference to legends connected with the lives and miracles of modern saints in treatises on canonization, which rite bears upon it in this way: The evidence of miracles wrought on the intercession of the candidate is submitted to a board of cardinals specially named for the occasion, and reported on to the pontiff, who finally adjudges upon its sufficiency, and in the affirmative case pronounces the alleged facts established, and decrees the enrollment of the new saint upon the calendar. The whole inquiry is in the nature of a judicial proceeding, and it conforms so closely to the forensic practice of civil tribunals that counsel are heard for and against the claims of the aspirant, the opposing counsel being complimented with the title of *advocatus diaboli*, "the devil's advocate." Now, if the pope is to be considered as acting *ex cathedra* in rendering sentence, then his judgment is infallible, and of course belief in the evidence on which that judgment is founded becomes obligatory. Upon the character of the pontiff's action in this case the weight of the numerous authorities cited by Benedict XIV., *De Sacrosancti Dei Canonizatione* (see Prato ed. of 1839, lib. i. cap. 12, 43, 44, 45), is decidedly in support of its infallibility, and the personal opinion of Benedict himself, though he does not give a formal decision upon it, is evidently favorable to that doctrine. In many cases, indeed, if not in all—as, for example, in that of the canonization of the saints Isidore, Ignatius Loyola, Francis Xavier, Teresa à Jesu, and Filippo Neri, by Gregory XV.—the decree expressly recites that the pope *Divino Numine instructus, ex altissimi huius Christianissime sapientie Cathedra quam divina vocatus constituitur, hanc ipse constituit, . . . decrevit*, etc. etc. Here the assertion of infallibility is unequivocally implied.

The literature of the legend is of vast extent. The most conspicuous collections are the *Vite Patrum, de Vita et Verbis Seniorum, seu Historia Erenitica* (best edition, that

of Rosweyde, 1 vol. fol., Antwerp, 1628); the *Legende Ancien*, or *Historia Lombardica*, compiled by Jacobus de Voragine in the thirteenth century, and first printed in 1470, perhaps the most widely circulated and at the same time intrinsically among the most worthless of all; the *Flos Sanctorum* of the Jesuit Ribadmeira, commonly known as the *General Legend* (first published in Spanish in 2 vols. fol., Madrid, 1599–1610): this has been augmented by supplements, and printed in many languages and in hundreds of editions, and is the source from which most smaller collections of legends have been drawn; and, finally, the *Acta Sanctorum*, edited by a Jesuit association known as the Bollandists, from the name of its founder. Of this vast collection, begun in 1613, about 60 folio vols. have appeared, and it will probably extend to 100. There is, moreover, an immense number of legends of individual saints, and especially of the Virgin Mary. Of these the most extensively known is the *Gloria di Maria* of Liguori (1st ed. 2 vols. 8vo., Venice, 1784). One of the most remarkable is the Portuguese *Statuto de Marimam* in 10 vols. 4to., Lisbon, 1709–23), containing the legends of more than 2000 miraculous images of the Virgin in the Peninsular possessions of Portugal alone. (On this whole subject consult Maury, *Les Légendes pieuses du Moyen Age* (1843); Milman, *History of Latin Christianity* (4th ed., 1867); and Lecky, *History of Rationalism in Europe* (4th ed., 1870).) GEORGE P. MARSH.

**Legendre** (ADRIEN MARIE), b. in Paris in 1752; d. at his suburban residence Auteuil Jan. 9, 1833. A mathematician who, says Prof. Nichol, "would have been at the head of the most illustrious school of modern Europe, had he not possessed as compeers Lagrange and Laplace." He early distinguished himself as a successful teacher of mathematics in the military school at Paris, and before attaining the age of thirty made his debut in the world of science by one of his first memoirs—that on *The Attraction of Spheroids*—by which he gained admission to the Academy of Sciences (1783). His equally important investigations of the *Figure of the Planets*, considered as made of spheroidal strata whether homogeneous or otherwise, soon followed, and in 1805 his *New Method for determining the Orbits of Comets*. His *Elements of Geometry* has been translated into all languages, and has become a classic in that species of literature. He assisted De Prony in the calculation of his great logarithmic tables; invented the rule of the *least squares of errors*; was author of a work, the *Exercices sur le Calcul Intégral*, and of researches on the *Eulerian integrals*; both of which were subsequently developed into the great work of his life—the *Traité des Fonctions elliptiques*.

A funeral discourse was pronounced by Poisson in which he says: "In common with the geometers who have preceded him, the labors of Legendre ended only with his life. . . . Only a short time preceding his death he procured the most recent observations of comets of short periods, for the purpose of applying and perfecting his methods. . . . The history of science offers many such examples. At an age nearly equal to that which Legendre attained, Lagrange died while publishing an enlarged second edition of his *Mécanique Analytique*; Laplace in finishing the 6th volume of the *Mécanique Céleste*; Euler while finishing an investigation of the ascensional force of balloons." (See *Mémoires Écrites*, of Baily de Mélioux; and Verhulst, *Des Fonctions elliptiques*.)

Legendre, though inferior in range and power of intellect to either of his three great contemporaries—Laplace, Lagrange, and Euler—was nevertheless only inferior to them; and was one of that age who most powerfully contributed to the advancement of mathematical science. According to Prof. Forbes, he was the first to imagine and employ those artifices of calculation known usually by the name of "Laplace's functions." When towards the close of his life the discoveries by Abel and Jacobi of the really distinctive characteristic of elliptic functions—their periodicity—gave an outlook for extension and generalization to the applications of these functions, he welcomed them with a liberality (says Prof. Forbes) "worthy of all commendation." Legendre's life, spent in privacy and strenuous devotion to science, was uneventful. (Consult Verhulst, *supra*, and Briot and Bouquet, *Théorie des Fonctions transcendentes périodiques*.) J. G. BARNARD.

**Légèrement** (Fr.), in music, a term indicating a gay, light, and airy movement.

**Le Gett**, tp. of Marion co., S. C. Pop. 1365.

**Leggett** MORRIS D., b. at Ithaca, N. Y., Apr. 19, 1831; removed to Ohio in 1847; studied law, practised, and was superintendent of schools at Zanesville in 1861, when he raised the 78th Ohio Infantry, of which he was appointed colonel in Jan., 1862, and which he led at Fort Donelson, Pittsburg Landing, and Corinth; commanded at the capture of Jackson, Tenn.; defended Bolivar, Tenn., against a largely superior force; appointed brigadier-gen-



eral of volunteers Nov. 29, 1862; was severely wounded at Champion Hills, and again before Vicksburg; was in the Atlanta campaign; commanded a division in Sherman's march to the sea; brevetted major-general for this latter campaign, he was in Aug., 1875, promoted to be full major-general, which office he resigned the following month, and was appointed commissioner of patents Jan. 13, 1871.

**Leggett** (WILLIAM), b. in New York City in 1802; graduated at Georgetown College in 1822; was midshipman in U. S. navy from 1822 to 1826; published in 1825 a volume of poems, *Leisure Hours at Sea*; wrote for the *Mirror* his *Tales by a Country Schoolmaster*, and established the *Critic*, a weekly newspaper, in 1828; was associated with W. C. Bryant in the editorship of the *Evening Post* from 1829 to 1835; edited the *Plain Dealer* in 1836; was appointed in 1839 diplomatic agent to Guatemala, but before going to his post d. suddenly at New Rochelle, N. Y., May 29, 1839. Two volumes of his political essays were published by Theodore Sedgwick, Jr., in 1840.

**Legg's**, tp. of Limestone co., Ala. Pop. 1216.

**Leghorn** [It. *Livorno*], a large maritime town in Central Italy, in the province of Leghorn, lat. 43° 32' N., lon. 10° 18' E. It stands on a tongue of land between the mouth of the Calambrone on the N. and the lowest spur of the Tuscan Apennines on the S., 62 miles W. S. W. of Florence and 12 miles S. S. W. of Pisa. A navigable canal connects it with the Arno, which enters the sea 7 miles N. of the town, and smaller canals intersect it in various directions. There are two harbors, the old and the new, the latter—S. of the former and overlooked by the large lighthouse—being capable of receiving vessels of heavy tonnage, and even ships of war. More than 11,000 ships of various sizes entered the harbor in 1873, the import and export trade of that year amounting to above \$35,000,000. The import trade embraces cotton, wool, cutlery, hardware, etc., and colonial products generally. The export trade is in silks, straw hats, borax, coral, and many of its own manufactures. These are very extensive, and consist of oil, soap, tobacco, salt, etc. The port of Leghorn was for a long time free, except for government monopolies, but since 1867 it no longer enjoys special privileges. Notwithstanding this change, the port of Leghorn is one of the most frequented in the Mediterranean, and the commerce and general prosperity of the town are constantly increasing; fine public and private buildings are being erected; facilities for communication between its different quarters are multiplying; its suburbs are being extended and embellished; and it is every year more and more resorted to as a fashionable bathing-place. The churches and public edifices generally are very respectable, and the Jewish synagogue is the second in Europe in size and richness. The monument to Ferdinand I., near the port, is a work of merit, without being pleasing. The aqueduct and great reservoir which supply the city with water are remarkable constructions. The first notices of Leghorn are of the ninth century, and relate to the building of a church there, but it had little importance for a long time. At the close of the fourteenth century we find it under the protection of the French king, who in 1407 sold it and its territory to Genoa for 26,000 gold ducats. Genoa ceded it in 1421 to Florence for 100,000 gold florins, and this republic, aware of the value of her new possession, spared no pains to increase its prosperity. Under the Medici the harbor was improved, the fortifications were strengthened, and exceptional privileges and immunities granted to the inhabitants; religious toleration was also established, so that merchants of all nations flocked thither. Towards the end of the last century Leghorn fell into the hands of the French, who impoverished it by forced contributions and forced loans, from which it recovered but slowly. The population, consisting of various nationalities, was in 1874, 97,996, among whom were 8000 Jews.

**Le'gion** [Lat. *legio*, from *legere*, to "gather," "collect"], a military organization of the ancient Romans, combining all the constituent elements of an army, and numbering from about 3000 to about 6000 men. Originally, service in the legion was a privilege reserved to the Roman citizen of property, the slaves, *proletarii* (mere children-begetters), etc., being excluded from its ranks, and the allied forces being separately organized under the distinctive denominations *socii* and *auxilia*; but the distinction between the *socii* and *Romani* disappeared when all the Italian states were admitted to full citizenship with the native Romans, and under the exigencies of the civil war all classes were enrolled in the legions, and the employment of mercenary soldiers became common. The horse and foot of the legion have already been described (see CAVALRY and INFANTRY), the artillery seems to have had no distinctive *personnel*, and the prototypes of the modern "staff departments" have not been minutely described. In imitation of the Romans the armies of France in 1534

and 1557 were organized into legions, and in 1792 our own army was officially designated as "the legion of the U. S.," the infantry regiments were styled "sub-legions," and the major and brigadier general were called respectively the legionary and sub-legionary general; but in neither of these cases was the resemblance to the original organization more than nominal. ROBERT N. SCOTT.

**Legion of Honor, Order of the**, a French order of merit instituted May 9, 1802 (19 Floral, an 10), by the First Consul, Napoleon Bonaparte. The order has received several modifications since then. It consists of several ranks—viz. grand officers, grand crosses, commanders, and knights. Its distinctions are conferred for civil, but more especially for military achievements. The order possesses considerable wealth, of which the proceeds are paid out in pensions to wounded and disabled members and some others. Their house at Paris was burned by the Communists May 24, 1871.

**Legna'go**, town of N. Italy, in the province of Verona, on the Adige and on the high-road between Mantua and Padua, about 23 miles S. E. from the city of Verona. This town has much strategic importance, and formed one of the four angles, though not the strongest, of the famous quadrilateral. Pop. in 1874, 13,355.

**Legna'no**, town in N. Italy, in the province of Milan, about 17 miles N. W. of the city of Milan. It contains some interesting churches, and, among other fine pictures, an invaluable one by Luini. Pop. in 1874, 6685.

**Legouvé**, the name of two French poets of some note. —GABRIEL MARIE JEAN BAPTISTE, b. at Paris June 23, 1764, and d. there, insane, Aug. 30, 1812. He wrote tragedies, of which *Epicharis et Néron* (1794) made a great sensation on account of Talma's performance of Nero and the allusions of the part to Robespierre; and elegies, of which *Le Mérite des Femmes* (1800) proved a great success.

**Legouvé** (GABRIEL ERNEST WILFRID), son of the preceding, b. at Paris Feb. 14, 1807, made his début in literature with a poem, *Découverte de l'Imprimerie* (1827), for which he received a prize of the Academy; wrote, in company with Scribe, *Adrienne Lecouvreur* (1849), *Les Contes de la reine de Navarre* (1850), *Bataille des Dames* (1851), and *Les Doigts de l'Éc* (1858). His tragedy, *Médée*, in which Mademoiselle Rachel refused to play, though the refusal cost her a fine of 5000 francs, was translated into Italian, and performed with great success by Madame Ristori. He is also the author of the *Histoire morale des Femmes* (1848), which made a success similar to that of his father's poem.

**Le Grand**, post-v. and tp. of Marshall co., Ia., on the Chicago and North-western R. R. (Iowa division). Pop. 1537.

**Legu'mine** [Lat. *legumen*, "pulse"]. This is one of the vegetable *proteids*, or, as they are sometimes called, *albuminoids*. (See article ALBUMINOIDS, by PROF. CHANDLER.) It is so extremely similar in its chemical properties and composition to animal caseine, the substance of cheese—that is, of curd of milk—that several distinguished chemists, among them Liebig and Braconnot, have been unable to find any difference, and concluded that they were identical. Other equally distinguished analysts, however, Dumas and Cahours, have maintained that there is an appreciable difference in composition and in chemical nature. Whether the vegetable caseine, plant curd, or legumine passes directly, in solution through the blood, into the milk of lactiferous mammals, is a question to be worked out by physiological chemists. Legumine occurs extensively throughout the vegetable kingdom, but is more especially found in various kinds of seeds and nuts. It derives its name from the fact that, with starch, it makes up almost the whole substance of the seeds of leguminous plants, such as peas and beans. Hence, the powerfully nutritious character of these as food—that is, for those possessed of powerful digestion, for vegetable caseine is far from being as readily soluble in the gastric liquids as animal caseine or curd of milk. Peas and beans contain about one-quarter of their weight of this plant-curd, and are comparable, therefore, so far as richness in nitrogen is concerned, to eggs or to milk when condensed. Ordinary cow's milk, according to the highest determinations on record, contains not more than 5½ per cent. of dry caseine by weight; woman's milk contains less than 4 per cent.

One remarkable point connected with the chemical composition of legumine is a large proportion of *phosphorus* in organic forms of combination. Voelcker found in legumine precipitated from its solutions by acetic acid, and thus freed from all mineral matters, from 1.88 to 2.18 per cent. of absolute phosphorus. The believers in the virtues of phosphuretted foods as *nerve* and *brain* nourishers should by this have their attention directed to leguminous aliments.



Legumine was prepared in pure state by Dumas and Cahours from milk of sweet almonds. They are bruised, soaked in warm water for three hours, crushed to pulp, and an equal weight of cold water added. In an hour the mass is pressed through a cloth. The liquid deposits its starch, and is then filtered. Acetic acid (avoiding excess) now precipitates or curdles the legumine as a white conglum or curd, which is washed on a filter with water, then with alcohol, dried, pulverized, and treated with ether to remove fatty substances. It is more difficult to obtain the vegetable curd pure from beans, as these contain mucilaginous matters which render the filtration troublesome. This might probably be overcome, however, by some experiment, should it be desirable to obtain cheaply a concentrated "brain-food." The legumine thus prepared is stated by other chemists still to retain in admixture some albumen, to separate which requires re-solution in ammonia and re-precipitation with acetic acid. H. WURTZ.

**Legumino'se** [Lat. *legumen*, a "pod",] or **Fabaceæ** [Lat. *fabæ*, a "bean"], a large and most important natural order of plants, equalled by no other of the dicotyledonous class, except, possibly, by the related order Rosaceæ. Its distinguishing marks are the papilionaceous corolla and the legume *tr.* *c.* a solitary and simple 2 valved pod, of which the pea-pod is a familiar representative, along with alternate leaves furnished with stipules. Yet no one of these characters is without exception, and the papilionaceous belongs to only one of the three great sub-orders, one of which, the Mimosæ, has wholly regular flowers. Among the food-plants of the order, beans, pease, and clover, also peanuts, are the most important representatives. But there are also many poisonous or very active plants or products, among which the Calabar or ordeal bean, now turned to useful account in medicine, is remarkable, inasmuch as the plant is nearly related to the common bean. Moreover, both in Australia and California plants of the pulse family, which would be supposed to be innocent and nutritious, prove to be sheep-poisons. Among plants or products of the order with active properties, senna, indigo, copaiba, tolu, kino, and catechu may be specified. Other drugs and dyes of large use are gum-arabic, tragacanth, liquorice, copaiba, tolu, tamarinds, sanders-wood, logwood, Brazil wood, etc. Among timber trees, the locust and rose-wood. ASA GRAY.

**Leh**, city of Central Asia, capital of the kingdom of Ladakh, is situated in lat. 34° 8' N., lon. 77° 40' E., in a valley of the Himalayas, at an elevation of 11,500 feet above the sea, and forms a station of some importance on the commercial road between Central Asia and India. It is surrounded with a wall of sun-dried brick, surmounted with turrets, and contains a great palace of the *rajah*. Its population is variously estimated at from 5000 to 12,000.

**Le'hi City**, post-v. of Utah co., U., on the Utah Southern R. R., at the junction of the American Fork R. R., and on the N. shore of Utah Lake, near the river Jordan. The people profess the Mormon faith.

**Le'high**, county of E. Pennsylvania. Area, 350 square miles. It is bounded N. E. by the Lehigh River and N. W. by the Blue Mountains. The soil is generally very fertile. This county contains mines of zinc and iron. Live-stock and grain are staple products. Carriages, tobacco, brick, clothing, flour, leather, furniture, iron, lime, metallic wares, and agricultural implements are leading articles of manufacture. Many of the people are of German descent. Cap. Allentown. Pop. 56,796.

**Lehigh**, tp. of Northampton co., Pa. Pop. 3496.

**Lehigh River**, in Pennsylvania, rises in Pike co., and traverses a region remarkable for its beauty and famous for its great production of anthracite coal. It passes the Blue Ridge at Mauch Chunk, and at Easton unites with the Delaware. It is nearly 100 miles long, and for 70 miles has been fitted for slack-water navigation.

**Lehigh'ton**, post-b. of Carbon co., Pa., on the W. bank of the Lehigh River, and on the Lehigh Valley R. R. and the Lehigh and Susquehanna division of the New Jersey Central R. R. It has 3 churches, 5 hotels, a fine public school, and 1 newspaper. Pop. 1485.

H. V. MOETHIMER, Ed. "CARBON ADVOCATE."

**Leh'man**, post v. and tp. of Luzerne co., Pa. Pop. 799.

**Lehman**, tp. of Pike co., Pa. Pop. 832.

**Leh'mann** (CHARLES ERNEST RODOLPH HENRI), b. at Kiel, in Holstein, Apr. 14, 1814, and received his first instruction in the art of painting by his father; but settled early in Paris, where he studied under Ingres, and began to exhibit in 1835. His pictures excel in brilliancy of coloring, and are generally distinguished by a peculiarly romantic and dream-like feeling, even when the subjects have been chosen from the Bible or the Greek literature.

He has also painted many excellent portraits, such as those of Liset, Alphonse Karr, and Baron Haussmann.

**Lehmann** (RODOLPHE), a brother of Charles Lehmann, b. at Kiel, in Holstein, Aug. 19, 1819; studied under his father and brother, but resided later on for the most part in Rome, and painted mostly scenes of Italian life and nature. *Le pape Sixte*. *Quint Bonavent les Mercuri Pontius*, now at the museum of Lille, is one of his most celebrated pieces.

**Le'ia**, town of British India, in the Punjab, in lat. 31° N. and lon. 71° E. It carries on a considerable trade in sugar, cotton, silk, indigo, copper, iron, and wool. Pop. 15,000.

**Leib'nitz** (GOTTFRIED WILHELM), b. June 21, o. s., 1646, in Leipsic, where his father was established as a notary public and actuary of the university. The father died when Gottfried was six years old. His mother sent him to school, where he evinced a remarkable love of study and unusual talent. He learned Latin without the aid of a grammar, simply by reading and re-reading Livy and the *Chronological Theatrum* of Calvisius, and acquired such fluency in that language that at the age of thirteen he wrote for a wager 300 faultless hexameters within six hours. A large number of his works are composed in Latin. He took chief delight in logic, and thus was led to the study of the scholastics and of metaphysics in general. At the age of fifteen Leibnitz entered the Leipsic University to prepare himself for active life by the study of law. He excelled there, as everywhere; read in 1663 his dissertation *De Principio Individui*, and in 1666 published his work *De Arte Combinatoria*, which really contains the germ of all his future achievements in the fields of mathematics and philosophy. In the same year he left Leipsic, because his age was urged as a barrier to his obtaining the degree of *doctor juris*, and went to the university at Altdorf, where he obtained it by his dissertation *De Casibus Perplexis*, and elicited such general admiration that he was offered a professorship at the university, which he, however, refused. During the winter he remained at Nuremberg, studying the works of Kepler, Galileo, Bacon, Gassendi, and Descartes, also continuing his law-studies. Here he made the acquaintance of the celebrated statesman Baron Boineburg, the former prime minister of the elector of Mentz, and accompanied him to Frankfurt, where he began to prepare himself for a political life. He there wrote his famous essay, *Nova Methodus discenda docendæque Jurisprudentiæ* (1668), which he sent to the elector of Mentz, accompanied by the sketch of a chart "which would enable any judge or lawyer to decide immediately any given case of law according to the fixed principles of jurisprudence." This so pleased the elector that he appointed Leibnitz assistant to Dr. Lasser in the elaboration of a reformed code of Roman law. He soon distinguished himself by his various literary labors—so much that within a few years, when barely twenty-four years of age, he was appointed by the elector a member of the court of appeals, the highest judicial tribunal of the electorate. His official labors did not in the least disturb his other studies. He was specially interested at that time in effecting a reconciliation between Protestants and Roman Catholics, and kept up an extensive correspondence with prominent members of both churches (with Bossuet among others), having discovered, as he thought, a basis on which the theories of both churches on the subject of transubstantiation, their main point of dispute, could be harmonized. The preparations made by Louis XIV. for a war against Germany at the same time led him to enter deeply into politics. To the German electors he submitted a memorial, counselling a friendly feeling towards France and the establishment of a united Germany, which, he said, would alone give peace to Europe. To Louis XIV. he submitted a memorial, through Boineburg, which counselled an expedition of France against Egypt, which was so well received by the French king that Louis XIV. expressed his desire for a personal interview with the author. Accordingly, Leibnitz left Mentz in Mar., 1672, for Paris, where he submitted a memorial to the king, which, however, has only recently been made public. He pointed out the conquest of Egypt as the key to India and the humiliation of Holland. Napoleon afterwards carried out the scheme in order to threaten England's power in the East. Leibnitz's main object was to divert the king's mind from a war with Germany by a foreign enterprise; and probably this object was soon discovered and caused the rejection of his scheme. He made frequent use of his stay in Paris, however, to study its libraries and become acquainted with its men of science. News of his friend Boineburg's death compelled him to visit London for a short time, where he made the acquaintance of Newton, Boyle, and others, and was chosen fellow of the Royal Society. Here the report of the death of his other friend, the elector of Mentz, reached him. When he returned from England, he did not



go to Mentz, therefore, but to Paris. Here he soon formed an extensive acquaintance, became intimate with Cassini and Huyghens, and was admitted to the highest circles of society. In 1676 he accepted the third offer made him by the duke of Brunswick-Lüneburg of a position at his court, having just then made his immortal discovery of the differential calculus, which he did not make public, however, until 1684. In 1678 the duke of Brunswick-Lüneburg, in recognition of his many labors in the interest of science and of the country, conferred the rank of counsellor upon him, which made him a member of the supreme court. Besides his judicial duties and other scientific labors, Leibnitz took charge of the duke's mines in the Hartz Mountains, utilizing the opportunity to study mineralogy, and kept up constantly his labors in behalf of a union between the Protestant and Roman Catholic churches. In 1679 the duke died, and was succeeded by his brother Ernst August, subsequently elector of Hanover. When, some years later, the princess Sophia Charlotte of Hanover, Leibnitz's pupil, married the prince of Brandenburg, future king of Prussia, it was deemed advisable in 1687 to send Leibnitz to Italy on a political expedition, but chiefly with a view to collect materials for a history of the house of Brunswick (the Guelph family) from its earliest origin. Leibnitz made this the great literary work of his life, though, like most of his works, it has been printed only recently. His stay at Rome was one prolonged ovation. Every learned society elected him a member. The office of custodian of the great Vatican library was offered him, with prospects of a cardinal's hat, if he would join the Roman Catholic Church. But, favorably disposed as he was to Roman Catholicism, he never could be brought to join that Church. He did his best to enlist it in behalf of science, and arranged a permanent correspondence with the famous Jesuit missionary Grimaldi, then leaving for China, through whom he also sent his *Science of Dynamics* to the emperor of China, so arranged as "to prove the creation of the world out of nothing." After his return to the Hanoverian court, Leibnitz was appointed custodian of the Wolfenbüttel Library. His patron, Ernst August, who in 1692 had become elector of Hanover, died in 1698, and although his successor, George, future king of England, retained Leibnitz in his position, Leibnitz no longer felt comfortable under a prince who took no interest in matters of science and art. He therefore accepted a call to Berlin from his former pupil, the princess Sophia Charlotte, and there established the scientific society which has since grown into the Berlin University. In 1700 he was sent on a political expedition to Vienna, and made another attempt to unite the Protestant and Catholic churches. On his return to Berlin he found that the English skepticism of the Lockian School had made its way there, and at the solicitation of Sophia Charlotte, now queen of Prussia, wrote his celebrated *Théodicée* to combat it. The death of the queen in 1705 was a severe blow to Leibnitz. More than ever he devoted himself to science. When in 1711 he met Peter the Great at Torgau, he induced him to found libraries, observatories, etc., and so interested that monarch that he was invited to another personal conference at Carlsbad. In 1714, Leibnitz visited Vienna for the last time, and there wrote for Prince Eugène his *Monadology*, the work by which he is most widely known as a philosophical writer. Soon after it was finished, the elector George, being about to leave for England, ordered Leibnitz home to attend to his duties. Leibnitz went back, finished his history of the house of Brunswick, and plunged into other scientific labors, in the midst of which death overtook him, Nov. 14, 1716. Only one person, his secretary, Eckhart, followed him to his grave. Protestant and Roman Catholic clergy both refused to attend his burial.

It is almost impossible to convey an idea of the multitude of Leibnitz's writings and the variety of subjects upon which they treat. His unpublished manuscripts fill the whole side of one of the rooms of the Hanoverian library, and range over the various subjects of law, history, theology, speculative philosophy, mathematics, and all the natural sciences. There is scarcely a branch of human knowledge which his wonderful mind has not explored and enriched; and in this universality of his knowledge he stands unrivalled in history. Neither Aristotle nor Kant, probably the other two most universal minds, reach Leibnitz in the extent of their knowledge. And with all this devotion to science he was never forgetful of practical affairs. An accomplished statesman and politician, he was an untiring correspondent, and in society brilliant and interesting as few men even of his time, when society made great demands. Though he never married, he enjoyed the society of ladies, and fascinated them by his courteous manners and conversational powers. During the reign of the late king of Hanover a beginning was made to publish the complete works of Leibnitz, a literary undertaking of un-

paralleled magnitude. A few volumes were issued in truly royal style, but the expulsion of the king and the absorption of Hanover into the German empire unhappily put a stop to the enterprise. The chief points of his philosophical system are three in number: (1) *The Principle of the Sufficient Reason*.—In human knowledge, says Leibnitz substantially in explanation of this principle, we meet with two different classes of knowledge—one which is based on the formula  $A = A$ , and which is self-evident, needing, therefore, no further explanation; and one which says of a thing (A) that it is not only this (i. e. A), but also something else. Kant subsequently called the former class analytical and the latter synthetical propositions. Now, of this latter class, adds Leibnitz, it will not do to assert merely that they are true, but a sufficient ground must be shown why they must be true; and if we cannot show the ground, they are not proved true. By strictly separating this class of propositions from those that are merely analytical or identical, and applying to all synthetical assertions the crucial test of the sufficient reason, Leibnitz contends that the higher sciences of physics, metaphysics, etc. can be as conclusively established as those sciences that rest merely upon the analytical principle. Leibnitz neglects, however, to state what is the sufficient reason which is the basis of all synthetical propositions, and it was reserved for Kant to complete the work of Leibnitz in this respect. It appears, however, from all of Leibnitz's writings whenever he had to apply that principle, that he was quite well aware of the nature of that sufficient reason. (See Kant.) (2) *The Doctrine of Monads*.—At an early period of his life, Leibnitz, who till then had accepted in explanation of the universe the then generally received theory of atoms, convinced himself of the insufficiency of this theory, in that it could not explain the activity reigning in the universe. By the two conceptions of motion and a world of atomic matter, Descartes had tried to explain, in his famous *Principia*, all the phenomena of the universe, from the position and course of the stars down to the construction of the smallest plant, and again up to the highest functions and passions of rational human beings. But as this theory was defective, in Leibnitz's opinion, in that it showed no sufficient ground for the motion which vitalizes the universe, he proposed to substitute for the material atoms spiritual atoms. He made public his discovery at an early day, and it excited an extensive discussion amongst the scientific men of his age. In his first announcement of his new theory, Leibnitz calls "spiritual atoms" what he subsequently termed monads. "Supposing," says he in substance, "that we look upon this universe as an infinite number of spiritual activities, each again containing within itself an infinite number of activities, and each thus limiting the other; then every such monadic activity must be limited or influenced in a more or less degree by all the others, so that even the smallest monad, if it could become conscious of all the impressions directed upon it, would become conscious of the whole infinite world. This limitation appears to each monad as something foreign to itself, and where this limitation ceases there is itself in its own body. Each monad having clearest consciousness of what passes within itself, and increasing that consciousness only as it learns to unravel the impressions produced upon it by the other monads, it is simply by the grade of consciousness attained that the monads are distinguished from each other. From the smallest speck of dust to the highest seraph this distinction rules; and as each monad carries within itself the power to reach the highest degree, there can be no creation and no death in the world; everything must be steady, progressive development or evolution. Matter must be always the same, since the monads are always the same; and force can never be destroyed, since the monad can never be destroyed. The whole interchange of forces is simply the result of a greater or less degree of movement on the part of the universal force which every atom possesses, and all forces are therefore correlated with each other through motion." Leibnitz's theory of nature, in its fundamental principles, is thus the same that has recently been adopted by the natural scientists of England. (Translations of several short articles written by Leibnitz in exposition of this theory can be found in the *Jour. Spec. Phil.* (St. Louis), vols. i. (containing the *Monadology*), ii., iii., v.) (3) *Pre-established Harmony*.—There remained, however, one great problem to explain, which was how one monad can influence another one, and which also involves the question how communication between body and soul is possible. This puzzled Leibnitz for a long time, until he was insensibly led to an idea which, he says, "surprised me, but which seemed inevitable. This was that the soul or every other real unity must have been created in such a manner as to have everything arise in it from its own proper nature, with a perfect spontaneity in relation to itself, and yet at the same time with perfect conformity to



the outside things. That thus our internal perceptions—that is, those in the soul itself, and not in the brain or in the subtle parts of the body—being nothing but phenomena related to external things or true appearances, and like well-regulated dreams,—that these internal perceptions, therefore, in the soul itself come to the soul through its own original constitution; that is to say, through that representative character capable of expressing outside things by relation to its organs—which was given to it at its creation, and which constitutes its individual character. Thus it is that each of these substances—each representing precisely the whole universe in its own way and according to a certain point of view, and the perceptions or expressions of the external things reaching the soul in this point by virtue of its own laws, as of a world in itself, and as if nothing existed but God and itself (to use the mode of expression of a certain person of elevated mind, and whose sanctity is everywhere recognized), must be in perfect accord with all others, whereby the same effect is produced as if they all communicated with each other by a transmission of species or of qualities, as the vulgar philosophers imagine. Moreover, the organized mass, wherein the point of view of the soul exists, being expressed more nearly, and finding itself reciprocally ready to act of itself according to the laws of the bodily machine in whatever moment the soul wills it—neither one interfering with the laws of the other—the intelligence and the blood have precisely those movements which are necessary to respond to the passions and perceptions of the soul. It is this mutual rapport, regulated in advance in each substance of the universe, which produces what we call their communication, and which alone constitutes the *union of body and soul*. It is thus that we can understand how the soul has its seat in the body by an immediate presence—a presence that could not be greater, since the soul is there just as the unity is in the result of the unities, which is the multiplicity."

This is the celebrated theory of a pre-established harmony, upon which Leibnitz also built his religious system, as indeed none of his discoveries stand apart, but each is closely connected with all others, and the result of the same original view of the universe. His mathematical discoveries were the outgrowth of his purely philosophical apprehensions, no less than his religious convictions, and it was his discovery of the monad theory which made him so sure that by its means he could reconcile Protestants and Roman Catholics on their main point of dispute, the doctrine of transubstantiation. (See Kuno Fischer, *Leibnitz und seine Schule*, in vol. ii. of his *Gesch. der neuen Phil.*; also Erdmann's ed. of his works, 2 vols., Berlin, 1840; Foucher de Careil's ed., 6 vols., Paris, 1899; G. H. Pott's ed., with Grottel and Gerhard, 12 vols., Hanover, Berlin, and Halle, 1841-66; Gannet Klopp's ed., 4 vols., Hanover, 1861-66; Guhrauer's ed., *W. L. Leibnitz*, 2 vols., and ed. of Leibnitz's German writings, Breslau, 1837-46.) A. E. KROGER.

**Leicester**, or **Leicestershire**, county of England, situated nearly in the middle of the country, bounded N. by the river Trent. Area, 803 square miles. Pop. 237,112. The ground is hilly; some coal and lead mines are worked; granite and freestone are quarried. But the rearing of sheep and cattle gives the country its industrial character: 250,000 acres of land are in grass; and its breeds of cattle and long-woolled sheep are very celebrated. The so-called Stilton cheese is chiefly made in this county, which also is the principal seat of the English manufactures of hosiery.

**Leicester**, town of England, the capital of Leicestershire, on the Soar, whose ancient name was Leire, whence the name of the city. Its manufactures of woollens and hosiery are very important, employing more than 25,000 hands; also lace is made here to a considerable extent. The city was known to the Romans under the name of *Rata*, and Roman remains are found. Pop. 95,084.

**Leicester**, post tp. of Worcester co., Mass., 6 miles W. of Worcester. The Boston and Albany R. R. traverses the S. part. The town has a fertile soil, well adapted to grazing, here a leading pursuit. There are several villages, 7 woollen and 11 card factories, 1 national bank, a public library, an academy, a town-hall, 8 churches, a memorial hall, and good water-power. Pop. 2768.

**Leicester**, tp. of Livingston co., N. Y. It contains several manufacturing villages. Pop. 1741.

**Leicester**, post tp. of Blount co., N. C. Pop. 2180.

**Leicester**, post tp. of Addison co., Vt., 5 miles N. of Brandon, on the Central Vermont R. R. It has manufactures of lime and paint. Pop. 630.

**Leicester** (ROBERT DUDLEY), EARL OF, a son of the duke of Northumberland, who was executed for trying to make Lady Jane Grey queen in 1553, b. Sept. 7, 1533; married Amy Robsart 1550; was condemned as a traitor 1554; pardoned 1555; became the favorite of Queen Eliza-

beth, who made him K. G. and master of the horse 1558. The sudden death of his wife in 1560 aroused strong suspicions that he was aspiring to the hand of the queen. Created earl of Leicester in 1564; in 1566, Elizabeth proposed his marriage with the queen of Scots, and somewhat later his secret marriage with the widow of Essex aroused the anger of the queen; was sent to the Low Countries as captain-general in 1585 and 1587, but displayed no capacity; was in 1588 generalissimo of the troops raised against the Spaniards. D. in Oxfordshire, Sept. 4, 1588.

**Leicester** (SIMON DE MONTFORT), EARL OF, founder of the English House of Commons, b. 1206 in France, and was a son of Simon de Montfort, the vanquisher of the Albigenses. In 1231 his brother, the Count Amaury de Montfort, gave him the honor of Leicester, inherited from his maternal grandmother, an English lady; for this title Simon did homage to Henry III. in 1231, and in 1239 it was formally granted by the king after his marriage with the king's sister; was for many years employed as governor of Gascony, where he conducted many wars with advantage, and twice refused the French regency; in England, unlike most other French adventurers of that period, he took the part of the barons against the king in the wars of Henry III.'s reign; compelled the king to sign the provisions of Oxford 1268, and after Gloucester's death (1262) became the leader of the baronial party; dictated terms at the Mise of Lewes 1264; summoned the Parliament of 1265, at which knights of the shire and representatives of the boroughs were admitted—the germ of the future House of Commons; became justiciary of England. Long the virtual master of the realm, he was attacked by Edward, prince of Wales, at Evesham, and there defeated and slain, Aug. 4, 1265.

**Leichhardt** (LUDWIG), b. at Trebitzsch, in the Prussian province of Brandenburg, Oct. 23, 1813; studied philology, medicine, and natural science at Göttingen and Berlin; travelled through Italy, France, and England, and went in 1841 to Australia, where he made a great name for himself as an explorer. The results of his first minor travels were published in *Beiträge zur Geologie von Australia* (Halle, 1855). His large tour from Moreton Bay on the E. coast to Port Essington on the N. coast 1841-46, he described in his *Journal of an Overland Expedition in Australia from Moreton Bay to Port Essington* (London, 1847). In Dec., 1847, he started on a still greater expedition across the continent from E. to W., but the last report which came from him was dated Fitzroy Downs Apr. 8, 1848, and later researches have confirmed that he perished on the trip. His biography was written by Zuehold (Leipsic, 1856).

**Lei'dy**, post tp. of Clinton co., Pa. Pop. 515.

**Leidy** (JOSEPH M. D.), b. at Philadelphia Sept. 9, 1823; graduated in medicine at the University of Pennsylvania in 1844; devoted himself to biological researches, especially comparative anatomy and vertebrate paleontology, on which papers were published in *Proc. of Acad. Nat. Sciences of Phila.*, *Trans. of Am. Philos. Soc.*, and *Smithsonian Contributions to Knowledge*; in 1851 was chosen professor of anatomy in the medical department of the University of Pennsylvania, and in 1871 professor of natural history in Swarthmore College, both which positions he still fills. During the civil war Prof. Leidy rendered important service as surgeon at Satterlee Hospital, Philadelphia. His contributions to scientific periodicals number some hundreds. Among his more important works are *Flora and Fauna within Living Animals*, *Memoir on an Extinct Species of American Os*, *Ancient Fauna of Nebraska*, *Memoir on the Extinct Stalk Tribe of N. A.*, and *Cretaceous Reptiles of the U. S.*, all published by the Smithsonian Institution, and *Contributions to the Extinct Vertebrate Fauna of the Western Territories*, 1873, published by U. S. Geol. Survey of the Territories. (See an interesting notice of his life and earlier writings in *N. J. Med. Reporter* for Sept., 1853.)

**Leigh**, town of England, in the county of Lancaster, 13 miles W. of Manchester. It has large manufactures of cambrics, muslins, and silk and cotton goods. Pop. 10,621.

**Leigh**, tp. of Amelia co., Va. Pop. 3461.

**Leigh**, tp. of Prince Edward co., Va. Pop. 3391.

**Leigh** (BENJAMIN WALKINS), LL. D., b. in Chesterfield co., Va., June 18, 1781; graduated at William and Mary College; practised law at Petersburg, and afterwards at Richmond; was reporter of the court of appeals, often chosen to the legislature; was appointed a commissioner to revise the statutes, and again to adjust land questions with Kentucky; and was in 1825 elected to the U. S. Senate, and took a prominent part in the debates, but resigned in 1837, and passed the rest of his life in retirement. He published 12 volumes of *Reports of Court of Appeals and Gen. Court of Va.* (1833-44). D. at Richmond Feb. 2, 1849.



**Leigh** (HZEKIAH G.), D. D., b. in Perquimans co., N. C., Nov. 23, 1793. For thirty-five years he occupied responsible positions in the Virginia and North Carolina M. E. conferences. He was one of the founders and principal supporters of Randolph-Macon College. He had a powerful intellect and great executive ability. D. in Mecklenburg co., Va., Sept. 19, 1853. T. O. SUMMERS.

**Leigh-ton**, tp. of Lawrence co., Ala. Pop. 1283.

**Leighton**, tp. of Allegan co., Mich. Pop. 1206.

**Leighton** (ALEXANDER), M. D., b. at Edinburgh, Scotland, in 1568; educated at the university of that city, in which he was professor of moral philosophy from 1603 to 1613, when he became a Presbyterian preacher at London, where he also practised medicine; wrote *Specimen Belli Sacra: or the Looking Glass of the Holy War* (1624), and an *Appeal to the Parliament: or Simon's Plea against the Prelacie* (1628). For the latter publication, deemed libellous with respect to the king, queen, and bishops, Leighton was sentenced by the Star Chamber to be twice publicly whipped, to lose both ears, to stand twice in the pillory, to be branded on the cheek with the letters S. S. (sower of sedition), to pay a fine of £10,000, and to suffer perpetual imprisonment in the Fleet. After eleven years' imprisonment he was released by order of the Long Parliament in 1640, received pecuniary indemnity, and in 1642 was made keeper of Lambeth Palace as a state prison, where he d. in 1644.

**Leighton** (FREDERICK), A. R. A., b. at Scarborough, England, Dec. 3, 1830; received his first instructions in drawing at Rome; entered as student the Royal Academy of Berlin in 1843, and finished a general education at Frankfurt; went to Brussels, where was produced in 1848 his first painting, *Cimabue finding Giotto Drawing in the Fields*; studied at Paris and Frankfurt, and again went to Rome, where he executed the *Cimabue*, which, exhibited at the London Royal Academy in 1855, and being by a hitherto unknown native artist, was so favorably received that it was eagerly purchased by the queen. In rapid succession he produced many fine paintings, classical, scriptural, and dramatic; especially noticeable are his *Triumph of Music* (1836); *Scene from Romeo and Juliet* (1858); *Star of Bethlehem*, and *Michael Angelo nursing his Dying Servant* (1862); *Helen of Troy and David* (1865); *Spartan Bride leading Wild Beasts to the Temple of Diana* (1866); has also executed designs for literary works, among which is *Romulo*.

**Leighton** (ROBERT), D. D., son of Alexander, b. in Edinburgh in 1611; graduated at the university of that city (1631), of which he became principal in 1653; appointed bishop of Dunblane in 1661, in pursuit of the plan of Charles II., Sharpe, and Lauderdale to Anglicize the Church of Scotland; accepted it with reluctance; appealed twice to the king to adopt milder measures in the attempted reform (1665 and 1669); accepted the archbishopric of Glasgow in 1670 upon liberal conditions, which were not fulfilled, and he therefore resigned in 1673 and retired to Broadhurst, Sussex. D. at London June 26, 1684. His works, all posthumous, are highly esteemed for their broad and liberal views; they include *Sermons* (1692); *Prelectiones Theologicæ* (1693); *Commentary on the First Epistle of Peter* (1693); and *Posthumous Tracts* (1703), and have been often reprinted. See his *Life* by J. N. Pearson, accompanying the *Works* (4 vols., 1825).

**Lei-ningen**, former principality of Germany, was erected in 1779, comprised an area of 250 square miles, and was situated between the Lower Palatinate and the bishoprics of Speyer and Worms. By the Peace of Lunéville in 1801 it was divided between Baden, Bavaria, and Hesse, and the prince was deprived of his sovereignty.

**Lein'ster**, province of Ireland, comprising the southeastern portion of the island, bordering on the Irish Sea and St. George's Channel. Area, 7619 square miles. Pop. 1,457,635 in 1861; 1,339,448 in 1871, of whom 1,141,401 were Roman Catholics. Before the English invasion this province formed two kingdoms, those of Leinster and Meath; now it is divided into twelve counties—namely, Dublin, Meath, Louth, Kildare, Carlow, Kilkenny, King's, Longford, Queen's, Westmeath, Wicklow, and Wexford.

**Leipo'a ocella'ta**, the "native pheasant" of Australia, a gallinaceous bird of the family Megapodidae, somewhat smaller than the turkey. Its flesh is good and its eggs are excellent. The nest is a mass of leaves, dirt, and sticks, the heat of which, produced by fermentation, hatches the eggs. The leipoa is a swift runner, but is very stupid, and often tries to escape the hunter by hiding her head in a bush.

**Leip'pa**, or **Böhmisch Leip'a**, town of Bohemia, on the Pulsnitz, is the seat of several civil and ecclesiastical authorities, and has good educational institutions, exten-

sive breweries, and manufactures of articles of steel, guns, and glass. Pop. 9244.

**Leip'sic**, city of the kingdom of Saxony, with 106,925 inhabitants according to the census of 1871, is situated in an extensive plain (which often was the theatre of great battles) on the Pleisse, which here receives the Parthe and flows into the Elster. It is one of the most important commercial towns of the German empire, the centre of the German book-trade, and the seat of a celebrated university. The inner town, consisting of old, tall houses, one looking very much like the other, presents the aspect of industry, enterprise, and solid wealth; it is encircled by five regular and modern-looking suburbs, and in a still wider circle the whole is surrounded by a number of villages, which join the town like a sort of second-grade suburbs. The inner town is separated from the suburbs by the Promenaden, a circle of beautiful gardens and walks, which occupy the place of the old fortifications, and contain the most important public places of the city, such as the Augustus-platz, on which the new theatre and the museum stand; the Rossplatz, and the Fleischerplatz. In the inner town is the market-place, which contains the town-hall, erected in the sixteenth century, and several other fine buildings. The most important streets are the Grimmer, Brühl, Peter, and Katharinen-strasse. The streets of the suburbs are longer, broader, and more regular, but much more quiet; Elster, König, and Nuremberger-strasse are noteworthy. In spring and fall a Messe takes place at Leipsic—that is, a market in which merchants from all countries come together in order to do business. As the improved means of communication which modern times afford makes such gatherings less necessary, the Messe has, of course, lost some of its importance. Nevertheless, it still attracts about 40,000 foreign merchants, often from distant countries, and the aspect of the city is much changed during this time, partly on account of the multitude of shops which fill the market-place, the Augustusplatz, and all surroundings, partly on account of the bustle in the streets. The principal articles in which bargains are made at the Messe are—fur (6,000,000 thalers annually), leather, cloth, woollens, linens, and glass. The most remarkable buildings are—the new theatre, built from 1864 to 1867, after plans by Langhaus, in Renaissance style, with a porch on Corinthian columns in the front and a magnificent veranda in the rear; the museum, opposite the theatre, finished in 1858, after plans by Lange, and containing on the ground floor a not very important collection of plaster casts, on the middle floor a large collection of pictures, among which are four celebrated landscapes by Calame, and on the upper story a large collection of engravings; the university or the Augusteum, frequented by about 2000 students, and built by Geutebrück in 1836 after plans by Schinckel; the Pleissenburg, formerly a citadel, now used as barracks, a large structure, though without any artistic interest, commenced in 1549 by the elector Maurice of Saxony. The most remarkable among the churches are—the Nicolaikirche, built in Gothic style in the twelfth century, and the Thomaskirche, built in the fifteenth century, and containing a beautiful marble altar. The Gewandhaus, built in 1481, is now used as a conservatory of music, and is the home of classical music in Germany.

Leipsic appears as a town for the first time in history in 1015; before that time it was an insignificant village, in which Henry I. built a castle in 922. During the Middle Ages the fortifications of the city protected its commerce, and Charles V. increased the liberties of its Messe. In the time of the Reformation it supported the new doctrine, but suffered much from the war; and afterwards felt more severely the Thirty Years' war. Tilly took it in 1631; later the Swedes and the imperials held it alternately; its prosperity was entirely destroyed. Since 1667 it attracted the book-trade, and since the beginning of the eighteenth century it became the centre of the same in Germany. The Seven Years' war destroyed its enterprise once more, but its favorable location enabled it to recover quite rapidly. During the wars of Napoleon new calamities came over it. From Oct. 16 to 18, 1813, the great battle in which Napoleon was defeated raged in and around it, and all great movements in Germany have affected it more or less on account of its central position. AUGUST NIEMANN.

**Leipsic**, post-v. of Liberty tp., Putnam co., O., near Dayton and Michigan R. R. (Roanoke Station). Pop. 200.

**Leis'ter** (JACOB), b. at Frankfurt, Germany; came to America in 1660 as a soldier in the service of the Dutch West India Co.; was some time stationed at Albany, where he engaged in trade with the Mohawk Indians, and acquired some wealth. While on a voyage to Europe in 1678 he was taken prisoner by Moorish corsairs, obtained liberty by paying a ransom, returned to America, settled in New York, and in 1683 became one of the commissioners of the court of admiralty. On May 31, 1689, Leisler headed an



insurrection "for the preservation of the Protestant religion," took the fort, declared for the prince of Orange, and planted within the fort a battery of six guns, which gave origin to that name as still applied to the public park at the lower end of Manhattan Island. The deposed lieutenant-governor, Francis Nicholson, and Mayor Cortlandt tried in vain to restore authority, and retired, the former to England, the latter to Albany. In August, the "committee of safety" appointed Leisler commander-in-chief with the powers of a governor, and he made unsuccessful efforts to be recognized as such at Albany. In December he dissolved the committee of safety, appointed a council, and assumed the style of a royal governor, on the strength of a despatch addressed "to such (person) as for the time being takes care for preserving the peace and administering the laws in His Majesty's province of New York." Early in 1690 he sent a small fleet against the French at Quebec. On the appointment of Sloughter as governor, Leisler refused to surrender the fort and the government (Mar., 1691) until convinced of the former's identity and authority. For this constructive treason Leisler was soon after imprisoned, with his son-in-law and secretary, Jacob Milborne, and both were condemned and executed May 16, 1691. At a later period the memory of Leisler was rehabilitated by an act of Parliament (1695), an indemnity was given to his heirs (1698), and the bones of Leisler and Milborne were honorably buried in the Dutch church. One of the acts of Leisler during his brief authority (1689) was the purchase of lands at New Rochelle as a place of refuge for persecuted Huguenots.

**Leisnig**, town of Germany, kingdom of Saxony, on the Mulde, manufactures woollen and linen stuffs. Pop. 5770.

**Leitch** (WILLIAM), D. D., b. at Rothesay, Scotland, in 1814; graduated in 1836 at the University of Glasgow; studied theology in the Divinity School; was ordained in the Presbyterian Church in 1838, and from 1843 to 1859 was parish minister at Monimail. In the latter year he was chosen principal of Queen's University at Kingston, Canada, in which office he was installed Nov. 8, 1860, and for the remainder of his life was actively engaged in organizing that institution upon a large basis of modern culture. Principal Leitch was an enthusiastic scientific observer, especially devoted to animal physiology and astronomy. In 1863 he published an esteemed work, *God's Glory in the Heavens, or Contributions to Astro-theology*. D. at Kingston May 9, 1864.

**Leitersburg**, post-v. and tp. of Washington co., Md., 6 miles N. E. of Hagerstown. Pop. 335; of tp. 1673.

**Leith**, town of Scotland, in the county of Edinburgh, on the Frith of Forth, 2 miles from Edinburgh, whose port it is, and with which it is connected by continuous rows of houses. Its streets are narrow, tortuous, and filthy, but its harbor is excellent, 25 feet deep, provided with a breakwater, and containing two wet docks and three dry docks. Its shipbuilding, both in wood and iron, and its manufactures of rope, sailcloth, soap, etc., are considerable, and its trade extensive, importing large quantities of grain, wine, hemp, timber, and tobacco. Pop. 44,277.

**Leitha**, or **Leytha**, a river of Austria, rises in Lower Austria, runs for some distance the boundary between the two divisions of the Austro-Hungarian empire, called, after the river, Cisleithania and Transleithania, breaks through the Leitha Mountains, which rise from 1500 to 2000 feet, into Hungary, and joins the Danube at Altenburg.

**Leitmeritz**, town of Bohemia, is beautifully situated on the right bank of the Elbe; contains a splendid cathedral, founded in 1054, and many other remarkable buildings, among which are the episcopal palace, surrounded with walls, the town-hall, and several monasteries; has a theological seminary, a gymnasium, and other educational institutions, important salmon fisheries, and straw hat manufactures, and carries on an active trade in corn, wine, and fruit. Pop. 10,025.

**Leitomischl**, town of Bohemia, on the Lainschna, has a fine palace and park, a beautiful church, and several good educational and benevolent institutions. Pop. 7087.

**Leitner** (GOTTFRIED WILLIAM), PH. D., b. at Pesth, Hungary, Oct. 11, 1839. His father, a German physician, left Hungary in consequence of the revolution of 1849, and settled in Turkey, where Gottfried, already acquainted with the classical languages, became proficient in Turkish, Arabic, and modern Greek, studying under the best native professors at Constantinople and Brusa; learned English, French, and Italian at the British College at Malta; became interpreter to the English commissariat during the Crimean war, after which he went to London, was naturalized as a British subject, and became professor of Oriental languages and Mohammedan law in King's College. In 1864 he was appointed director of a college at Lahore, in

the Punjaub; founded numerous societies, schools, colleges, and free public libraries in India; established several newspapers in Arabic and Urdu; promoted the study of the Aryan languages, and succeeded in organizing the Punjaub University upon a broad basis. From 1866 to 1868 he was engaged in an exploration of Thibet and other countries N. of the Himalayas, and was the first to make known the remarkable country of Dardistan, with its interesting group of languages. At a later date he extended his philological researches to the languages of Cabool, Cashmere, and Badakhshan, excavated an important series of Græco-Buddhist sculptures, and exhibited at the Vienna Exposition of 1873 an extensive collection of Central Asiatic antiquities. He has published a *Philosophical Grammar of Arabic* in the English, Urdu, and Arabic languages; *The Races of Turkey: a Comparative Grammar of the Darda Languages: Dialogues* in those languages; *History, Songs, and Legends of Dardistan*, and *Græco-Buddhist Discoveries*, besides numerous contributions to the Proceedings of learned societies in London and on the Continent.

**Lei'trim**, county of Ireland, in the province of Connaught, bordering N. on Donegal Bay. Area, 613 square miles, or 392,363 acres, of which 115,869 are uncultivated, and 23,748 under water, covered by lakes, of which Lough Allen, traversed by the Shannon, is the largest. The ground is hilly, very irregular, and rugged; coal, iron, and lead are found. The soil is cold, stiff, and retentive, except in the valleys, where it is very fertile. Rye, potatoes, and oats are the common crops, some cattle are reared. Pop. 155,297 in 1841; 111,915 in 1851; 104,744 in 1861; 95,562 in 1871. The principal town is Carrick-on-Shannon, with only 1568 inhabitants.

**Le'land**, post v. of Adams tp., La Salle co., Ill., on the Chicago Burlington and Quincy R. R., 67 miles S. W. of Chicago.

**Leland** (CHARLES GODFREY), b. at Philadelphia Aug. 15, 1824; graduated at Princeton College in 1846, after which he spent two years travelling in Europe, and studying at Heidelberg, Munich, and Paris, devoting himself especially to æsthetics and the philosophy of modern civilization. Returning to Philadelphia in 1848, he studied law, but abandoned its practice in favor of the literary vocation, to which he addressed himself particularly through the magazines, and acted occasionally as editor of more than one of the periodicals of that day. While well versed in graver subjects, and well acquainted with all branches of *belles-lettres*, Mr. Leland achieved his greatest popularity by productions of a humorous or burlesque character. He has passed several years in Europe, and now resides in London, where he is well known in literary circles. Among his works are *The Poetry and Mystery of Dreams* (1855), *Master Knell's Sketch Book* (1855), *Sunshine in Thought* (1862), *Legends of Beeds* (1864), *Hans Breitmann's Ballads* (5 parts, 1867-70), a volume of poems (1871), *Egyptian Sketch Book* (1873), *English Gypsies and their Language* (1873), *Fu Sang* (1874), besides translations from Heine and Schell. In 1875 he published a volume of *English Gypsy Poetry* with the assistance of Miss Janet Tuckey and Prof. E. H. Palmer. As a writer of dialect poetry Mr. Leland has shown a considerable mastery of the quaint speech of the "Pennsylvania Dutch," and his "Breitmann" ballads are as highly appreciated in England as in America.

**Leland** (HENRY PERRY), brother of Charles G. Leland, b. in Philadelphia Oct. 28, 1828; was a frequent contributor in prose and verse to the *Knickerbocker*, the *Spirit of the Times*, and other magazines and periodicals. He was endowed with large powers of observation, cultivated by travel, and a keen sense of humor, which would have given him eminence in American literature. He published two books—a volume of travel, *Americans in Rome*, and a collection of humorous sketches entitled *The Gipsy Boy More* (1856). During the civil war he was a lieutenant in the 11th Pennsylvania Vols., and was prostrated by a sunstroke, from the effects of which he never recovered. D. at Philadelphia Sept. 22, 1868.

**Leland**, or **Laytonde**, JEAN, b. in London, England, about 1500; was educated at St. Paul's School and at Oxford; took holy orders, and devoted himself to the study of English antiquities. He was appointed by Henry VIII. one of his chaplains, rector of Paepling near Calais, and royal antiquary clerk. In the latter capacity he was commissioned to make a survey of England, a task which occupied him six years, and was so thoroughly performed that the mass of materials gathered was more than he could arrange, much less prepare for publication. After eight years' solitary labors of classification, he became insane in 1550, and d. at London Apr. 18, 1562. His account of British authors, entitled *Commentarii de Scriptores Britannice*, was published in 1599 by Dr. Anthony Hall, his



*Itinerary of England in 1710-12* (9 vols.), and his *De Robus Britannicis Collectanea* in 1715 (6 vols.), the two latter works being edited by an eminent scholar, Thomas Hearne. Leland's manuscripts were deposited in the Bodleian Library at Oxford, and were largely used by Stowe, Camden, and Dugdale in their respective antiquarian works.

**Leland** (JOHN), D. D., b. at Wigan, Lancashire, England, Oct. 18, 1691; educated at the University of Dublin; was for 50 years pastor of a Presbyterian church at Dublin, where he d. Jan. 16, 1766. His polemical and apologetical works were highly esteemed and widely circulated. The best known was *A View of the Principal Doctrinal Writers in England in the Last and Present Century* (1754), often reprinted.

**Leland** (JOHN), b. at Grafton, Mass., May 14, 1754; was 1775-91 a Baptist preacher in Virginia, and 1792-1841 a pastor in Cheshire, Mass., though in fact he was an itinerant, visiting often places remote from his residence. D. at North Adams, Mass., Jan. 14, 1841. His *Life* and writings have been twice published since his death.

**Leland** (THOMAS), D. D., b. at Dublin, Ireland, in 1722; educated at Trinity College, Dublin, where he became fellow and professor of poetry. His translation of the *Oration of Demosthenes* (1756-70) was long a standard work; also published a *History of the Life and Reign of Philip, King of Macedon* (1758), and a *Dissertation on the Principles of Human Eloquence* (1764), a controversial work directed against Bishop Warburton; a *History of Ireland* (1773), and several volumes of *Sermons* (1769), besides numerous other works. D. at Dublin in 1785.

**Leleges**, was the name of an ancient race which was widely spread over Greece, the western coast of Asia Minor, and the intermediate islands, but which, like the Pelasgians, became incorporated with the Hellenes and disappeared as an independent people. Herodotus says that Leleges was the ancient name of the Carians; a later Greek writer places them in the same relation to the Carians as the Helots to the Lacedæmonians. In the Homeric poem both Leleges and Carians appear as equals and auxiliaries of the Trojans. Thus it appears that there existed a close relation between the Leleges and Carians, but about the character of this relation, and about the origin of the people, nothing is known. What the later Greek literature contains concerning this subject is evidently invention.

**Leleux** (ADOLPHE), b. at Paris Nov. 15, 1812, and began his artistic career as an engraver and lithographer; in 1835 commenced to exhibit, and soon gained great reputation as a genre painter, representing with much humor and grace scenes of life in Brittany, Northern Spain, Algeria, and the streets of Paris during the revolution of 1848. His pictures are very common in French galleries.—His brother, ARMAND, b. at Paris in 1818, studied for some time under Ingres and in Italy, but turned also to the genre. He seems to have a finer sense for the strictly picturesque than his elder brother, but less humor and character.

**Lelewel** (JOACHIM), b. at Warsaw Mar. 21, 1786; studied in his native city and at Vilna, and became professor of history at the Lyceum of Krementis in Volhynia in 1809, and at the University of Vilna in 1814, but was dismissed in 1824, being suspected of participating in secret revolutionary associations. Next year he was elected a member of the Polish diet, and became one of the most energetic and influential agitators, and one of the most prominent leaders of the Polish rising of 1830. After the failure of the revolution he fled to France, and lived partly in Paris, partly at Lagrange, the villa of La Fayette; but in 1833 he was banished from France on account of his participation in different Polish conspiracies. He went to Brussels, where he resided for the rest of his life, wholly devoted to science. D. May 29, 1861. His writings are very numerous, but they are all of the highest order. His knowledge is always ample, and generally exhaustive; his views are large and elevated; his style is pure and very impressive. Besides his *Numismatique du Moyen Age* (Paris, 1835), *Pythéas de Marseille et le Géographe de son Temps* (Paris, 1836), *Géographie des Arabes* (2 vols., Paris, 1851), *Géographie du Moyen Age* (4 vols., Breslau, 1852-57), all of which are scientific contributions of the highest value, he wrote several works relating to the history of his native country which contain some of the most brilliant pages of modern historiography, and which generally are as reliable as they are interesting. The principal of these works are—*History of Poland* (Warsaw, 1829), with a continuation (Brussels, 1843), *Considérations sur l'Etat politique de l'ancienne Pologne, et sur l'Histoire de son Peuple* (2 vols., Paris, 1844), *La Pologne au Moyen Age* (3 vols., Posen, 1846-51).

**LeLONG** (JACQUES), b. at Paris Apr. 19, 1665; received his first education at Malta, having been destined for the order of St. John, but separated therefrom; studied in

Paris, and in 1699 was appointed librarian at the *oratorium* of St. Honoré in Paris, where he d. Aug. 13, 1721. His *Bibliotheca Sacra*, a catalogue of all editions and translations of Holy Scripture (2 vols., 1709), and his *Bibliothèque historique de la France* (1719), a catalogue of all French historians and their works, are regarded as model works of bibliography.

**Le'ly** (SIR PETER), b. at Soest, Westphalia, in 1618; d. in London in 1680. His father, whose family name was VAN DER FAES, took the name DU LYS or LELY from the circumstance of having lived over a perfumer's shop, which bore the sign of a lily. Peter studied at Haarlem with Peter Grebber, but came to England in 1641 as a historical painter, and soon devoted himself to portraits, at first copying those of Vandyke, who had died the year before his arrival. Through the influence of William, prince of Orange, he was introduced to Charles I., whose portrait he executed, along with those of William and Mary. Lely succeeded Vandyke as court-painter, and rose rapidly to fame and fortune. It was he who painted the portrait of Cromwell, and who was bidden by his sitter to put in all the pimples and warts. Charles II. conferred on him the honor of knighthood, and commissioned him to paint the "beauties" of his time for Hampton Court. In the same place are several of the portraits of admirals which the duke of York, afterwards James II., engaged this artist to paint. Most of his portraits are of women, and are of a showy and meretricious character. The artist painted to suit the taste of an abandoned age. His historical pieces are in private collections. The *Susanna* and the *Elders* is in the gallery of the marquis of Exeter. Lely was buried in Covent Garden. There is his monument with bust by Gibbon and epitaph by Flatman. O. B. FROTHINGHAM.

**Lemaire** (NICOLAS ÉLOI), b. at Triancourt, France, Dec. 1, 1767; studied at the College of St. Ménechould and afterwards at Sainte-Barbe in Paris; was appointed professor of Latin poetry in the College of France, afterwards in the same department in the faculty of letters in Paris (1811); became dean of the faculty (1825); in 1810 Murat named Lemaire as head of his projected University of Naples, but Napoleon was not willing to let him leave France, and settled a pension upon him. After the Restoration, Louis XVIII. favored the publication of a complete series of the Latin authors, of which Lemaire was constituted chief editor. From the list of writers, made by Louis himself, Lucretius was omitted for political considerations. The series was completed in 142 volumes, to which Lucretius was subsequently added by P. A. Lemaire, nephew and assistant of the editor. D. Oct. 3, 1832. (See *Notice sur A. E. Lemaire*, par J. L. Gillon, in appendix to the *Bibliotheca Latina*.) H. DRISLER.

**Le Mars**, post-v. and tp., cap. of Plymouth co., Ia., at the junction of the Iowa division of the Illinois Central and the St. Paul and Sioux City R. Rs., 25 miles N. E. of Sioux City. It has a State bank, 2 newspapers, a variety of stores, workshops, and a flouring-mill, 3 churches, 3 hotels, etc. It is the centre of a fertile farming district. Pop. 152. J. C. BUCHANAN, Ed. "SENTINEL."

**Lemberg**, city of Austria, the capital of Galicia, situated on the Peltov in a narrow valley surrounded by forest-clad hills. It is the seat of the government, and of a Roman Catholic, an Armenian, and a Greek archbishop. It has a cathedral, built in 1370 by Casimir the Great, two beautiful synagogues, many splendid palaces, and other magnificent buildings. Its university is attended by about 1400 students and has 35 professors. Its manufactures are not important, but its trade, though to a great extent merely transit, is very extensive; it is mostly in the hands of Jews, who number about 25,000. Pop. 87,105.

**Lémery** (NICOLAS), b. at Rouen Nov. 17, 1645; studied pharmacology in his native city, at Montpellier, and at Paris, and gave lectures on chemistry which attracted great audiences, and gained the applause of all truly scientific men, as he kept closely to facts, and abandoned all mystical dreams of a sympathy between the metals and the planets, of an elixir for the prolongation of human life, and other such things. He belonged to the Reformed Church, and from this circumstance severe troubles arose. In 1683 he left France and went to England, where he presented a copy of the 5th ed. of his *Cours de Chimie*, published in 1675, to Charles II., and was well received. Soon after, however, the political troubles in England caused him to return to Paris, and after the Revocation of the Edict of Nantes in 1685, by which he lost his right of practising as an apothecary and physician, he joined the Roman Catholic Church, and continued his activity as a lecturer and writer unmolested till his death, June 19, 1715. The most prominent writings, besides his *Cours de Chimie*, are *Pharmacopée universelle* (1697) and *Traité des Drogues simples* (1698).



**Lem'hi**, county of Idaho, bounded E. by the Bitter Root Mountains. It has several fertile valleys, but is generally mountainous. It has important gold-mines. Cap. Salmon City. Pop. 988.

**Lem'ington**, post-tp. of Essex co., Vt., on Connecticut River, 67 miles N. E. of Montpelier. Pop. 191.

**Lem'tey's**, tp. of Mecklenburg co., N. C. Pop. 971.

**Lem'ma** [Gr. *Ἀλμα*], an auxiliary proposition demonstrated out of its regular order to facilitate the demonstration of some other proposition. The conclusion of the lemma is needed in the demonstration of the main proposition; and rather than enumber that proposition, a separate demonstration is introduced. The eleventh, twelfth, and thirteenth propositions of Book viii., Davies's *Legende*, are lemmas.

W. G. PIERCE.

**Lem'ming**, a name applied to rodents of the family Muridae and sub-family Arvicolinae (field mice), belonging to the genus *Myodes*. Some species are very abundant in the high northern regions of both continents. They are very prolific, and in Scandinavia are at times extremely destructive. They are remarkable for their occasional great migrations in search of food. *Myodes Norvegicus* is the typical lemming.

**Lemnis'cate** [Gr. *λεμνίσκος*; Lat. *lemniscatus*], a curve of the fourth order, shaped somewhat like the figure 8, as shown in the diagram.

It is the locus of the points of intersection obtained by drawing perpendiculars from the centre of a hyperbola to the tangents drawn to that curve.

If the equation of the hyperbola is

$$a^2y^2 - b^2x^2 = -a^2b^2,$$

the equation of the corresponding lemniscate is

$$(x^2 + y^2)^2 = a^2x^2 - b^2y^2.$$

If the hyperbola is equilateral, that is, if  $a = b$ , this equation becomes

$$(x^2 + y^2)^2 = a^2(x^2 - y^2).$$

The curve is quadric; in the latter case the entire area included within the two branches CA and CB is equal to the square of the semi-transverse axis, that is, to  $a^2$ . In the figure A and B are the vertices of the hyperbola, and C is its centre. At A and B tangents to the curve are perpendicular to AB; the point C is a multiple point, at which tangents to the curve coincide with the asymptotes of the given hyperbola.

W. G. PIERCE.

**Lem'nos** [*Ἰνῆρος*, now *Limni* or *Stalini*], an island in the *Egean*, belonging to Turkey, 40 miles S. E. of Athos. Area, 150 square miles. It is of very irregular outline, is rocky and hilly, and bears strong marks of volcanic action, but the valleys are fertile, and the ancients relate that the mountain *Mosychilus* was sometimes an active volcano. This island, so famous in history and mythology, now contains some 12,000 inhabitants, mostly Greeks. Its chief town, Castro, is the seat of a bishop.

**Lem'on** [Hindustanee, *limbu*, *limu*, or *nimbu*, from which the Arabian *limun*; Sp. *limon*, etc.], the fruit of *Citrus limonium*. The *Citrus* genus, of which the orange and lemon are the familiar representatives, constituted a natural order, *Aurantiaecæ*, which of late is merged in the large order *Rutaceæ*. The leaves of these trees are noted for the translucent dots appearing like punctures when held between the eye and the light, these dots being oil-glands and giving the fine aroma which characterizes the genus; also for the joint below the blade, which shows the leaf to be a compound one reduced to the terminal leaflet; and the petiole below is usually more or less winged, with leafy borders. The lemon tree does not form the close head of deep green foliage which is so striking in the orange tree, but is of irregular growth, with paler and sparser leaves. The young shoots are dull purple; the corolla externally purplish and internally white; the delicate aroma distinct from that of the orange-blossom. The fruit is pale yellow, ovoid or oblong, usually crowned by a nipple; the rind firm and adherent to the pulp; the juice sharply acid, but in some varieties sweetish. The roughness of the surface of the lemon is owing to the imbedded oil-cells. These furnish the oil and essence of lemon, obtained either by expression or distillation. Lemon-peel is a well-known flavoring ingredient. Lemon-juice is not only largely used for acidulated drinks and for effervescing draughts, but also for the preparation of citric acid, its important ingredient. This is used in medicine for febrile and rheumatic diseases, and in the arts for certain processes of calico-printing, to discharge colors and deepen the white parts of fabrics dyed with ferric salts. Concentrated lemon-juice is

largely employed on shipboard for the prevention of scurvy in long voyages. The commercial article is derived from the lime and bergamot, as well as from lemons.

The lemon is of Indian origin; the tree, which probably represents the wild state of both the lemon and the citron, is a native of the forests of Northern India. The introduction of the tree to Europe is due to the Arabians. Its chief cultivation as an object of industry is on the Mediterranean coast between Nice and Genoa, in Calabria, Sicily, etc. It endures less cold than the orange, and wherever it well succeeds is a more profitable culture.

ASA GRAY.

**Lemon**, tp. of Butler co., O. Pop. 5242. It includes Middletown (P. O.) and other villages.

**Lemon**, post tp. of Wyoming co., Pa. Pop. 531.

**Lemon (MARK)**, b. in London, Eng., Nov. 30, 1809; was author of more than sixty plays and farces, many of them highly successful, and of several novels, but will be chiefly remembered for his long connection with *Punch*. From the establishment of that paper in 1841 he was assistant editor, and in 1843 assumed the chief management, which he retained through life. He was also for many years literary editor of the London *Illustrated News*, for which he wrote about 100 songs, and assistant of Charles Dickens in the management of *Household Words*. He was distinguished for his generous sympathies and his hatred of shams. D. at Crawley, Sussex, May 23, 1879.

**Lemond'**, post-tp. of Steele co., Minn. Pop. 417.

**Lemon', Oil of** (*Oilum Citri*), the volatile oil of lemon-peel, extracted from the grated rind by pressure or by distillation with water. It may also be obtained by putting the grated peel in hot water and skimming off the oil which rises to the surface. That obtained by pressure has more of the peculiar flavor of the fruit, but contains mucilage, etc., which make it more liable to change on keeping than that which is prepared by distillation. Oil of lemon is a volatile liquid, generally yellow, having the peculiar odor of the fruit and a pungent, aromatic taste. Its sp. gr. is 0.8517. It is sparingly soluble in water; dissolves in 7.14 parts alcohol of sp. gr. 0.8317; in 10 parts alcohol of sp. gr. 0.85; in any quantity in absolute alcohol; mixes with both fixed and volatile oils. It dissolves sulphur, phosphorus, resins, and fats. Exposed to air and light, it absorbs oxygen, with the formation of ozone, becomes darker and more viscid, and evolves a little carbonic acid. It consists almost entirely of two hydrocarbons, *Citellin*, isomeric with each other and with oil of turpentine, differing from each other in optical rotary power, and in their behavior with hydrochloric acid.

Oil of lemon is largely used in perfumery and as a flavoring for ice cream and syrups; has the stimulant properties of the aromatics, though in pharmacy it is chiefly used to impart flavor to other medicines. It should not be dark-colored or viscid, and should not leave a permanent stain on paper. It is often adulterated with oil of turpentine, lavender, alcohol, etc. The presence of cheaper oils may generally be recognized by the odor. Turpentine may be detected by noting the behavior of the oil with regard to polarized light before and after heating. With pure oil little or no change will be noticed, but when turpentine is present the dextro-rotary power will be considerably increased by heating.

C. F. CHANDLER.

**Lemont'**, post v. and tp. of Cook co., Ill., on the Chicago and Alton R. R., 26 miles S. W. of Chicago. Pop. 3579.

**Lemontey'** (PIERRE ÉDOUARD), b. at Lyons Jan. 14, 1762. Deputy in the National Assembly, Lemontey soon turned against the revolutionists, and he fought at Lyons during the siege of the city by Couthon. He escaped alive, and fled to Switzerland. He returned to France in 1804, and was elected in 1817 member of the Academy. His principal works, which were held in high repute, are *Essays on the Monarchical Establishment of Louis XIV.* and *History of the Republic*. D. at Paris June 26, 1826. FELIX ADAMGNE.

**Lem'onweir**, post v. and tp. of Jackson co., Wis., on the Milwaukee and St. Paul R. R. Pop. 1917.

**Le Moyne**, a Canadian family of eleven brothers, seven of whom acted prominent parts in advancing French explorations, conquests, and settlements in America.—Their father, CHARLES LE MOYNE, b. in Normandy, France, in 1626, came to Canada in 1644, lived some years among the Hurons; obtained extensive land grants; was distinguished in wars against the Iroquois under Courcelles and Tracy; was held a prisoner by those Indians several months in 1665, and was created in 1668 Seigneur de Longueuil, to which title that of Châteauguay was afterwards added. He was for some time military commander of Montreal, where he d. in 1682. Of his sons, PIERRE and JEAN-BAPTISTE were distinguished in Louisiana, gaining the titles of SIEURS DE BIENVILLE and D'HERVILLE (which see). The eldest



brother, I. CHARLES, Baron de Longueuil, b. in Montreal Dec. 10, 1656; served in his youth in the French army in Flanders; promoted colonization to Canada: built a stone fort on his estate at Longueuil; was wounded in the repulse of Sir William Phipps's assault upon Quebec in 1690; was made governor of Montreal and baron in 1700; commander-in-chief of the colonial forces; fought against the English expedition of Walker and Nicholson in 1711; was in command at Three Rivers in 1720, and at Montreal from 1724 to 1726; rebuilt Fort Niagara in the latter year; was made chevalier of the order of St. Louis, and d. at Montreal June 8, 1729.—II. JACQUES, Sieur de Sainte Hélène, b. at Montreal in Apr., 1659, was sent in Mar., 1686, with his younger brothers, Pierre and Paul (afterwards Iberville and Maricourt), in an expedition under the command of Chevalier de Troyes against the English on Hudson's Bay, where they had built Forts Monsipi, Rupert, and Kichichouanne. These three forts were captured, as well as a vessel of war having on board the English governor-general of Hudson's Bay, Sainte Hélène having borne a leading part in each action. He was second in command of the expedition which took Fort Corlear (Schenectady) Feb. 9, 1690, and in the same year commanded the batteries which repelled the English squadron at Quebec, on which occasion he was mortally wounded.—III. PAUL, Sieur de Maricourt, b. at Montreal Dec. 15, 1663, participated, as above mentioned, in Troyes's expedition against Hudson's Bay, being wounded before Fort Monsipi (June 20, 1686); remained with his brother Iberville in command of that district up to 1690, when he aided in the defence of Quebec; took part in Frontenac's expedition against the Iroquois, with whom he negotiated peace in 1701, and in Apr., 1704, lost his life, with forty others, in a stockade burned by those Indians.—IV. JOSEPH, Sieur de Serigny, b. at Montreal July 22, 1668; became an officer in the French navy, and in 1694 and 1697 commanded vessels in Hudson's Bay in co-operation with the land operations of his brother Iberville. Subsequently he commanded a squadron; brought to Louisiana some of its earliest settlers, and in 1718-19 surveyed the coast of that colony. He was engaged in the capture of Pensacola from the Spaniards (May 14), and repulsed them from Dauphin Island, near Mobile (Aug. 19, 1719), after a siege of a month; was made captain of a ship of the line in 1720, and in 1723 rear-admiral and governor of Rochefort, France, where he d. in 1734.—V. ANTOINE, Sieur de Châteauguay, b. at Montreal July 7, 1683; became an officer of the French army; brought a body of colonists to Louisiana in 1704; served under Iberville against the English in 1705 and 1706; was royal lieutenant in Louisiana in 1718; was engaged in the Florida campaign against the Spaniards in 1719; taken prisoner at Pensacola Aug. 7, and commanded at Mobile from 1720 to 1726, when he was removed from office and recalled to France; sent as governor to Martinique in 1727, and afterwards to Cayenne; returned to France in 1744; was made governor of Cape Breton in 1745; successfully defended Louisbourg against the New England forces under Pepperell, and d. at Rochefort, France, Mar. 21, 1747. He inherited the title of Sieur de Châteauguay from his brother Louis, b. in Jan., 1676, who was mortally wounded in the attack on Fort Nelson, Hudson's Bay, and d. Nov. 4, 1694.—Another brother, FRANÇOIS, b. Mar. 10, 1666, killed in battle with the Iroquois at Repentigny June 7, 1691, was the first Sieur de Bienville, the title having passed on his death to his brother, Jean Baptiste. Sauvolle, the first colonial governor of Louisiana, has often been incorrectly included as one of the brothers Le Moynes. PORTER C. BLISS.

**Lempa**, a river of San Salvador, Central America, rises in Lake Guija, near the Guatemala boundary, flows E. S. E. nearly 150 miles through the departments of Sonsonate, Cuscatlan, and San Vicente, then bending S. forms the E. boundary of the departments of San Vicente and La Paz and the W. boundary of San Miguel, and falls into the Pacific after a total course of 210 miles. The Lempa is the largest stream of the Pacific coast of Central America, and is navigable for a large part of its course. The valley of the Lempa is broad and well settled, and one of the most productive agricultural regions within tropical America.

**Lempière** (JOHN), D. D., b. in the island of Jersey about 1750; studied at Westminster School and at Oxford; took orders in the Church of England; was head-master of classical schools at Abingdon and Exeter; became rector of Meath and Newton-Petrock, Devonshire, in 1811, and d. Feb. 21, 1824, at London. He published in 1788 a small *Bibliotheca Classica*, or "Classical Dictionary," much enlarged in the 2d ed. of 1792, and which has since been many times reprinted in England and the U. S. It was based upon Sabbathier's *Dictionnaire des Auteurs classiques*, published at Châlons-sur-Marne in 36 vols. (1766-90), and was in turn the basis of Anthon's well-known classical dictionary. Dr. Lempière published also a volume of *Ser-*

*mons* (1791), the first volume of a translation of Herodotus (1792), and a *Dictionary of Universal Biography* (1808, in a single volume, which was reprinted in New York in 1825 (2 vols.), with additions by Eleazar Lord.

**Lemp'ster**, post-tp. of Sullivan co., N. H., 40 miles W. of Concord, has 3 churches and manufactures of lumber. Pop. 678.

**Lemur** [Lat. *lemur*, "spectre"], the name of a genus of mammals, bestowed on it on account of the appearance of the animal, and especially its large staring eyes and its nocturnal habits. By the late Dr. Gray the genus was split into three—viz. *Varecia*, *Lemur*, and *Prosimia*. (See LEMURIDÆ and LEMURINÆ.)

**Lemures**, in Roman mythology, was by some writers used as the general name for all spectres or spirits of the dead, of which the good ones were called *laræ* and the evil *larvæ*. More commonly, however, *lemures* was used synonymously with *larvæ*, denoting only those spirits which returned to the upper world with the purpose of injuring the living. In order to propitiate them an annual festival called *Lemuria* was held to their honor, and certain ceremonies were performed on the nights of the 9th, 11th, and 13th of May. The days on which these rites were performed were considered unlucky, and the temples remained closed during the festival. A description of the ceremonies is found in the fifth book of Ovid's *Fasti*.

**Lemuridæ** [from *Lemur*, the typical genus, and the family termination *-idæ*], a family of the sub-order Prosimiæ and order Primates, whose teeth are of three kinds—viz. incisors ( $\frac{1}{2} = \frac{2}{2} \times 2$ ), canines ( $\frac{1}{2} \times 2$ ), and molars ( $P. M. \frac{2}{2} = \frac{3}{2}$ ;  $M. \frac{3}{2} \times 2$ ); the incisors of the upper jaw small (sometimes deciduous), and separated into two groups by a symphyseal interspace, and those of the lower jaw larger, contiguous, and proclivous; the canines of the lower jaw proclivous, parallel with and resembling the incisors (and hence sometimes mistaken for them); leg with the fibula and tibia distinct from each other; hind foot with the second toe armed with a subulate claw, and the other toes provided with flattened nails. This family includes the lemurs, or, as they are sometimes called, half-monkeys, and is confined to the island of Madagascar, the equatorial parts of Africa, and India. A considerable range of variation is exhibited by its several constituents in the general form and proportions, the shape of the head, the development of a tail (which in some is very large, and in others wanting), the size of the ears, and the length of the tarsus; the modifications in these respects have caused the differentiation of the family into four sub-families—viz. Indrisinæ, Lemurinae, Nycticebinæ, and Galagininæ. The peculiar relations of the family will be more appropriately considered under the head PROSIMIÆ, and the minor groups under their titles. THEO. GILL.

**Lemurinae** [from *Lemur* and the sub-family ending *-inæ*], the chief sub-family of Lemuridæ, in which there are 36 (exceptionally 32) teeth—viz.  $I. \frac{2}{2}$  (sometimes lost from the upper jaw),  $C. \frac{1}{2}$ ,  $P. M. \frac{3}{2}$ ,  $M. \frac{3}{2} \times 2$ ; the neural spines of the posterior (last dorsal and lumbar) vertebrae inclined forward; the tail elongated, and generally exceeding two-thirds the length of the body; the hind limbs considerably longer than the fore ones, and with the tarsus of normal proportions, or moderately elongated; and the ears moderate, with the anterior portion of the helix well developed, folded over the fossæ of the concha and anti-bell, and with the tragus and anti-tractus distinctly developed. The group includes the typical lemurs, which are readily recognizable by their external appearance; the head is produced into a more or less elongated snout, and somewhat resembles that of the raccoons or foxes. All the living species are confined to the island of Madagascar. Exclusive of *Chirogaleus* (which rather belongs to the Galagininæ), they are grouped in four genera—viz. *Lemur*, *Haplemur*, *Lepilemur*, and *Micocebus* (Peters, 1874). They are chiefly nocturnal animals, live in the forests of Madagascar in the trees, feed on insects and fruit, and associate together in troops. In repose they roll themselves up in the form of a ball, and wind their tail around the body. Their elongated hind limbs enable them to leap with agility. THEO. GILL.

**Lemuroidea**, a name applied by some to the sub-order PROSIMIÆ (which see).

**Le'na**, one of the principal rivers of Siberia, rises near Irkutsk, in the mountains N. of Lake Baikal, and enters the Arctic Ocean through several branches between lon. 125° and 130° E. It receives the Vitim, Olekma, and Aldan from the right, and the Viliooi from the left, passes by Olekminsk and Yakootsk, and is navigable from May to November.

**Lena**, post-v. of Stephenson co., Ill., on the Illinois Central R. R., 132 miles N. W. of Chicago. It has a bank, a weekly newspaper, steam flouring and planing mills, an



iron-foundry, several carriage and wagon manufactories, and other shops, 1 very fine and 2 smaller public-school buildings, a school library, 2 hotels, a steam elevator, 4 grain-warehouses, and the usual number of stores. Grain, stock, dairy products, tobacco, etc. are the chief articles of export. Pop. 1294. J. W. NEWCOMER, Ed. "STAR."

**Lena**, a v. of Brown tp., Miami co., O. Pop. 114.

**Le'nau** (NIKOLAUS), whose true name was NIEMTSCH VON STIEHLENAU, b. at Csárad, Hungary, Aug. 15, 1802; studied philosophy, jurisprudence, and medicine at Vienna, travelled much; visited in 1832 the U. S.; resided after his return to Europe alternately in Vienna, Ischl, and Stuttgart, but became insane in 1844, and d. Aug. 22, 1850, in a lunatic asylum at Oberdöbling, near Vienna. He published his first volume of poems in 1832; in 1838 followed a second; in 1835, *Faust*, in 1837, *Saragatada*, in 1842, the *Abdogenes*, and after his death, *Don Juan*. A collected edition of his works was published at Stuttgart in 1853, in 4 vols. It is unquestionable that Lenau was an original poetical genius, and the great impression which he produced in Germany was not only natural, but just. The extraordinary brilliancy and variety of his imagery might be the product of study and labor, to some extent at least; but there is, especially in his Polish and Hungarian songs, a fresh gush of genuine feeling, and in his verse a full, round melody which belongs to the genius alone. Nevertheless, even in his earlier productions, it is evident that he endeavors to raise, by the aid of the speculative philosophy, his poetical foundation above that standpoint which he actually occupies as a living personality; and this attempt at making the poetry bigger than the poet by help of an artificial substruction—an attempt frequently met with in the latest period of German literature, but which by itself is as impossible as climbing the moon—resulted with Lenau first in forced ideas, unsound excitement, and obscure expressions, and then in the total destruction both of the genius and the personality. CLEMENS PETERSEN.

**Len'awee**, county of Michigan, bounded S. by Ohio. Area, 720 square miles. It is undulating, very fertile, and well watered. Cattle, grain, and wool are staple products. Lumber, carriages, cooperage, metallic wares, saddlery, furniture, clothing, cheese, flour, machinery, and brick are leading articles of manufacture. The county is traversed by the Michigan Southern R. R. and its branches. Cap. Adrian. Pop. 15,395.

**Len'cas**, a tribe of Indians in Honduras, Central America, speaking a language called *Chontal*, a Mexican term signifying "barbarian." They are industrious and peaceable mountaineers, numbering some 40,000, and occupying the table lands of Otoro and Intibucut, near Comayagua, the capital of the republic. There are Chontal Indians in Nicaragua and in the Mexican states of Oaxaca and Tabasco, but their languages are probably distinct from each other and from that of the Lenecas.

**L'Enclos** (ANNE, called NINON DE), b. at Paris in 1615. Possessed of a small fortune, which she managed very shrewdly, and which enabled her to make love the pursuit of her life without making it a business, she left early the parental roof and established an independent household. She was beautiful, she was spirited; Scarron, Saint-Evremond, Molière, Fontenelle, Larocheffoucauld, and others read their works in her salon; but, above all, she was fascinating, and it soon became indispensable for all young men of birth, wealth, and elegant ambitions to be introduced to her. One lover followed the other in rapid succession, and this life went on uninterruptedly for more than half a century. She was the mistress of the marquis de Ségur; in the next generation his son was her lover, and in the third she seduced his grandson. Her own son, who had been educated by the father and kept in ignorance of the mother, fell desperately in love with her, and when, in order to prevent a horrible crime, she was compelled to reveal the secret suddenly to him, the young man blew out his brains in her presence, but she herself remained comparatively cool at the affair. At last a change came. She was now over seventy. Young men began to call her "Mademoiselle de L'Enclos," and not, as formerly, simply "Ninon." Ladies, even of the highest position and of the finest education, now began to crowd her salon, and for many years longer her social position was very brilliant. She felt sad, however, as her letters to Saint-Evremond, who wrote her biography, show, but there was no remedy. To the student her character does not seem to be of any great interest, but her life is exceedingly characteristic of the age in which she lived. Her salon and the Revolution of the Edict of Nantes prepare the feeling very well for the scenes of the French Revolution. She attained a great age, dying at Paris Oct. 17, 1795. CLEMENS PETERSEN.

**Lenc'zy**, or **Lenczye'u**, town of Russia, in the gov-

ernment of Warsaw. It has some linen manufactories. Pop. 5338.

**Lendina'ra** [Lat. *Londunaris*], a small town of N. Italy, in the province of Rovigo, about 25 miles S. W. of Padua. This very ancient town was the subject of much contention during the Middle Ages. It now contains some handsome churches, with fine pictures by Paul Veronese, Sebastiano del Piombo, etc. Pop. in 1874, 6909.

**Le Neve** (JOHN, b. in England about 1679; was educated at Trinity College, Cambridge, and became rector of Thornton-le-Moor, Lincolnshire. D. about 1741. He was a zealous collector of biographical materials; wrote *Fasti Ecclesiæ Anglicanæ* (1746), *Monumenta Anglicanæ* (9 vols., 1700-19), *Lives of the Protestant Bishops* (1720), *Lives of the Archbishops* (1723), and other minor works. A new edition of the *Fasti* was published in 1854 (3 vols.) by T. Duffus Hardy, assistant keeper of the public records, with a continuation down to that year. While the original edition contained only 11,000 entries, Hardy's edition contained data respecting more than 30,000 clergymen of the Church of England.

**L'Enfant** (PIERRE CHARLES), b. in France in 1755; came to America with La Fayette in 1777, and served in the Revolution as an officer of engineers; became captain in 1778; was wounded at the siege of Savannah; promoted to be major in 1783; was engineer at Fort Mifflin in 1794; drew up the plan for the city of Washington, and was architect of some of the public buildings at that capital. In 1812 he was appointed professor of engineering at West Point Military Academy, but declined. D. in Prince George's co., Md., June 14, 1825.

**Len'itives** [Lat. *lenire*, to "soften"], in medicine, substances which, without specially active virtues of their own, possess by reason of viscosity the power to mechanically sheathe the mucous membranes or raw surfaces from the action of irritants. Such are the bland fixed oils, glycerine, and solutions of gummy and starchy substances.

EDWARD CURTIS.

**Lenkoran'**, town of Russia, in the government of Baku, on the Caspian Sea. In its vicinity are many hot sulphur springs of great medicinal repute. Pop. 5644.

**Len'nep**, town of Rhenish Prussia, on the Lenne, an affluent of the Rhine, has extensive manufactures of linen, woollen, cotton, and silk fabrics, especially of ribbons. Pop. 7653.

**Lennepe, van** (JACOB), b. in Amsterdam Mar. 25, 1802; studied law at the University of Leyden; practised with great success as an advocate; was appointed attorney general for the province of North Holland, and d. Aug. 26, 1868. He made his début in literature with a volume of poems, *National Legends*, and shortly after, under the Belgian revolution of 1830, his two comedies, the *Frontier Village* and the *Village beyond the Frontier*, were performed with great success. He wrote about thirty more dramas, some of which were received with great applause. But it was chiefly as a novel-writer he gained his fame. Inspired by the example of Walter Scott, he treated the history of his fatherland in a series of romances, about 50 in all, and several of these acquired a great reputation and were translated into German, French, and English; as, for instance, *The Ransom of Lennepe* and *The Adopted Son*.

**Len'ni-Lenape**. See DELAWARES.

**Len'ni Mills**, post-v. of Middletown tp., Delaware co., Pa., on the West Chester and Philadelphia R. R.

**Len'nox**, county of Ontario, Canada, bordering on Lake Ontario, includes Amherst Island in that lake. It is traversed by the Grand Trunk Railway. The county of Addington is joined to it for judicial purposes. The soil is fertile. Cap. Nepesee. Pop. 16,396.

**Lennox** (CHARLOTTE RAMSAY), b. in New York in 1720, her father, Col. James Ramsay, being lieutenant-governor of the province; went to London at the age of fifteen; devoted herself to literature, and wrote novels which obtained great popularity. She enjoyed the friendship of Richardson and Dr. Johnson. Among her works were a volume of *Poems* (1752); *The French Quaker*, 1 vol.; *Shakespeare Illustrated* (1753-54), a collection of tales used by Shakespeare in his plots; *Henrietta, a Novel* (1758); *Phœnix, a Dramatic Pastoral* (1758); *Sophia* (1763); *Father Ranney's Greek Theatre*; and a translation of the duke of Sully's *Memoirs* (1761). D. in London Jan. 4, 1804.

**Lennox** (EARL AND DUKES OF). See STEWART AND RICHMOND.

**Lennox** (Lord GEORGE HENRY), GEN., b. in England Nov. 27, 1797, was second son to Charles Lennox, second duke of Richmond. He entered the army in 1761; distinguished himself in the German campaign as aide-de-camp to the duke of Cumberland, 1767, and to the king, 1762; entered



Parliament in 1761; attended his brother, the third duke of Richmond, in his embassy to France in 1765; became lieutenant-general in 1777; constable of the Tower of London and governor of Plymouth in 1784; general and member of the privy council in 1793. D. at Stoke Park Mar. 25, 1805.

**Lennox** (Lord WILLIAM PITT), b. in England Sept. 20, 1799, the fourth son of the fourth duke of Richmond, and godson of William Pitt; educated at Westminster; entered the army; was for some years attached to the staff of the duke of Wellington; has been a voluminous contributor to the *Sporting Review* and to several magazines and newspapers. Among his works are *Compton Audley* (1841), *The Tuft-Hunter* (1843), *Pecoy Hamilton* (1852), *Philip Courtney* (1857), *Merric England* (1857), *Recreations of a Sportsman* (1862), *Fifty Years' Biographical Reminiscences* (1863), *Adventures of a Man of Family* (1864); and *Drafts on my Memory* (1865).

**Len'noxville**, post-v. of Compton co., Quebec, Canada, at the junction of the Massawippi Valley and the Grand Trunk Railways, 3 miles from Sherbrooke; is the seat of Bishops' College, a flourishing institution. Pop. about 900.

**Lenoir**, county in E. North Carolina. Area, 400 square miles. It is traversed by the Atlantic and North Carolina R. R. and the navigable Neuse River. It is level and fertile. Rice, cotton, and corn are staple products. Cap. Kinston. Pop. 10,434.

**Lenoir**, post-v. and tp., cap. of Caldwell co., N. C., 15 miles N. of Morganton. It is the seat of Lenoir Female College. Pop. of v. 446; of tp. 2054.

**Lenoir** (Gen. WILLIAM), b. in Brunswick co., Va., May 31, 1751; removed in childhood to North Carolina; took an active part in the campaigns against the British and Tories in North Carolina and South Carolina; was for sixty years justice of the peace; often a member of both branches of the legislature; president of the senate for five years; then president of the council, and for the last eighteen years of his life major general of the State militia. D. at Fort Defiance, N. C., May 6, 1839.

**Lenormand** (MARIE ANNE ADELAÏDE), b. in Alençon May 27, 1772; came in 1790 to Paris as saleswoman in a linen shop, and appeared in 1793 as a fortune-teller. She was several times arrested—in 1794, 1809, and 1821—but this circumstance only contributed to make her more popular. During the empire her rooms were visited by people of the highest rank, even by the empress Josephine, and when, after the fall of Napoleon, she went to Aix-la-Chapelle, she attracted the attention of the assembled monarchs, especially of Alexander of Russia. After 1830 she was nearly forgotten, and d. in obscurity June 25, 1843, but her life, and even her writings, *Mémoires historiques et secrets sur l'impératrice Joséphine* (1829), etc., are not without interest for the mental physiognomy of those times.

**Lenormant** (CHARLES), b. in Paris, France, June 1, 1802; studied law; travelled in Italy, where he gave special attention to archaeology; became in 1825 inspector of fine arts; accompanied Champollion the younger to Egypt in 1828; took an active part as a member of the commission for exploring the Morea; became after the revolution of 1830 chief of the section of fine arts at the ministry of the interior, keeper of books and antiquities at the royal library, professor at the Sorbonne (1835), and professor of Egyptian archaeology at the College of France. He wrote numerous treatises on art, numismatics, ceramics, and Egyptology, as well as on religion and history, and was editor for many years of the *Correspondant* magazine. D. at Athens Nov. 24, 1859.—His wife, AMÉLIE, a niece of Madame Récamier, edited the correspondence of that celebrated lady (1859), besides writing works on *Madame de Staël* (1862) and the *Women of the Revolution* (1865).

**Lenormant** (FRANÇOIS), son of Charles, b. at Paris in 1835; was educated by his father, following his footsteps as an archaeologist, to which he added a thorough study of the languages of the cuneiform inscriptions, in which department he has become a leading authority. He is especially prominent for his important researches in the Accadian language; and after travelling in Egypt, Turkey, and Greece became in 1874 professor of archaeology at the Bibliothèque. His *Manual of the Ancient History of the East* (3 vols., 1868-69; Am. ed. 2 vols., 1869-70) is the best modern compendium of the results of Egyptian, Phœnician, and Assyrian researches. Other important works are *Lettres assyriologiques et épigraphiques* (3 vols., 1871-72-73); *Études accadiennes* (1873-74); *La Magie chez les Assyriens* (1874), and *Les premières Civilisations* (1874). From none of the recent workers in the field of the cuneiform monuments have greater results been obtained.

**Len'ox**, tp. of Warren co., Ill. Pop. 948.

**Lenox**, tp. of Iowa co., Ia. Pop. 445.

**Lenox**, post-v. and tp. of Berkshire co., Mass., 5 miles S. of Pittsfield. It was long the county-seat. It is traversed by the Housatonic River and R. R., and has manufactures of iron, plate glass, lime, lumber, flour, brick, etc. Iron ore and limestone are obtained here. The town has 4 churches, a public library, and a good high school. It is a favorite place of summer resort. Pop. 1965.

**Lenox**, tp. of Macomb co., Mich. Pop. 2134.

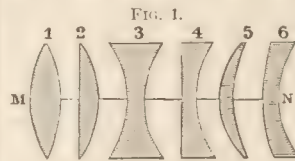
**Lenox**, post-tp. of Madison co., N. Y., on Oneida Lake, has several mineral springs and beds of iron and gypsum. It contains Canastota, Oneida, and many other villages. Pop. 9316.

**Lenox**, post-tp. of Ashtabula co., O. Pop. 752.

**Lenox**, tp. of Susquehanna co., Pa. Pop. 1751.

**Lens**, town of France, in the department of Pas de Calais, on the Souchez, an affluent of the Scheldt, has important coal-mines in its vicinity. Pop. 5738.

**Lens** [Lat. *lens*, a "lentil"], in optics, a transparent substance bounded by opposite curved surfaces, or by one plane and one curved surface, the curvature being usually spherical. The property of a lens is to refract or bend the rays of a pencil of light transmitted through it symmetrically toward or from a fixed line called the axis. The axis is fixed by the condition that the tangents to the opposite surfaces at the points where it meets them are parallel to each other and perpendicular to this axis. Lenses are called converging or diverging lenses according to the effect produced by them upon parallel rays. They are of several kinds, distinguished by the character of their curvatures. Six



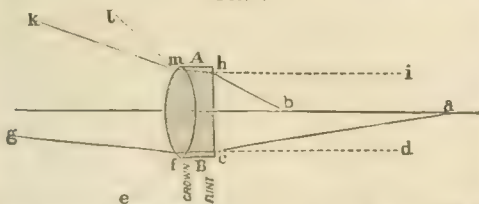
forms are shown in the figure, the first a double convex, the second a plano-convex, the third a double concave, the fourth a plano-concave, the fifth a meniscus, and the sixth a convexo-concave or concavo-convex, receiving the one or the other of these names according as the incident light falls on the convex or the concave side. The use of lenses in optical instruments is to aid vision by forming images of objects, to be viewed instead of the objects themselves; which they do by causing pencils of light from the several points of such object to converge toward or diverge from corresponding points, in the first instance on the opposite side of the lens, and in the second on the same side. These points are called foci. The image is positive and real when formed by converging rays; negative and imaginary when without being actually formed it seems to exist to the eye receiving the diverging rays. Only one of the pencils from the object can have its axis coincident with the axis of the lens; but every oblique pencil has, nevertheless, an axis passing through the optical centre of the lens; and the focus of each pencil will be found in the axis of that pencil or in the axis prolonged. It is unfortunately true, however, that the rays refracted from the border of a lens of spherical curvature meet the axis at a point less distant from the lens than that in which those nearer the centre meet it. Hence, the focus of a simple lens is not a single point; or rather, every elementary ring into which the lens may be supposed to be divided produces its own focus; and the distance on the axis between the focus of the extreme border and that of the rays indefinitely near the centre is called the spherical aberration. It is furthermore true that inasmuch as the rays of the different colors of light are unequally refrangible, these different colors have foci differently distant from the lens; the focus of the red being most distant, and that of the violet least. This separation of the different colors is called dispersion, and the distance along the axis between the foci of the rays of greatest and least refrangibility is called the chromatic aberration. Spherical lenses would therefore be of little use in optics if it were not possible so to combine them as to neutralize the effects of both these two kinds of aberration. Chromatic aberration may be corrected by using a convex lens formed of a material of low dispersive power in combination with a concave in which this power is higher. Two such lenses placed in contact may be so adjusted to each other that their absolute dispersions shall be equal and opposite, while there is a predominance of refracting power in the converging glass by which it may form an image. In such combinations the converging lens employed is usually of crown glass and double convex, its diverging mate being plano-convex and of flint glass. The convexity of one side of the double convex is in this case made of exactly the same curvature as the concavity of the plano-concave, and the two are usually united with Canada balsam or other transparent cement; by which means the loss of light in



consequence of reflection at the surfaces of contact is almost wholly prevented. Chromatic aberration cannot be perfectly corrected by a combination of two glasses only, because it is not true that the dispersive powers of different media are in precisely the same ratio for each of the elementary colors. Combinations of three different lenses have therefore sometimes been used in telescopes, in order to correct the very small secondary dispersion which is left in any combination of two. But this is a refinement which is in general hardly necessary. A combination of glasses for the correction of color is called an achromatic combination. A combination designed to destroy the effect of spherical aberration is called applanatic. The spherical aberration of a single lens can never be less than 1.07 times the thickness of the lens. This is the amount of aberration in a lens made of glass having an index of refraction of 1.5, of which the two opposing curvatures have radii in the ratio of one to six, the incident rays falling upon the more convex surface. If the index is greater, the disproportion of the radii of curvature must be greater also. For the index 1.6, it is one to fourteen. For the index 1.686, it is one to infinite—i. e. a plano-convex. By a combination of a double convex and a meniscus (whose radii of curvature may be calculated when the index of refraction of the glass is given) the spherical aberration in the axis may be completely corrected. Such a combination was first described by Sir John Herschel. But this is a fact of no practical value, because the aberration of oblique pencils in such combinations is very great. A meniscus having the curvature of a prolate ellipsoid, and an opposing spherical concave surface whose centre of curvature is the more distant focus, will concentrate rays falling parallel to its axis upon its convex surface truly into that more distant focus; provided the index of refraction of the material is equal to the semi-axis major divided by the eccentricity. A plano-convex lens of which the convex side has the curvature of a hyperboloid will, on a like supposition as to the index, cause rays incident on the plane surface parallel to its axis to converge truly into the more distant focus of the hyperboloid. In these cases, however, the ob-

FIG. 2.

FIG. 3.



lique pencils suffer aberration: and though probably for celestial objects, in which the extreme obliquity of the pencils is very small, they might be useful, the difficulty of constructing glasses of such curvature prevents their being used. An achromatic combination of two lenses like that shown in Fig. 3 is applanatic also for two points on the line of its axis; but the oblique pencils still have aberration at these distances. These points are indicated in the figure at *a* and *b*. It was discovered, however, in 1829, by Mr. J. J. Lister of London, that the aberrations of oblique pencils from radiants at these distances are contrary to each other, and also that the focus conjugate to radiant at the shorter of these distances, *b*, is negative, while that conjugate to a radiant at the longer distance, *a*, is positive: so that if an object be placed at the nearer applanatic focus of a given combination, its image is a virtual image formed behind itself; and if the place of this virtual image be at the distance of the remoter applanatic focus of a second combination, a positive image will be formed beyond this second combination which will be free from both spherical and chromatic aberration, as well in oblique axes as in the principal axis. In Fig. 3 the line *ml* shows the direction of a ray from *b*, and the line *fg* that of a ray from *a*. The first produced toward the right would meet the axis behind *B*. The second continued to the left

would meet the axis beyond the lens. In Fig. 4, *b* is the nearer applanatic focus of the lens *B*; and its conjugate *a* is the remote applanatic focus of the lens *A*. By the use of both lenses, therefore, an object at *b* will form an image beyond *A* which will be free from aberration both of color and of sphericity. This discovery of Mr. Lister was the foundation of the wonderful improvement introduced into the compound microscope about forty years ago. Besides the evils of aberration attendant on the use of spherical lenses, there is another which consists in the fact that the images formed are not plane, but curved, even after aberration has been corrected. This defect has, however, been also removed in the Microscope by combinations explained in the article on that instrument (which see).

F. A. P. BARNARD.

**Lent** [Ger. *Lenz*, "spring;" according to some writers because the days *lengthen*; others derive it from *lenz*, "lentile," that food being largely eaten during the Lenten season], the fast of forty days (not counting Sundays) which begins with Ash Wednesday and ends with Easter Sunday. It is observed by the Eastern, Roman, Anglican, Lutheran, and some other churches. It commemorates the forty days' fast of our Lord in the wilderness. The Greek Church lengthens it to forty-eight days.

**Lentan'do** [It.]. In music, this term, when applied to a series of notes, signifies a gradual and regular decrease of rapidity. It frequently occurs in connection with medial and final cadences, and in passages marked as expressive, where it has the effect of a gradual dying out or melting away of the sound into comparative stillness.

**Len'tile** [Lat. *lens*], the *Errum lens*, an annual leguminous herb of the Old World, resembling the vetch or pea, and extensively cultivated as food. The seed is the part employed. It is smaller, more nutritive, and more digestible than the pea. There are many varieties. It grows well on the poorest lands, and might be cultivated in the Southern U. S. Lentile flour is used for invalids, and is palatable and excellent. The vine is small, but affords excellent fodder for sheep, horses, and cattle. Fre-senius found in 100 parts of air-dried seed—starch 35.5, gum 7, sugar 1.5, legumine 2.5, fat 2.5, cellulose, pectine, etc. 12, ash 2.3, and water 14. Lentiles have recently been introduced into England.

**Lenti'ni** [Lat. *Leontini*], town of Sicily, in the province of Syracuse, about 23 miles N. W. of the city of Syracuse. Interesting vestiges of the ancient city, such as remains of aqueducts, cisterns, tombs, etc., still exist, and vases, coins, and inscriptions are found in abundance. In its neighborhood may still be seen the ruins of the castle of Bricinia, mentioned by Thucydides. In 426 b. c. Leontini sent to Athens for help against Syracuse. In 214 b. c. it fell into the hands of the Romans. The present town is composed of respectable buildings, and the streets are commodious. Its trade and industry are considerable. Pop. in 1871, 10,578.

**Len'to** [It.], one of the terms used in music to express a slow and sombre species of movement. Lento is very slightly quicker than "large" and "adagio." The superlative, *lentissimo*, implies a further retardation of time.

**Lentulus** was the name of a celebrated patrician family of ancient Rome, belonging to the *gens Cornelia*. One of the most conspicuous members of this family was **Publius Cornelius Lentulus Sura**. He was consul in 71 B. c., but in the following year he was ejected from the senate, together with sixty-three others, on account of the open scandals of his private life. This event brought him in connection with that party in Rome which wished to overthrow the republican institutions; and after Catiline left the city in 65 B. c., Lentulus was actually at the head of the conspiracy. The undertaking failed, partly on account of his irresoluteness and weakness, and it was wholly his awkwardness and utter lack of cautiousness in his relations to the ambassadors of the Allobroges which furnished Cicero with evidences on which he could arrest the leaders of the conspiracy and bring them before the court. Lentulus was strangled in the prison of the Capitol.

**Lenz** (JAKOB MICHAEL REINHOLD, b. at Sessweyen, Livonia, Jan. 12, 1750; studied at Königsberg, and went in 1771 as tutor for two young noblemen to Strasbourg, where he associated much with Goethe and Jung Stilling. After Goethe left Strasbourg, Lenz fell desperately in love with Frederica Bronn of Sessenheim, and seems to have led a rather wild life. In 1776 he went to Weimar; but unable to bring his life into harmony with the demands of good society, he soon left again, roved around from place to place, half insane, and died in utter misery at Moscow May 24, 1792. His works, mostly consisting of dramas, were collected in three volumes in 1828 by Tieck. Like his life, they present only a loose series of impulses, incoherent and



often repulsive. But just as his life derives a certain interest from his connection with Goethe, so his works are of value to the student of German literature as illustrations of the character and tendencies of the so called *Sturm und Drang* period.

**Leo**, a sign of the zodiac, which the sun enters about July 22 and leaves about Aug. 23. The constellation of the same name, one of the finest in the heavens, occupies the zodiacal region corresponding to the sign Virgo, and contains many remarkable nebulae.

**Leo**, the name of six emperors of the Byzantine empire: **LEO I., THE THYRACIAN** (457-474), b. in Thracia about 400, was only a military tribune when the emperor Marcian died in 457. But Aspar, the commander-in-chief of the army, dared not grasp at the crown himself, as he was a foreigner by birth, of the nation of the Alani, and an Arian by creed. He raised Leo to the throne, persuaded that he was too indolent to care for anything more than the attributes of power. Leo, however, soon emancipated himself from the influence of Aspar, and even seized the very first opportunity of getting entirely rid of him. A magnificent expedition was undertaken in connection with Anthemius, emperor of the West, against Genseric, king of the Vandals in Africa. The expedition failed utterly, and the odium of the failure was thrown on Aspar. The Vandals being Arians like the Byzantine minister, a rumor of treason arose, and under the riots which ensued Leo had Aspar killed in the interior of the palace. In the beginning of his reign several successful campaigns had been made against the Huns, but in the latter part military calamities were added to inundations, earthquakes, and conflagrations. **LEO I.** was the first Christian king who at the ceremony of coronation received his crown from the hands of a bishop—an ominous precedent; he favored the clergy much, and is generally called the Great by the orthodox party; the Arians called him *Mucella*, the "butcher."—**LEO II.** (from Jan. to Nov., 474) was a grandson of **LEO I.**, and only four years old at the death of his grandfather.—**LEO III., THE ISAURIAN** (717-741), b. in Isauria about 680 of poor parents, enlisted in the army, where he rose rapidly, and was commander-in-chief of the Eastern army against the Saracens in 716, when Theodosius III. deposed and exiled Anastasius II. Leo chose not to acknowledge Theodosius III., marched his army against him in the name of Anastasius II., defeated him, and seized the crown for himself. The Saracens followed him, and besieged Constantinople for two years, but having been routed several times, they were at last repelled with great loss. In 726 he issued an edict ordering all images to be removed from the churches of the empire, and thus began the memorable contest between the iconoclasts and iconolaters which disturbed the empire for more than a century. The immediate result of the edict was a general commotion, especially in the western provinces, and in 728 the exarchate became lost to the Byzantine crown.—**LEO IV.** (775-780), b. in 750, a son of Constantine V., whom he succeeded. He was mild and tolerant, but weak; his generals, however, were very successful against the Bulgarians and Arabs. **LEO V., THE ARMENIAN** (813-820), arrived from the commandship of the army to the throne through a long series of despicable treasuries; but having once established himself firmly on the throne by his brilliant victories over the Bulgarians and Arabs, he showed himself an administrator of uncommon ability. Reforms were introduced, and the whole administrative system placed on a footing of honesty and justice. He was violent, however, even cruel, and utterly intolerant. He persecuted the worshippers of images with great severity. At last a conspiracy was formed, and he was murdered on Christmas Day in the church, before the altar.—**LEO VI., THE PHILOSOPHER** (886-912), b. in 865, a son of Basil I., whom he succeeded. He was a writer. His *Oracula* is a poem in iambic verses, prophesying the fate of the Byzantine empire; there are several editions of it. His *Orationes*, numbering thirty-three, are composed mostly on theological subjects; there is no collected edition of them, but some are found in Baronius's *Annals*, others in *Bibliotheca patrum*, etc. More important was his treatise on military affairs, mostly consisting of extracts from other writers. There exist many editions of this work, as well as an English translation by John Cheke (1554), and a French by Joly de Mezeray (1771). The reign of this ruler was one uninterrupted series of stupidities and failures.

**LEO I., SAINT, POPE**, regarded by many Protestants as the first real pope, and surnamed the Great, b. about 390, probably at Rome; in early life displayed uncommon zeal, knowledge, and capacity, and was often employed by the popes upon important ecclesiastical and political duties; was chosen pope in 440, though only a deacon. Leo opposed the Pelagian, Manichean, Priscillian, and Eutychian heresies; labored with great ability for the extension of the

Roman primacy; visited Attila in person (452), and induced him to spare Rome, but in 455 the city was sacked by Genseric. **LEO d. Nov.** 10, 461. Of the many editions of his writings, the best is that of the Ballerini (Venice, 753-757).—**LEO II., SAINT**, became pope in 682, and d. in 683.—**LEO III.**, a Roman, became pope in 795; crowned Charlemagne emperor of the West, and freed Rome from Byzantine domination. **D. June 11, 816.**—**LEO IV.**, a Roman, became pope in 847; built the Leonine wall about the Vatican suburb, which is hence called the Leonine City; restored the town of Porto, which he colonized with Corsicans, and founded Leopolis (now deserted), 12 miles from Civita Vecchia. **D. July 17, 855.**—**LEO V.**, a Benedictine and cardinal, became pope Oct. 28, and d. in prison Dec. 6, 903.—**LEO VI.**, a Roman, became pope July 6, 928, and d. Feb. 3, 939.—**LEO VII.**, a Roman, became pope in 936, and d. in 939. Little is known regarding him.—**LEO VIII.**, a Roman, was made pope by Otto I. in 963, in place of the infamous John XII. Benedict V. was his rival. **D. 965.**—**LEO IX. (Bruno)**, an Alsatian, cousin-german to Conrad the Salic, b. June 21, 1002; became bishop of Toul in 1026; was celebrated for learning; was nominated pope at Worms in 1048, and recognized at Rome in 1049; was largely under the influence of Hildebrand, afterwards Gregory VII. The great events of his pontificate were the Berengarian controversy and the great excommunications of Leo and Hildebrand for the extension of discipline. **D. Apr. 13, 1054.**—**LEO X. (Giovanni de' Medici)**, son of Lorenzo the Magnificent, b. at Florence Dec. 11, 1475; received the tonsure and was made abbot of Fontevault and of Passignano when but seven years old; became cardinal in *petto* when thirteen, and full cardinal-deacon when seventeen (1492); was exiled with the other Medici in 1494; served under Julius II. against the French as legate and field-marshal, but was taken prisoner at Ravenna 1512; by the aid of the emperor, the pope, Venice, and Spain restored the Medici to Florence 1512; succeeded Julius II. as pope 1513. His pontificate is memorable for the splendor of the papal court; his extensive patronage of learning and art; the reorganization of the University of Rome, and the establishment of a committee under the presidency of Lascaris for the publication of Greek manuscripts; the scandalous and open sale of indulgences in order to procure the necessary means of building St. Peter's church; the origination of the Reformation under the influence of Luther, at which he at first laughed as a ludicrous monkish quarrel; the confirmation and extension of the Spanish power in Italy; and the final suppression of the Florentine republic. As a prince, Leo had illustrious qualities; as an ecclesiastic, he certainly failed, as much from a lack of the ecclesiastical spirit as from a want of knowledge of the tendencies of the critical times in which he lived.—**LEO XI. (Alessandro Ottaviano de' Medici)**, a grand-nephew of Leo X., b. at Florence 1535; became bishop of Pistoia 1573; archbishop of Florence 1574; cardinal 1583; pope 1605; d. Apr. 27, 1605, after a pontificate of twenty-six days.—**LEO XII. (Annibale della Genga)**, b. Aug. 2, 1760; became archbishop of Tyre 1793; cardinal in 1816; pope in 1823; extended papal authority, and reformed some points of the temporal and spiritual administration. **D. Feb. 10, 1829.**—**LEO XIII. (Giovacchino Pecci)**, b. Mar. 2, 1810, at Carpineto, in the diocese of Anagni; became a cardinal in 1846; chamberlain of the Sacred College in 1877, and pope in 1878.

**Leo (Heinrich)**, b. Mar. 19, 1799, at Rudolstadt, the capital of the German principality of Schwartzburg-Rudolstadt. Under the influence of Jahn he changed from medicine to history, took part in Jena and Göttingen with great energy in all the agitation of the young students, and wrote *Ueber die Verfassung der lombardischen Städte* (1820). But suddenly he broke off all these connections, went to Italy with a stipend from the princess of Rudolstadt, and became on his return an enthusiastic admirer of Hegel. Having settled in 1828 as professor in history at the University of Halle, he developed a great productivity, following more or less closely the tracks of Hegel's ideas in his *Handbuch der Geschichte des Mittelalters* (1830), *Geschichte der italienischen Staaten* (5 vols., 1829), *Zweif. Bücher der niederländischen Geschichte* (2 vols., 1832-35). But once more he suddenly and harshly turned against his own former standpoint, attacking the Hegelian philosophy in a rather curious manner in his *Dr. Diesterweg und die Deutschen Universitäten* (1836), *Sensschreiben an Görres* (1838), and *Die Hegeligen* (1839). Hengstenberg had now become his idol. Under his influence, and in the service of ultra-reactionary tendencies, he wrote *Lehrbuch der Universalgeschichte* (6 vols., 1835-44), and *Leitfaden für den Unterricht in der Universalgeschichte* (4 vols., 1838-40), and a number of articles in the *Evangelische Kirchenzeitung*. **D. Apr. 24, 1878.**

**Leo Africa' nus (JOANNES)**, originally named AL HASAN IBN MOHAMMED, b. at Granada, Spain, about 1485, of



Moorish parents, who emigrated to Fez in Morocco after the capture of Granada by the Spaniards. At the age of sixteen he accompanied an uncle on an embassy to Timbuctoo, and afterward travelled through several countries of N. and Central Africa, penetrating through Bornoo to Nubia, descending the Nile, and extending his explorations into Persia. Returning from Constantinople by sea in 1517, he was captured by corsairs and taken to Rome, where he became a Christian, was patronized by Pope Leo X., whose name he took, learned Italian and Latin, and taught Arabic. D. at Tunis in 1562. His great work, the *Description of Africa*, was written in Arabic, published in Italian by Ramusio (1550) and in Latin by Elzevir (1632).

**Leo Allatius** [Latinized form of LEONE ALLACCI], b. of Greek parents in the island of Chios in 1586. He was taken when nine years old to Calabria in Italy, and thence in 1600 to Rome to complete his studies; was employed in 1622 by Pope Gregory XV. to superintend the transfer to Rome and the incorporation in the Vatican of the Heidelberg library, which had been given to the pontiff by the elector of Bavaria; was appointed by Pope Alexander VII. in 1661 librarian of the Vatican, which office he held till his death in 1669. Leo was a prolific writer; his works were partly editions and translations of the classic and ecclesiastic writers and notices of authors, and partly treatises on the history and doctrines of the Roman Church and on the differences between the Eastern and Western churches. Though the son of Greek parents, he was an extreme partisan of the Roman Church. A complete list of his productions (50 enumerated by Fabricius) is added to his *Excursus de Mensura Temporum Antiquorum* (Cologne, 1645), and is also given by Fabricius in his *Bibliotheca Græca*, vol. xi. 437 *sup.*, ed. Hædæ. (See *Cruzer, Zur Gesch. der Class. Philologie*.) H. DRISLER.

**Leo'ben**, town of Austria, in the province of Styria, on the Mur, is beautifully situated, well built, and fortified. Here a preliminary treaty was concluded (Apr. 18, 1797) between Austria and France, which was followed half a year later by the Peace of Campo Formio.

**Le'obschütz**, town of Prussia, in the province of Silesia, on the Zama. It has a large trade in wool, flax, and corn. Pop. 8274.

**Leoch'ares**, an Athenian sculptor of the middle of the fourth century B. C., belonged to the second Athenian school. Piny mentions several of his works, and speaks with enthusiasm of them. Of one, *Gangmede carried off by the Eagle*, which originally was cast in bronze, there are marble copies in Rome and Venice.

**Leo' Diaconus**, b. about A. D. 950 at Caloc in Ionia; was sent to Constantinople to pursue his studies, and was present 966 when the populace broke out in revolt against the emperor Nicophorus Phocas; accompanied Basil II. in the war against the Bulgarians, though filling the office of deacon; wrote a history of the events that took place in his own time from A. D. 949 to 975, valuable for its information, though faulty in style. This work was first published Paris, 1818, by Hass, who has collected in his preface the chief facts of his life; reissued in the *Corpus Historiarum Byzantinorum* Bonn, 1828. H. DRISLER.

**Leo' Grammaticus**, of whose life scarcely anything is known, and whose date even is doubtful, wrote, probably at the beginning of the eleventh century, under the title *Chronographia Synoptica*, a narrative of Byzantine events from 813 to 949 A. D. The work is extant, and was published along with *Theophrastus* by Combefis (Paris, 1666). H. DRISLER.

**Leo'la**, tp. of Adams co., Wis. Pop. 188.

**Leom'inster**, town of England, in the county of Hereford, on the Lugg. It is the centre of the most celebrated cattle breeding district of England. Pop. 886.

**Leominster**, post V. and tp. of Worcester co., Mass., on the Nashua River and on the Boston Clinton and Fitchburg and the Fitchburg R. Rs., 18 miles N. of Worcester and 40 miles W. N. W. of Boston. It has a national and a savings bank, a newspaper, 5 churches, a large public library, a high school, 2 hotels, and a number of stores. The principal manufacturing business consists of horn goods, furniture, pianos, children's carriages, tanning and currying, paper, woollen, linen, leather-board mills, and fork works. The village is supplied with a product water at a cost of about \$100,000, and with gasworks. It is surrounded by some of the best farming land in the county. Pop. 2894. F. N. BOWLER, Ed. "Enterprise."

**Le'on**, province of Northern Spain, comprising an area of 6166 square miles, with 350,000 inhabitants. It is covered with mountain-ranges, which, especially in the northern part, enclose beautiful, well-watered, and fertile valleys, while the eastern parts are more level and afford excellent

pasturage. Large flocks of merino sheep are reared; flax, hemp, maize, and fruits are raised, and many medicinal herbs are gathered. Together with the provinces of Salamanca and Zamora it formed the former kingdom of Leon, founded in 746 by Alfonso the Catholic, who conquered it from the Saracens, and was united to Castile by Ferdinand III. in 1230. The inhabitants of this province, who generally are uneducated and lazy, but honest and noble, boast much of the purity of their blood and the antiquity of their Christianity.

**Leon**, town of Spain, the capital of the province of Leon, at the confluence of the Bernesga and the Torio. Since the annexation of the old kingdom of Leon to Castile the city has lost its importance, and although it has a large market for wool and horses, and many beautiful churches and magnificent palaces, its general character is decay. Its cathedral, built in the fourteenth century, is perhaps the most elegant specimen of Gothic architecture extant. Pop. 10,040.

**Leon**, city of Mexico, state of Guanajuato, near the boundary of Jalisco. It was founded in 1576, but did not acquire importance until the middle of the present century. It now claims to be second only to the capital of the republic in point of population, which is generally estimated at 100,000. The chief industries are tanning, saddlery, and manufactures of cotton and woollen stuffs. There are abundant iron-mines at Comanja, a few miles to the N. Leon is well built, has a large and beautiful square, with several fine public buildings and churches, and has become the commercial emporium for an extensive region, especially for the rich plain or *hajo* of Guanajuato, famous for its thriving cities and its prosperous agriculture. Leon has for years aspired to become the capital of a new state (*Estado del Centro*) to be formed of parts of Guanajuato and Jalisco, and is not without hopes of becoming the capital of Mexico. A railroad is now (1875) contracted for by a Mexican company from Mexico to Leon, and another by an American company from Leon to the Rio Grande, which will vastly increase the importance of this city.

**Leon**, town of Nicaragua, and the capital of the department of Leon, is situated in lat. 12° 25' N., lon. 86° 37' W., in the centre of a well watered and well cultivated plain, 200 feet above the sea, and numbers 24,000 inhabitants, creoles and mestizos of different grades. It is divided into six quarters (cantones)—Sagrario, San Felipe, San Juan, Calvario, Zaragoza, and Laborio y San Sebastian, and separated only by a street from the Indian town of Subitaba. The city was originally founded by Francisco Fernandez de Cordova in 1523, on the western border of Lake Managua in Imbita, but on account of various embarrassments of the location the inhabitants removed in 1610 the city, together with the large Indian town Subitaba, to the present place. Good water was found here, which now is led from different springs through the city. Formerly the capital of the province of Nicaragua, and the seat of a bishop and of the Spanish government, Leon has developed into the best built city of the republic. In its central part the streets are paved and lighted. The finest building is the cathedral, commenced in 1716 by Bishop Maria Bullon y Figueroa, and finished in 1774 by Bishop Andres y Cabrera. It belongs to no particular style, but is of immense dimensions, though too low in proportion to its length and breadth. The front façade is ornamented with a large quadrangular tower, whose platform offers a most splendid view. In the neighborhood of the cathedral stands the old episcopal palace, and connected with it the college of San Ramon, the university of Nicaragua. Both buildings were founded in 1678 by Bishop Andres de las Navas y Quevedo. The new episcopal palace, situated at the southern corner of the plaza and close to the cathedral, was not finished in 1873. At the northern corner of the plaza stands the old government building. But none of these structures are distinguished by architectural beauty. The ten or twelve other churches of Leon are rather commonplace, though two of them possess interesting peculiarities; thus, the front façade of the church Del Calvario is ornamented with bas-reliefs representing scenes of Holy Scripture, which are not without artistic merit, and in the interior of the church De la Merced several good pictures are found and a beautiful altar. Several former monasteries have been taken into public use, thus the monastery of San Juan de Dios has been transformed into a hospital, which serves as a practical school for medical students. Leon has no industry, but some trade through the port of Corinto. The surroundings are very beautiful, and mineral springs are found on many points of the foot of Sierra de las Mariposas. The town of Subitaba, situated close by, has a large church, devoted to the Virgin, the cathedral of Leon, but no other structure of any importance. It is divided into two quarters, San Pedro and Puebla Grande. At the time of the conquest it had 100,000 inhabitants; the pres-



ent number is not known. The inhabitants are engaged in some small Indian industry. AUGUST NIEMANN.

**Leon**, county of Florida, bounded N. by Georgia. Area, 600 square miles. It is undulating in the N. and level in the S. It is very fertile, and abounds in heavy forests and beautiful lakes and streams. Corn and cotton are staple products. It is traversed by the Jacksonville Pensacola and Mobile R. R. Cap. Tallahassee. Pop. 15,236.

**Leon**, county of E. Central Texas. Area, 1100 square miles. It is bounded E. by Trinity River and W. by the Navasota. The county is fertile, and contains extensive timber-lands. Iron ore and lignitic coal abound. Livestock, corn, and cotton are staple products. The county is traversed by the International and Great Northern R. R. Cap. Centreville. Pop. 6,523.

**Leon**, post-v. of Centre tp., cap. of Decatur co., Ia., 21 miles S. of Osceola. It has a national bank and 1 weekly newspaper. Pop. 820.

**Leon**, tp. of Goodhue co., Minn. Pop. 970.

**Leon**, post-tp. of Cattaraugus co., N. Y. Pop. 1204.

**Leon**, post-tp. of Monroe co., Wis. Pop. 1241.

**Leon**, tp. of Waushara co., Wis. Pop. 869.

**Leonard** (DANIEL), b. at Norton, Mass., May 29, 1740; graduated at Harvard College in 1760; became a prominent lawyer; was frequently chosen to the legislature, and at first supported the Whig cause with great energy and eloquence, but at the outbreak of hostilities adhered to the royal cause, losing thereby a considerable estate. He undertook to reply to John Adams's arguments against the colonial measures of Lord North, and his letters, signed *Massachusettsensis*, have been pronounced the best defence of the English government that appeared in America. Leonard left Boston with the British forces (1776); resided for a time in London; was many years chief-justice of Bermuda, and d. at London June 27, 1829. The polemic between Adams and Leonard was reprinted in 1819, with a preface by the former, who employed the *nom de plume* of *Naufragius*.

**Leonard** (JAMES), b. at Pontypool, England, about 1618; settled at Taunton, Mass., in 1652, and established there the first iron-works in the British colonies of America. D. at Taunton in 1691.

**Leonardo da Pi'sa**, or **Leonardo Bonacci**, b. at Pisa in 1170 or 1180; spent a great part of his life in travelling through Egypt, Syria, and Greece in order to study the different systems of arithmetic, and acquired a great reputation as a mathematician. He was the first to introduce algebra in Europe, and he contributed much to the full understanding of the Arabic system of arithmetic. His principal work, *Liber Abaci*—which latter word, originally the name of an instrument of calculation, he uses as the general designation of arithmetics—was written in 1202, and published in a splendid edition in 1857 at Rome by B. Boncompagni.

**Leonardo da Vinci**. See VINCI, in APPENDIX.

**Leonardsville**, post-v. of Brookfield tp., Madison co., N. Y. It has a church, a national bank, and manufactures of importance.

**Leonardtown**, post-v. and tp., cap. of St. Mary's co., Md., on Briton's Bay, a tributary of the Potomac River, has 2 churches, a court-house, a jail, a town-hall and library, a weekly newspaper, 2 hotels, 6 stores, 2 wheelwright and blacksmith shops, etc. It is quite popular as a summer resort. Pop. of v. 485; of tp. 2957.

B. HARRIS CAMALIER, FOR ED. "ST. MARY'S BEACON."

**Leon**, de (FRAY LUIS PONCE), b. at Belmonte near Granada, Spain, in 1527; entered the University of Salamanca at an early age, distinguishing himself in classics and philosophy; entered the order of St. Augustine at Salamanca in 1543, devoting himself to a profound study of sacred literature; became in 1560 a licentiate in theology and doctor of divinity, and in 1561 obtained the professorship of St. Thomas Aquinas (theology) by competition with seven candidates, and in 1571 obtained in addition the chair of sacred literature. He had become known as the most elegant poet of Spain, when, on account of a spirited translation of the Canticle, to which, in opposition to the received teachings of the Church, but in conformity with the conclusions of modern scholarship, he gave the form of a pastoral eclogue, he was thrown into prison by the Inquisition (1572), upon the double accusation of Lutheranism and of disobedience to the decrees of the Council of Trent in having translated a book of Scripture into a modern tongue. He was brought before the high court more than fifty times, easily vindicated himself from the first charge, and presented an elegantly-written defence, which is one of the admired monuments of Spanish prose.

It was of no avail that he proved the translation to have been made at the request of a friend, and without intention of publication; the Dominicans, who controlled the Holy Office, were jealous of his fame as the most distinguished theologian of a rival order, and he was condemned to the rack; but, fortunately, this sentence was revoked by the higher court at Madrid, and by the urgent efforts of powerful friends he was liberated after five years' confinement, during which he had written his classic treatise *On the Names of Christ* ("De los Nombres de Cristo"), and commenced other works, some of which his broken health prevented his completing. The university remained faithful to its greatest name, and Fray Luis resumed his lectures with applause Dec. 30, 1576, on which occasion he commenced his address with the words, "As we remarked in our last lecture," thus seeming to forget the long and painful interval of silence. In 1580, Fray Luis published a Latin *Commentary on the Canticle*; in 1583 *The Perfect Wife* ("La Perfecta Casada"); wrote soon after a poetical paraphrase of the book of Job, and translations of Virgil's *Eclogues* and *Georgics* and some of the *Odes* of Horace, which were not published during his life. His lyric poems, the finest in the language, shared the same fate, as also his translations of forty of the Psalms. He rose to be general and provincial vicar of his order, passed the remainder of his life in perfect tranquillity, and d. at Madrid Aug. 23, 1591. His poems and miscellaneous works were first published by his friend Quevedo in 1631, since which time they have been recognized as Spanish classics. (See Ticknor's *Spanish Literature* and A. Arango y Escandon's *Proceso de Fray Luis de Leon* (Mexico, 1871), an elegant and scholarly production.) PORTER C. BLISS.

**Leones'sa**, town of S. Italy, in the province of Aquila degli Abruzzi. This town, consisting of several small villages, was given in dower by Charles V. to his daughter Margaret, and rich mementoes of that period are still preserved. Pop. in 1874, 5451.

**Leonforte**, town of Sicily, in the province of Catania. This town is situated on the skirts of a mountain about 33 miles S. W. of Catania. It is surrounded by a wall, and in the churches may be seen some very good pictures. It has an active trade in grain, oil, almonds, sulphur, wines, etc. Pop. in 1874, 12,010.

**Le'onhardt** (GERHARD ADOLPH WILHELM), b. at Neuhaus in Hanover June 6, 1815; studied jurisprudence at Göttingen and Berlin; entered the service of the Hanoverian government in 1837, and was appointed minister of justice in 1865. For fifteen years he was president of the committee of examination in jurisprudence. When (in 1866) Hanover was annexed to Prussia, Le'onhardt was first made president of the court of appeal at Celle, and then chief-justice for the new provinces, Nov. 16, 1867; the king gave him a seat in the Prussian Herren-haus ("House of Lords"), and shortly after he was appointed Prussian minister of justice. Both in Hanover and Prussia many important and excellent laws are due to him, and as a member of the federal council and president of the standing committee on justice he has created a new criminal code for the German empire. AUGUST NIEMANN.

**Le'onhardt, von** (KARL CÆSAR), b. at Rumpenheim, in the electorate of Hesse, Sept. 12, 1779; studied political economy at Marburg and Göttingen, and held several important positions in the Hessian government from 1800 to 1816. At Göttingen the lectures of Blumenbach led him to the study of mineralogy and geology, and he continued to cultivate these sciences with great energy and success, even while in office. In 1816 he was made a member of the Academy of Sciences at Munich, and in 1818 he accepted the chair as professor in geology at the University of Heidelberg, where he d. Jan. 23, 1862. From 1807 to 1829 he edited the *Taschenbuch für Mineralogie*, and from 1830 to 1858 the *Jahrbuch für Mineralogie*. His writings, the most prominent of which are *Naturgeschichte der Erde* (4 vols., 1836-45), *Grundzüge der Mineralogie* (2 vols., 1860), etc., are not so much distinguished by original discoveries and independent researches as by a clear and comprehensive representation of what was already known.

**Leo'ni**, post-tp. of Jackson co., Mich. Pop. 1376.

**Leon'idás**, post-tp. of St. Joseph co., Mich. Pop. 1463.

**Leonidas**, king of Sparta, succeeded his half-brother, Cleomenes, about 490 B. C., and was sent in the spring of 480, when the Persians had conquered Macedonia, to defend the defiles of Thermopylæ, between Mount Æta and the Malia Gulf. With the co-operation of a fleet in the gulf, the defiles could be defended by a comparatively small army, but the Greek fleet was unfit for battle at the moment the Persian attack began, and, what was still worse, they had forgotten to occupy a practicable pathway which led across Mount Æta, and which was shown to the

Persians by a traitor, Ephialtes. For two days the Greeks resisted the barbarian host with great valor; the Persian losses were enormous. But at daybreak on the third day Leonidas learned that the Persians had found the pathway and were coming in masses across the mountain. There was still time to retreat. But having sent away his auxiliary troops, Leonidas with his 300 Spartans remained in the defiles, and, occupying a small hill in the centre of the position, they fought to the last man.

**Leonidas** [*Λεωνίδας* or *δῆς*], the name of two poets whose remains are preserved to us in the Greek *Anthology*. The former, a native of Tarentum, flourished about B. C. 276. He composed over 100 epigrams in the Doric dialect. —The other, of Alexandria, lived in the reign of Nero at Rome. In the *Anthology* there are 43 epigrams ascribed to him, some of which are probably not his. They are less highly esteemed than those of Leonidas of Tarentum. The poems of both are edited by Jacobs in the *Anthologia Græca*, and by Meineke (Leipzig, 1791). H. DRISLER.

**Leoline Verse** [from Pope Leo II., or from one Leoninus, Benedictine canon of St. Victor, Paris, in the twelfth century], the rhyming hexameter, pentameter, or elegiac verse, especially in Latin. Traces of this rhyming practice appear in Ovid, and even in earlier poets, but the custom prevailed extensively in the Middle Ages, the rhyme being often barbarously imperfect, and the metre not much better.

**Leonowens**, ANNA HARRIETTE CRAWFORD, b. at Caernarvon, Wales, Nov. 5, 1834, daughter of a British officer, Thomas Maxwell Crawford, who while acting as aide-de-camp to Sir J. Maenaghton was cut in pieces by the Sikhs on the frontiers of Lahore. She married an officer, Thomas Leonowens, upon whose death in India she was left in that country with two children dependent upon her own exertions, and resided for some time at Singapore. Through the recommendation of the English consul at that port she was selected to fill the post of governess in the family of the late first king of Siam, who, having learned English from American missionaries before coming to the throne, desired his numerous children to be educated in that language, of which he was an enthusiastic admirer and cultivator, having even established a printing-press within his palace. Arriving at Bangkok in 1863, she filled for four years not only the position of instructress to the royal household, but of secretary to the king in his extensive English correspondence, and exerted a considerable influence as a mediator with the king in behalf of the victims of arbitrary oppression, whether natives or foreigners. The present first king of Siam, then a boy, was the special object of her careful and successful training, and shortly after his accession to the throne in 1868 abolished slavery throughout his dominions. (See SIAM.) Mrs. Leonowens on retiring from her post in July, 1867, settled in the U. S. and engaged in literary pursuits, being now a resident of New York. She has published two interesting volumes upon her Siamese experiences: *The English Governess at the Court of Siam* (1870) and *The Romance of the Harem* (1872).

**Leontini.** See LENTINI.

**Leon-tius**, or **Leo Piliatus**, a native of Thessalonica, according to Hody, but Hallam makes him on the authority of Petrarch's letters a Calabrian; came to Florence about 1360 A. D., and was employed by the republic at the request of Boccaccio to teach his native language. He was the first who publicly lectured on Homer in Western Europe, and the first who translated that poet into Latin. Leaving Florence, he visited Venice, where he met Petrarch, who had studied Greek under Barlaam. Thence he went to Constantinople, intending to return to Italy, but d. while crossing the Adriatic. Gibbon describes his appearance and manners as repulsive. (*Decline and Fall*, vol. viii. p. 148.) From him Boccaccio collected the materials for his treatise on the genealogy of the heathen gods. (See GIBBON, *l. c.*; Hody, *De Græcæ illustribus*, pp. 111.) H. DRISLER.

**Leopard** [Lat. *leo*, "lion," and *pardus*, a "panther," it having been anciently believed to be the offspring of the lion and panther], the *Felis tigris* of *Felis pardus* of Linnæus. The leopard, though not the largest, is one of the most active and bloodthirsty of the cat family. Found throughout a large part of Africa and of Asia and its islands, it is of even wider distribution than the lion. It rarely assails man, but among animals, wild and domestic, it is extremely destructive. Its beautifully spotted fur gives it a readily distinguished character. The black leopard is a variety brought from Java. The "hunting leopard" belongs to a very distinct genus of the cat family, *Caracal*, and is more properly known as the CHITTAI, which see.

**Leopardi** (GIACOMO), b. of a noble family at Recanati, not far from Ancona, in 1798; was taught the rudiments

of Latin and of philosophy by two ecclesiastics; at the age of eight began Greek by himself, and after his fourteenth year pursued his studies without master, or even guide, making unrestricted use of his father's large and choice library. "At sixteen," says one of his biographers, "his learning was so vast that it is impossible to speak of it without seeming to exaggerate." He was completely master of the Greek and Latin languages and classical literature, was familiar with the Fathers of the Church and other later Greek and Latin writers, had a scholarly knowledge of English, French, Spanish, and Hebrew, and was profoundly versed in his own language. Notwithstanding acquirements so disproportionate to his years, his faculties were not in the least clogged by them, and his reason and imagination lost nothing of their astonishing power and individuality. His physical strength, however, gave way, and there were already symptoms of the complicated and cruel malady which finally ended his life. At the age of nineteen, conscious of his great genius and burning with a lofty ambition, he longed for the resources of a larger town; but his father, a zealous Catholic, and already alarmed at the skeptical tendencies of his son, refused to consent to his wider contact with the world; and the obedient son reluctantly remained at home until 1822. As it is impossible in this brief notice to enumerate his works in the order of their production, the reader is referred to the biographies of Leopardi for a list of the brilliant results of his labors during these years. The splendid success of the three poems entitled *All' Italia*, *Sopra il Monumento di Dante*, *Ad Angelo Mai*, etc. induced him to brave all opposition and go to Rome, which he did in 1822. Here he was enthusiastically welcomed, and soon made the acquaintance of Niebuhr, who expressed to Bunsen and other eminent Germans the liveliest admiration for the learning and genius of the pale, bent, and emaciated young Italian. He even procured for him the offer of the chair of Greek philosophy in the University of Berlin, but the wretched health of the poet forced him to decline this flattering offer. His small pecuniary means were soon exhausted, his views on the subject of religion prevented him from accepting employment at the papal court, and he was obliged to return, in the spring of the same year, to Recanati, where he remained, with occasional long visits to Milan and Bologna, until 1827. In that year he went to Florence, where he lived—with now and then a visit to his family—until 1833, in close friendship with Capponi, Niccolini, etc. The joyousness which had marked the first boyhood of Leopardi had faded early away, and was succeeded by an ever-increasing sadness, which had now darkened into the deepest melancholy—alike the cause and the consequence of his hopeless philosophy. No doubt his physical sufferings largely influenced his philosophical beliefs, though he protested vigorously against this apology for them, and insisted that his absolute denial of a beneficent Providence, and his assertion that *pain* was the only reality, were the results of a free and earnest exercise of his reason and of the courage which he had to proclaim his conclusions. In 1833 his devoted friend Ranieri took him to Naples in the hope of alleviating at least his terrible physical sufferings. The effect of the change was at first beneficial, and even Leopardi began to regard life as a thing to be desired; but neither the climate nor the tenderest care on the part of his generous friend could save him, and he expired on June 14, 1837. Leopardi has been compared with Byron, but there is little in common between the selfish bitterness of the great English poet and the profound melancholy of the Italian—the former a natural outgrowth of unbridled passions, the latter of acute and incessant physical suffering. The student of Leopardi will be likely to find a stronger parallel between his character and genius and those of Pascal, widely different as were their philosophical and religious convictions. Though it is not improbable that had his life been prolonged this earnest seeker after truth would have ultimately rested in a less despairing creed, yet the miserable attempts to make it appear that Leopardi in his last days sought for a reconciliation with the Church have been most thoroughly exposed and confuted. (See MARO MONNIER, *L'Italie est-elle la Terre des Morts*, also Montanari, *Ricerche del Genio Leopardi*; the works of Leon di Simeon, Sainte Beuve, Scholz, Ranieri, Giordani, Gerbeli, etc.) The most complete collection of Leopardi's works yet published was issued from the press of Le Monnier at Florence between 1854 and 1861, under the supervision of different editors.

CAROLINE C. MARSH.

**Leopold**, post-tp. of Perry co., Ind. Pop. 862.

**Leopold I.**, emperor of Germany, b. 1795, d. at Vienna June 9, 1868, the second of Frederick III. and Maria Anna of Spain. He was educated for the Church, but at the death of his father in 1806 he became king of Hungary, and in 1858 he succeeded his father as



king of Bohemia and emperor of Germany. He was a man of small stature and feeble health, with a sour and melancholy face, and the lip of the Hapsburgs extraordinarily developed. He had some interest in linguistic studies and a fine ear for music, but he was reticent and stiff in his behavior, a man of regular and simple habits, but ceremonious, proud, bigoted, and hard. Although he was very industrious, he left the administration in utter confusion, and in spite of his peaceableness, or rather timidity, his reign was one long series of wars with Louis XIV., the Turks, and the Hungarians. Of his three wars with France, the two first, which ended by the Peace of Nymwegen in 1678 and of Ryswick in 1697, are described in the articles on **LOUIS XIV.** and **WILLIAM OF ORANGE**, and the last one, the **SPANISH WAR OF SUCCESSION**, in a separate article. The point at issue between Austria and Turkey was Transylvania. The Turks held it, and the Hungarians demanded it. In 1662 the war began, and the Turks broke into Hungary. But in 1663, Leopold received troops from the German empire, Sweden, and France, and money from the pope and the Italian states, and Aug. 1, 1664, Montecucoli succeeded in routing the Turkish army at St. Gotthard on the Raab. On Aug. 10 an armistice of ten years was concluded, in which, however, the Turks retained Transylvania, to the great indignation of the Hungarians. Soon after disturbances arose in Hungary from the contest between the national Protestant and the Austrian Catholic parties. Leopold treated his political adversaries with the utmost harshness, and the result was a formidable insurrection under the leadership of Tökölyi in 1682. The Hungarians called the Turks to aid, and on July 14, 1683, an army of 200,000 men laid siege to Vienna. Leopold had fled, and in spite of the valorous resistance of the citizens and the garrison the city would have fallen, and with it the power of the house of Hapsburg, if the Polish king, John Sobieski, had not arrived before its walls (Sept. 12), and completely routed the besieging army. In 1687, Archduke Charles of Lorraine defeated the Turks at Mohács: in 1697, Prince Eugene defeated them at Zenta; and in 1699 peace was concluded at Carlowitz, by which the Turks ceded Transylvania, Slavonia, etc., and retired behind the Danube, never to endanger Europe again. The Hungarians also submitted, and at the diet of Presburg (1687) the Hungarian crown was declared hereditary in the family of Hapsburg. Nevertheless, they rose once more, and when Leopold d. at Vienna (May 5, 1705) insurrection raged in his Hungarian countries, and war with France in his Belgian, German, and Italian possessions.

**Leopold II.**, emperor of Germany (1790-92), b. at Vienna May 5, 1747, the second son of Francis I. and Maria Theresa. In 1765 he succeeded his father as grand duke of Tuscany, and proved himself a liberal and enlightened ruler. But, like his brother, Joseph II., and like Pombal in Portugal and Struensee in Denmark, he was a despotic reformer, and his reforms caused great annoyances and disturbances. In 1790 he succeeded his brother in Austria and Germany, and found on his ascension to the throne the vast empire in a critical state. With great tact, however, he managed the difficult situation. He pacified Hungary, quelled the insurrection in Belgium, concluded peace with Turkey at Sistova in 1791, and re-established the friendly relations with Prussia by the congress of Reichenbach in 1790. Just as he had entered a confederation with Prussia and Saxony for the support of Louis XVI. against his rebellious subjects, he d. suddenly at Vienna Mar. 1, 1792.

**Leopold I.**, king of Belgium (1831-65), b. Dec. 16, 1790, the youngest son of Duke Francis of Saxe-Coburg; received a very careful education, was made a general in the Russian army after the marriage of his sister to the grand duke Constantine, accompanied Alexander I. to Vienna and Paris in 1814, and was married in 1816 to the princess Charlotte Augusta, heir-apparent of Great Britain. After her death in 1817 he lived in retirement in London or travelling. In 1830 he refused the crown of Greece, but in 1831 he accepted that of Belgium, and married in 1832 a daughter of Louis Philippe, who bore him three children. His reign was calm and undisturbed. He was firm, discriminating, and progressive in his interior policy, and he represented his people with tact and dignity among other sovereigns. D. at Leaken, near Brussels, Dec. 10, 1865.

**Leopold II.**, king of Belgium, b. Apr. 9, 1835, a son of King Leopold I. and Queen Louisa, a daughter of Louis Philippe of France; was married (Aug. 22, 1853) to Marie Henriette, a daughter of the archduke Joseph of Austria, and ascended the throne Dec. 10, 1865.

**Leopold I.**, prince of Anhalt-Dessau, generally known as the **OLD DESSAUER**, b. June 3, 1676, and evinced even as a boy a strong passion for military business. In

1688 the emperor Leopold I. made him a colonel and chief of a regiment of horse, but in 1693, at the death of his father, who was a Prussian general-field-marshal, he entered the Prussian service and received his father's regiment. He was at once passionate and shrewd, domineering and kind, utterly rough in his manners and often sublime in his feelings. As a youth he fell in love with Anna Luise Föse, the daughter of a druggist, and in spite of all remonstrances, as soon as he was of age (in 1698) he married her, induced the emperor to raise her to princely rank, and led a noble and happy married life with her. He served from 1698 to 1713 with great distinction and in high and responsible positions under Eugene and Marlborough in the Netherlands, on the Rhine, and in Italy, and on the accession of Frederick William I. to the Prussian throne he actually became the head of the Prussian army. He was a master in military training. He invented the equal step, and formed those armies with which Frederick II. founded the political power of Prussia. He was at once despotic and inspiring, and that spirit—a spirit of discipline—before which the Austrians broke down at Sadowa and the French at Sedan, descends from the Old Dessauer. He was, however, not only a drill-sergeant, like his royal friend, Frederick William I.; he was also a general. His conquest of Rügen and the capture of Stralsund in 1715 in the war against the Swedes were brilliant exploits. Frederick II., who disliked him because he smelt of the *tobacco collegium*, valued his capacities as a commander very highly. In the first Silesian war he placed him in command of the army on the Hanoverian frontier, and in the second he sent him to invade Saxony, where he won the brilliant victory at Kesselsdorf which ended the war. After the death of his wife, in 1745, he retired from all participation in public life, and d. on his estate at Dessau Apr. 7, 1747.

**Leopold II.**, grand duke of Tuscany (1824-59), b. Oct. 3, 1797, a son of the grand duke Ferdinand III. He ruled in the same spirit as his grandfather, Leopold I., emperor of Germany, under the name of Leopold II. In 1847 he granted a free constitution, and although in 1849 he had to flee to Naples, he was recalled shortly after by his own subjects. Thus he weathered the liberal storm, but the national, which soon followed, was too powerful for him. In 1859 he fled with his family to Vienna. No regard was paid to his abdication in favor of his son. His dominions were incorporated with the kingdom of Italy in consequence of a popular vote, and he d. an exile at Brandeis, in Bohemia, Jan. 29, 1870.

**Leosthenes**, an Athenian general of whose earlier life nothing is known. In 324, when Alexander the Great ordered all the Greek states to recall those citizens who had been exiled for political reasons, several of the states rose in rebellion. Alexander dying shortly after, a league was formed for the purpose of driving the Macedonians out of Greece, and Leosthenes was placed at the head of the confederate army. His career was short but brilliant. He routed the Boeotians, who sided with the Macedonians, and then defeated Antipater, the Macedonian general, and shut him up in Lamia. But while besieging this city he was wounded mortally in the head by a stone thrown from the ramparts, and d. two days after, 322 B. C.

**Lepanto**, **Gulf of**, also called the **Gulf of Corinth**, an inlet of the Mediterranean, 75 miles long and about 16 miles wide, between Peloponnesus and the mainland of Greece, terminates to the E. in the Gulf of Patras, connected with it by the Strait of Lepanto, not more than a mile wide. In this gulf was fought (Oct. 7, 1571) the celebrated battle between Don John of Austria, commanding the allied Spanish, Venetian, and papal fleet, and Ali Pasha, commander of the Turkish fleet, from which battle may be dated the decline of the Turkish power in Europe. (See the elaborate and very impressive description in Prescott's *History of Philip II. of Spain*.)

**Lepidine** [Gr. *λεπίς*, "scale," or "bark"].  $C_{10}H_{15}N$ . A volatile, oily base, homologous with chinoline, obtained with that and other bases on distilling quinine or cinchonine with water and potassic hydrate. Its sp. gr. is 1.072, boiling-point between 266° and 271° C. The isomeric base iridoline, formerly supposed to be identical with lepidine, is found in the oil of coal-tar. C. F. CHANDLER.

**Lepidodendron** [Gr. "scale tree"], a genus of fossil trees, usually referred to the *Lycopodiaceae*, but was once thought to be allied to the coniferous *araucarias*. Their remains are found in the Devonian rocks and the Lower Coal-measures, and they are believed to have contributed largely to the production of coal. Their surface is marked with scale-shaped spaces, which are the scars of fallen leaves. Many of them were of great size—40 to 80 feet high and 3 to 6 feet through. Remains of many species are known, partly American, partly European, and partly common to both continents.

**Lepid'olite** [Gr. *λεπίς*, "scale," and *λίθος*, "stone"], a species of mica, crystallizing in the trimetric system, and in composition a silicate of alumina, etc., with lithia. It is generally met with in granular masses, consisting, as its name implies, of foliated scales.

**Lepidop'tera.** This term [Gr. *λεπίς*, "scale," and *πτερον*, "wing"] was applied to the butterflies and moths by Linnæus, in allusion to the fine powdery scales which clothe their wings. But this is a character of secondary importance, as certain Diptera (*Culex*, etc.) and Coleoptera, as well as Neuroptera, have the body slightly scaled. The Lepidoptera are better distinguished by the long, slender larva (caterpillars), which have usually from two to five pairs of soft, fleshy, unjointed abdominal legs, besides the three thoracic pairs. They are active, and eat vegetable food; the pupa (chrysalis) is inactive, the limbs being soldered to the body, the whole integument forming a solid case; while the adult (imago) is distinguished from all other insects by the want of mandibles fitted for mastication (as they exist in a very rudimentary state), and by the maxillæ being united and forming a sucking tube called the "tongue." Other essential characters are the small head with its large clypeus, the minute labrum, the large globular compound eyes, the large, scaled labial palpi held up in front of the face and protecting the tongue, and by the usually broad wings densely covered with minute scales. The Lepidoptera are essentially flying insects; the broad wings are strengthened by hollow rods (the so-called veins, containing an air-tube around which the blood flows), which are placed nearest together on the front or costal edge of the wing. The normal number of these veins is six; they are variously branched, affording characters for distinguishing families and genera. As they rarely walk, only using their legs as supports while at rest, these appendages are slender and weak, and very uniform in appearance, but frequently the foremost pair of legs are aborted or rudimentary. The head is small, the masticatory muscles being slightly developed, since these insects take little food, and then only by sucking up dew or honey through their tongue. The thorax, however, filled with the large, powerful muscles of flight, is very large in proportion to the head, and more or less spherical, due to the small size of the prothoracic segment and the rather small third (metathoracic) segment. The abdomen, or hind body, is cylindrical, about twice as long as the thorax, with no true ovipositor or other appendage, except two valve-like pieces in the female, representing the ovipositor of other insects. In the male there is a pair of hooked forceps adapted for clasping the abdomen of the female during copulation. Returning to the head, besides the two large compound eyes, are two simple eyes (ocelli) situated behind the former. The most interesting organs are the antennæ, which vary greatly in the different groups. In the butterflies they are knobbed, in the Sphinx and its allies they are fusiform, in the silkworms (*Bombycidae*) they are beauti-

where the hairs gradually pass into scales. These scales are inserted by a sort of ball-and-socket joint to the wing, the points of attachment being arranged in irregular raised lines. They are more or less notched at the end, and beautifully ornamented with microscopic lines. Under the microscope they are colorless, and the varied and rich colors of the wings of butterflies and some moths are, like those of pearl, due to the interference of light.

Regarding the internal anatomy of the Lepidoptera, we may say that the nervous system is, in its general form, much as in other insects. There are seven ventral ganglia in the adult and eleven in the larva. This decrease in their number is due to the fusion during the pupa state of the first, second, third, and fourth ganglia of the larva, exclusive of those situated in the front part of the head. The two thoracic ganglia or nerve-centres resulting from this fusion distribute nerves to the legs and the muscles of the wings. Meanwhile, the fifth and sixth ganglia of the larva have either disappeared entirely, or been united with the others. (*Neuropt.*) In connection with the tongue is a sucking stomach, which opens into the posterior end of the oesophagus. The silk-glands of the larva are very large, consisting of two long, flexuous, thick-walled glands situated on the sides of the body, and opening by a common orifice on the under side (labium), usually at the extremity of a short tubular protuberance. They are most developed when the caterpillar is about to transform into the pupa state, and is about to spin a cocoon. The silk is a glutinous secretion which solidifies and assumes a thread-like texture on exposure to the air. There are six long urinary tubes which open into the posterior or pyloric end of the stomach. The ovaries consist of four very long tubes; the copulatory pouch is a remarkably large pyriform reservoir. The testes form two round or oval follicles.

The metamorphoses of the Lepidoptera are "complete," the larva being worm-like, the pupa inactive and closely resembling the adult, except that the limbs are soldered to the body. The eggs of butterflies and moths are more or less spherical, sometimes flattened, usually ribbed, and forming beautiful objects for the microscope. The young caterpillar on hatching often eats up its shell and embryonal membranes before partaking of its true vegetable food. It is then much like the adult, but with the head larger in proportion to the body, and usually without the hairs, spines, and warts characteristic of the older individuals, and which are acquired during the subsequent moults. There are four or five of these changes of skin or moults. Previous to moulting the caterpillar stops eating, the old skin, now hardened and tense, splits asunder on the back, and the caterpillar draws its new body out of the rent, and then considerably exceeds its former size. This is a critical period with the insect, and many through weakness and disease die during the process. Mr. Trouvelot tells us in his account of the *Polyphemus* silkworm (*American Naturalist*, vol. i. p. 50) that when the silkworm is hatched it weighs one twentieth of a grain, when ten days old one-half a grain, and when it has attained its full size, which it does in fifty-six days, it weighs 267 grains, or 1140 times its original weight. By the time the caterpillar has become fully grown it will have consumed not less than 120 oak leaves, weighing three-quarters of a pound; besides this, it will have drunk not less than one-half an ounce of water. "So the food taken by a single silkworm in fifty-six days equals in weight \$6,000 times the primitive weight of the worm. Of this about quarter of a pound becomes excrementitious matter, 267 grains are assimilated, and over 5 ounces have evaporated."

Before entering upon the pupa state the caterpillar grows restless, stops eating, deserts its food, and spins a silken cocoon, or, if not a silk-producing worm, constructs a rude cocoon of particles of dirt, or, if a borer, in the stems of plants or trunks of trees, of chips made by the larva, fastened together with silk. Here it remains for two or three days. Meanwhile, its body contracts in length, and the skin of the pupa grows beneath that of the larva. While the body of the wormlike caterpillar exhibits no difference between the thorax and abdomen, the muscles of the growing pupa variously contract and enlarge beneath the caterpillar skin until the pupa form is complete, when it works its way out through a rent in the back. The pupa skin is developed from the *lepidodermis* or outer layer of skin, as shown by Weismann, and the rudiments of the pupa and imago exist as small disks of cells attached to fine tracheæ or nerves in the very young caterpillar, so that Swammerdam is right that the skin of the pupa and imago existed in the larva is partially correct. The different form of cocoons are very varied and often beautiful objects. Those of the geometrid or measuring moths are then, and often consist simply of a network of threads suspended among the leaves of the plants on which the caterpillar has fed. The cocoon of the *Chenopoda* moth is made out of the hardest the caterpillar, which are finely barbed and adhere together without



Caterpillar, chrysalis, and butterfly, male and female, of the pine-sawfly moth (*Bombus lapidarius*).

fully pectinated, the branches being especially long and well developed in the American silkworm (*Pheba Philophaena*), and *Cecropia*, *Luna*, and *Promethes* moths. These branched organs are undoubtedly provided with the sense of hearing, as are the knobbed feelers of the butterflies, which have scattered over the knob little auditory hairs connecting with the antennal nerve. The hairs clothing the body of a butterfly or moth are simply modified scales, as can be demonstrated by comparing a number under the microscope with the scales taken from the base of the wings,



any silk thread. The most complete cocoons are those of the silkworms. Our native silkworm (*Telca Polyphemus*) constructs a very perfect cocoon, a continuous thread composing it. Mr. Trouvelot states that the Polyphemus larva, when about to spin its cocoon, draws the leaves together as a support for the threads, forming the foundation of the cocoon. "This seems to be the most difficult feat for the worm to accomplish, as after this the work is simply mechanical, the cocoon being made of regular layers of silk united by a gummy substance. The silk is distributed in zigzag lines of about one-eighth of an inch long. When the cocoon is made the worm will have moved his head to and fro, in order to distribute the silk, about 254,000 times. After about half a day's work the cocoon is so far completed that the worm can hardly be distinguished through the fine texture of the wall; then a gummy, resinous substance, sometimes of a light-brown color, is spread over all the inside of the cocoon. The larva continues to work for four or five days, hardly taking a few minutes of rest, and finally another coating is spun in the interior, when the cocoon is all finished and completely air-tight. The fibre diminishes in thickness as the completion of the cocoon advances, so that the last internal coating is not half so thick and so strong as the outside ones." The cocoon of the Chinese silkworm (*Bombyx mori*) is white or whitish yellow, and is over an inch long and nearly half as broad; 360 cocoons weigh a pound and a half.

It has long been known that the females of the *Bombyx mori* and a few other moths have in one or more instances been known to lay eggs which without being fertilized by the males have hatched out. *Psyche helix* was for a long time supposed to reproduce solely in this way, but lately Claus has found the males, which, however, are exceedingly rare. Connected with this subject of parthenogenesis among the Lepidoptera is the occurrence of two forms of the sexes, or dimorphism. Mr. Wallace has discovered two forms of females of *Papilio Mmonia*: one form is normal, having its wings tailed, as usual among the swallow-tailed butterflies, while the second form is tailless, resembling the tailed male. *Papilio Panmon* has three sorts of females, and may be said to be trimorphic. *Papilio Ormenus* is trimorphic. Our *Papilio Turnus* is dimorphic, the Southern dark form having been described as a distinct species under the name of *P. Glaucus*. *Papilio Ajax* is polymorphous, the same batch of eggs having given rise to *P. Ajax* and varieties *Walshii*, *Tetamonides*, and *Mucosus*. Lepidoptera in the larva state are much exposed to disease, especially those kept in confinement. Pebrine, a disease due to a very minute fungus, has threatened to exterminate the silkworm in Southern Europe. Another disease, muscardine, is due to the attacks of another fungus, the *Botrytus Bassianus*. Fossil Lepidoptera have occurred in the Jurassic formation; a sphinx-like moth has been found in the Tertiary beds of Europe, and an unknown moth in the Tertiary rocks of the Rocky Mountains. A few minute forms have occurred in amber. About a thousand species of butterflies alone inhabit this country, and about 25,000 species of Lepidoptera in all are known to exist.

The following synopsis of the different families begins with the lowest and ends with the highest:

*Synopsis of the Families of Lepidoptera.*

1. Wings variously fissured; larva either hairy and pupa naked (*Pterophorus*), or naked and spinning a cocoon (*Alucita*): *Pterophorida* (plume moths).
2. Wings very narrow, more or less pointed; fringe very long; larva very slender, often mining leaves: *Tineidæ* (clothes moth, etc.).
3. Wings oblong: larva naked, rolling up leaves: *Tortricidæ* (leaf-rollers).
4. Palpi very long; larva often glassy green: *Pyrulidæ* (snout moths).
5. Wings broad, triangular; larva with only two pairs of abdominal legs, and consequently a measuring gait: *Phalænidæ* (geometrids, measuring-worms).
6. Wings rather narrow; larva smooth, cylindrical, tapering towards both ends: *Noctuidæ* (owl moths, cutworms, etc.).
7. Head unusually small, sunken; antennæ pectinate; body hairy; larva hairy, spinning a thick cocoon: *Bombycidæ* (silkworms).
8. High-colored moths, with large heads; antennæ either simple, sub-fusiform, or slightly pectinate; larva naked, and humped at the end, or with radiating tufts of hairs: *Zygenidæ*.
9. Wings very long and narrow, semi-transparent; larva boring trees: *Egeriadæ* (borers).
10. Large moths with large heads, narrow wings; a long tongue; larva with a horn on the end of the body; pupa often with a free tongue-case: *Sphingidæ* (hawk moths).

11. Antennæ knobbed, wings broad; larva often spined; chrysalis naked, often with protuberances and golden or silvery spots: *Papilionidæ* (butterflies).

A. S. PACKARD, JR.

**Lepidosiren** [Gr. *λεῖς*, "scale," and *σείρη*, "siren"], the typical genus of the family Lepidosirenidæ, distinguished by its very elongated eel-shaped body (it having about fifty-five pairs of ribs); the pectoral and ventral "fins" or filaments are plain and tapering, and are entirely destitute of rayed fringes; there are five branchial arches, with four corresponding intervening clefts; no external branchial appendage is developed; and the cusps of the dental plates of the palate, as well as lower jaw, are well developed. The genus is represented by only one well distinguished species (*Lepidosiren paradoxa*, Fitzinger), although two or three have been thought to exist by some. The species occurs quite generally apparently in the Amazon River, as well as its tributaries, but is rare: if popular reports are to be credited, this or a species of the same genus sometimes attains a gigantic size, though the length of those obtained rarely much exceeds three feet. (See **LEPIDOSIRENIDÆ**.)



Lepidosiren.

THEODORE GILL.

**Lepidosirenidæ** [from *Lepidosiren*, the typical genus of the family, and the termination *-idæ*], a family of fishes of the order Sirenoidea, with an elongated and eel-shaped body covered with moderate cycloid scales; the dorsal and anal are united with the caudal, and form a continuous homogeneous border for the tapering tail; the pectoral and ventral fins are developed as articulated filaments; the upper labial cartilage has a median pair of conical teeth; the palatine dental plate on each side is elongated and oblong, and has several strong cuspidate vertical ridges; the labial plate is of similar form, and has also several transverse cuspidate ridges; the air-bladder is represented by two lung-like sacs slightly connected together and communicating by a duct, provided with a glottis opening in the floor of the œsophagus. This family is of extreme interest, as it was for a long time a matter of dispute whether its members were fishes or amphibians. Fitzinger (1837) and Natterer (1839), who first described the American type (*Lepidosiren paradoxa*), referred it to the amphibians next to *Siren*, from which they differentiated it chiefly by the scales, and hence gave the name *Lepidosiren*—i. e. "scaly siren." Owen (1839), who first made known the African type, on the other hand contended that it was a fish. After much discussion they were and are now conceded to be true fishes, representing a peculiar family (*Lepidosirenidæ*), order (*Sirenoidea*), and super-order or sub-class (*Dipnoi*) of the class *FISHES* (which see). The family is also interesting, as being (next to the related *Ceratodontidæ*) the most nearly allied to numerous extinct fishes which flourished during Palæozoic and Mesozoic times, and which until lately were much misunderstood. The two recent genera (**LEPIDOSIREN** and **PROTOPTERUS**) are alone known, and will be noticed under their respective names. (See also **SIRENOIDEI**.)

THEODORE GILL.

**Lepidosteidæ** [named from the typical genus *Lepidosteus* (*λεῖς*, scale, and *δασύς*, bone) and the family termination *-idæ*], the only existing family of the order Rhomboganoidea, distinguished by the elongated and sub-cylindrical body covered with rhomboidal scales; the head elongated, and terminating forwards in a long beak-like snout; the upper jaw projecting beyond the lower, and with the nostrils near the end of the snout; the fins are provided with fulcræ; the short dorsal situated far behind, and just above the anal fin; the stomach is simple in form, but with numerous pyloric appendages; the intestine has a rudimentary spiral valve. This family, although the only living type of the order to which it belongs, had numerous relations in the Mesozoic and Palæozoic epochs. The skeleton has many peculiarities, among which is the composite structure of the upper jaw, as well as the character of the vertebrae, which are convex in front and concave behind. There are but few representatives, which are divisible into three groups, by some entitled genera, viz.: *Lepidosteus*, *Cylindrosteus*, and *Atractosteus*. The genera are regarded by some as monotypic; i. e. all the forms belonging to each are considered to be members of a single species; while others, e. g. Agassiz, admit as many as eighteen or twenty undefined species in the family. The species are found chiefly in the waters of northern America, but representatives of one group, *Atractosteus*, descend as far southwards as Central America and Cuba; a species has also been recently discovered in China. In the Tertiary epoch the family was represented by forms closely related to the living American species in Europe.

THEODORE GILL.



**Lep'idus**, the name of an ancient patrician family of Rome belonging to the Æmilian gens. The most conspicuous member of the family was Marcus Æmilius Lepidus, the triumvir. He was a weak, vain, and avaricious man, destitute of any talent or any superior quality, but twice—and both times in moments of the utmost consequence—chance placed the decision of affairs in his hands. He was prætor in 49 B. C., when the war broke out between Cæsar and Pompey. He sided with Cæsar, was made his *augustinus equitum* in 47 B. C., consul in 46 B. C., and in 44 received as his provinces Spain and Gallia Narbonensis. He was just organizing his proconsular army at Rome, and was thus at the head of the only armed force in the city, when Cæsar was murdered. He used his position to get himself elected *pontifex maximus*, and having brought about a reconciliation between Antony and the senate, he proceeded to his provinces, flattered and coaxed by both parties. The agreement between Antony and the senate did not last long, however, and after the defeat at Mutina, Antony took refuge with Lepidus, and was well received. Octavianus, who up to this time had acted simply as the general of the senate, saw that in a contest with Lepidus and Antony the cause of the aristocracy was a lost cause, and commenced immediately negotiations which led to the formation of the famous triumvirate in 43 B. C. By the partition of the provinces, Lepidus received Spain and Gallia Narbonensis, and was left as governor of Rome while Antony and Octavianus proceeded against Brutus and Cassius. But by the second partition, after the battle of Philippi in 42 B. C., he was treated rather slightly, and received only Africa. This province he held till 36 B. C., in which year Octavianus ordered him to join him at Sicily against Sextus Pompeius. Lepidus came, and believed the opportunity favorable for an attempt at throwing off the authority of Octavianus. At the decisive moment, however, his soldiers deserted him, and on his knees he had to beg for mercy. Octavianus treated him with great contempt, deprived him of his province, though not of his private fortune or of his dignity of *pontifex maximus*, and banished him to Circiæ, where he lived in retirement till his death, 13 B. C.

**Lepor'idæ** [Lat. *lepus*, "hare," and *-ida*], a family of duplicidentate glirine mammals, readily recognizable by the external appearance of the body, as well as by the struc-

sides the four incisors of the upper and two of the lower jaw ( $\frac{2}{1} \times 2$ ), consist of six molars in the upper and five in the lower jaw on each side (M.  $\frac{3}{1}$ , P. M.  $\frac{1}{1} \times 2$ : those of the upper jaw have mostly (M. 2, P. M. 2) a vertical groove on the outer as well as inner surface; the crowns are broader than long, and have three transverse ridges; those of the lower jaw are broader, and the grooves are much stronger. Imperfect clavicles are developed. Such are the most important characters common to the hares and rabbits. The species are quite numerous, between thirty and forty species being generally recognized, and are most abundant in the arctogeian regions—North America, Europe, and Northern Asia) and the temperate zone; representatives are found, however, far N. and S., one (*Lepus glacialis*) extending to the Arctic regions, and others are found as far S. as Brazil, India, and the Cape, but scarcely or not at all in the lowlands of the torrid regions. Though thus widely diffused and numerous in species, they agree so closely in structure as to render it doubtful whether there is more than one generic type among them, although as many as four have been proposed by the late Dr. J. E. Gray.

There is a remarkable difference in habits between the hares and rabbits. The hares never burrow, but simply compose a "form" or nest, in which they rest and bring forth their young, and the young are born covered with hair and with the eyes open. The rabbits, on the contrary, burrow in the ground, and often make extensive tunnels, and in these burrows they live and bring forth their broods; the young are brought into the world naked and blind. Notwithstanding such differences, however, there are no corresponding structural characters, and the different animals are closely related. All the American species are "hares" in the sense thus understood. THEOPHIL GILL.

**Leporide'** [Fr.], a name applied to a remarkable fertile hybrid between the common European hare and the rabbit. Leporides are now extensively bred in France, where they are esteemed for the table.

**Lepo'rius**, a native of Gaul; entered in the beginning of the fifth century a monastery in the vicinity of Marseilles, and acquired a great reputation for learning and holiness. He afterwards fell into the heresy of Pelagius, and maintained that man has no need of the grace of God, and that Christ was born with a human nature only. He was excommunicated, and went to Africa. Here he met with St. Augustine, and so great was the influence of this powerful man on Leporius that in 425 he retracted, and was ordained a presbyter by Augustine. His retraction, which was addressed to Proculus, bishop of Marseilles, and Cylinnius, bishop of Aix, and published in 1630 under the title *Liber de emendatione scilicet satisfactionis ad episcopos Gallos*, was much appreciated by the old Church.

**Lep'ra** [Gr. λέπρα, "leprosy"], a disease of the skin, in which scaly patches, concealing a red and inflamed surface, are seen, particularly upon those parts of the limbs where the bones are but thinly covered. It is not contagious, may last for many years or may be spontaneously cured, and does not usually affect the general health. Arsenical medicines, with applications of tarry compounds and iodide of sulphur, are recommended in its treatment.

**Lep'rosy** [Gr. λέπρα, "leprosy"], "an incurable constitutional disease of adult life, which is especially prevalent in tropical and sub-tropical climates." (Robert Living.) It may be divided into three forms, as follows: "First. Macular leprosy, characterized by an eruption on the skin, accompanied by anesthesia. Second. Anæsthetic leprosy, of which the chief features are anesthesia and discolorations of the skin and atrophy of the muscles, with ulceration and mutilation of the hands and feet. The third form, or tubercular leprosy, is characterized by a booming and tubercular thickening of the skin, especially of the face, ears, hands, and feet, followed by similar changes in the mucous membrane of the upper part of the alimentary and respiratory tracts, ending fatally in from two to ten years, by intercurrent disease in some vital organ." (Lancet.)

Leprosy, or *elephantiasis*, *lepra*, is a disease which has been known and justly dreaded from the earliest ages. We find frequent mention of it in the Bible, but the disease as there spoken of evidently included many other skin affections, which at that time they were unable to differentiate. The proof of this is that the cases are there mentioned as having recovered, which we now know would



The Rabbit.

ture of the skeleton. The hind legs being much more developed than the fore (although not so disproportionately as in the kangaroos and jumping mice), the animal progresses by a series of running leaps or short jumps, in which latter case the back is crooked and arched backward, and gives the characteristic physiognomy; the head is high, arched backward, and compressed; the eyes lateral and prominent; the snout rounded, and with the nostrils converging downward to a median furrow which divides the lips; the ears are more or less elongated, and the tail is short and bushy, and turned up. The skull is high and compressed, the rostral portion much produced and broad, and the interorbital area widened by the development of enlarged and expanding supraorbital plates or processes separated generally by narrow fissures from the body of the frontal bones fore and aft; the orbits are ample; the nasal processes of the supramaxillary bones are perforated in a sieve-like manner; and the lower jaw has the ascending ramus very oblique, and the condyles consequently far backward, and the angular process extensive forward. The teeth, be-



have been impossible had they been true leprosy. The leper has always been an outcast from society, both on account of the loathsomeness of his disease, and the idea which has prevailed of its contagiousness. During the Middle Ages numerous leper-houses were established in various parts of Europe, where those suffering from the disease were confined, and prohibited by law from appearing in the streets. Now, however, that it is known that the disease can only be transmitted from parent to offspring, the laws are more lax on this point, and a leper-house is a thing seldom heard of. At the present time leprosy is most prevalent in Syria and Egypt, and the cases met with throughout Europe and America are rare. Almost every drug in the pharmacopœia has been used in the treatment of this disease, but without avail, and now the treatment is principally palliative. Good food, clothing, and the prevention of marriage amongst lepers are the only means we possess to better their condition and decrease their number.

EDWARD J. BERRINGHAM.

**Lepsius** [KARL RICHARD, Ph. D., b. at Naumburg, Prussian Saxony, Dec. 23, 1810, the son of K. P. Lepsius (1775–1853), an able archaeologist; studied at Leipsic, Göttingen, and Berlin under Bopp's instruction, graduating at Berlin with a thesis on the EGYPTIAN TABLES (which see), which obtained his degree; went to Paris in 1833, and for his *Paleogeography applied to Linguistic Researches* gained the Volney prize; in 1835 made researches in the libraries of Italy; devoted his attention to languages, especially to Egyptology, and wrote *Letter to M. Rosellini on the Hieroglyphic Alphabet* in 1837; went to England in 1838; projected an expedition to Egypt, which left England in 1842, and with success returned to Germany in 1845; became professor at Berlin in 1846; again went to Egypt in 1866, and discovered at Tanis a bilingual inscription of the time of Ptolemy Euergetes; his published a valuable work on the Nile, translated into English; and was placed over the Prussian state library in Berlin in 1874. Among his works are *Das Faltbuch derer Ägypten* (1842), *Die Chronologie der Ägypten* (1843), *Denkmäler aus Ägypten und Aethiopien* (1849–50), *Ueber den ägyptischen Götterdienst* (1851), *Beiträge aus Ägypten* (1852), *Königbuch der alten Ägypten* (1853), *Die ägyptische Elbe* (1860), *Une enquête égyptique Kunstformen*, etc. (1871), etc.

**Leptandra** [proposed for its generic name by Nuttall], the pharmaceutical name of the Culver's physic (*Veronica virginica*, order Scrophulariaceae), a tall perennial herb of the Atlantic U. S. which has decided cathartic powers. Its impure resinoid is extracted and sold as *leptandrin*. It is an agent of considerable value, and is believed by many practitioners to act decidedly upon the liver; but this is very doubtful.

**Lep'tis** [Phœnician for "naval station"], or **Great Leptis**, so called to distinguish it from another and less important Leptis, an ancient Sidonian colony and seaport in what is now Tripoli in Barbary, between the two Syrtes and near the modern Tripoli. It had a fine roadstead and an artificial harbor, long since choked with sand. At this point are very extensive ruins, in great part buried in the sand. Leptis once had a large trade, but is now almost without inhabitants. It was one of the three cities which gave the name *Tripolis* to this region.

**Leptocardia** [Gr. λεπρός, "slender," and καρδία, "heart"], the class of vertebrates containing the lowest organized forms of the branch, and formerly confounded with the class of fishes. Only a single genus (*Branchiostoma*, Costa, or *Amphioxus*, Yarell) is known, and this is believed to be the surviving type of a class which must have been rich in representatives in the distant past, but which, on account of the easy destructibility of all its parts, has left no recognized remains in the rocks. The brain is of the most rudimentary character and not developed into enlarged lobes, as in all other vertebrates; the skull is also undeveloped, nor are there any rudiments of auditory organs; the skeleton is represented by a simple notocord or embryonic backbone, which is not divided into vertebrae, and has no ribs or other appendages, no scapular or pelvic arches, and consequently no pectoral or ventral fins being developed. The circulatory system is also very simple, and the heart simply tubular and not divided into distinct chambers (and hence the name of the class). The mouth is an elongated aperture bounded by a semicartilaginous hoop, which is beset with filamentary processes clothed with ciliated tentacles; this opens into "an expanded pharyngeal chamber, which is split on each side by obliquely transverse clefts, through which the water taken in by the mouth is discharged into an "atrial chamber," and thence through a pore which represents the branchial orifice of the Myxinidae. Such are the chief distinctive characters of this type. The differences from all others are so great that it is at first difficult to perceive the

homologies of the various organs and parts with those of the higher vertebrates. So great, indeed, are the differences that the original describer of the European species, Pallas, failed to perceive any resemblance to fishes or other vertebrates, and referred it to the mollusk genus *Limax*. Quite recently, too (in 1874), Semper, with a full knowledge of its organization, has deliberately excluded it from the vertebrates altogether. By all other authorities, however, it has been referred to the branch of vertebrates, but in various degrees of relationship to the class of fishes. Costa, Yarell, and most other authors until recently have regarded it as the lowest of fishes. Isidore Geoffrey St. Hilaire, C. Bonaparte, and Moquin-Tandon (all under the name *Myxozoa*), and Hückel, Gegenbaur, O. Schmidt, Cope (all under the name *Leptocardia*), and others, have raised the type to class value; and several of them have contrasted it with all the other vertebrates, and thus expressed their views as to the fundamental nature of its distinctive characters.

Although the animal is so peculiar, it can be, however, in general terms, compared with the Marsipobranchiates, and therefore with the other vertebrates; and although the brain is in a rudimentary condition, the principal nerves are developed (though under somewhat doubtful guises), and their relation to the frame-work permits the probable recognition of the homologies of the several regions of the "head." The muscular system is represented by flake-like segments or "myotomes," V-shaped and pointed forwards. According to Huxley, the oral aperture is large and extends backwards to the level of the junction between the sixth and seventh myotomes, and is there divided from the branchial cavity by a "velum palati." Eight ("a-h") pairs of nerves are given off from the cerebro-spinal axis as far as this point. The eighth or most posterior of these, which for convenience may be called *h*, passes out between the sixth and seventh myotomes, and runs down parallel with the lateral attachment of the velum. The next five (*g, f, e, d, c*) pass out between the first six myotomes to the integument and to the walls of the buccal cavity. The foremost two nerves (*b* and *a*) pass in front of the first myotome; and the nerve *a* runs parallel with the upper side of the notochord to the end of the snout, giving off branches to that region of the body which lies in front of the mouth; this nerve lies above the eye-spot. In Huxley's opinion, the eighth nerve (*h*) corresponds with the last of the pre-auditory cranial nerves in the *Ammocetes* or young of *Petromyzon*, which is the "portio dura;" while those between it and the optic nerve represent, apparently, the third (*motores oculorum*), fourth (*pathetici*), fifth (*trigeminal*), and sixth (*abducentes*) pairs of cranial nerves in the higher vertebrates, the optic nerves of course being the second pair, while the first (*a*) in *Branchiostoma* "has the characteristic course and distribution of the orbito-nasal division of the trigeminal." Thus the head has at least six pre-auditory myotomes, and "on the other hand, from the seventh myotome backwards, a certain number (supposed to be eight) of segments answer to the post-auditory or parachordal region of the higher vertebrate." These are supposed to represent "proto-vertebræ," and thus antagonize the hypothesis, at one time so prevalent, that the head of vertebrates is composed of four "vertebræ;" and Huxley suggests "that the numerous proto-vertebræ which lie in front of the fourteenth of *Amphioxus* (*Branchiostoma*) are represented only by muscles and nerves in the higher Vertebrata." The other characteristics of this curious type will be found in the works of the numerous authors who have directed attention to it, the most recent of whom are Stieda of Dorpat, and Huxley and Ray Lankester of London. But one genus (*Branchiostoma* of Costa, 1834, or *Amphioxus* of Yarell, 1836) is known, and the species are doubtful. Representatives have been found along almost the entire European coast, but most abundantly in the Mediterranean Sea, the Indian seas (Borneo, etc.), North Carolina, the Caribbean Sea, and Brazil. They live in the sand from lower water mark to a depth of at least ten or twelve fathoms. They are transparent, and specimens rarely exceed three inches in length.

THEODORE GILL.

**Lep'tophis** [Gr. λεπρός, "slender," and ὄφις, "snake"], a genus of non-venomous colubroid serpents of very slender proportions and arboreal habits. Some serpents of the U. S. (e. g. grass-snake, or *Cyclophis astivus*, and ribbon-snake, or *Eutania saurita*) have been erroneously referred to the genus.

**Lequesne** (EUGÈNE LOUIS), b. at Paris Feb. 15, 1815; studied law, and was admitted to the bar in 1839, but entered in 1841 the School of Fine Arts; became a pupil of Pradier at Rome, and began to exhibit in 1845. His most prominent works are the *Dancing Faun* in the garden of the Luxembourg, the *Victory* on the tomb of Napoleon, and

the *Papirus* on the front of the new opera-house; he has also made a number of excellent busts.

**Leray's**, tp. of Blue Earth co., Minn. Pop. 148.

**Le Ray**, tp. of Jefferson co., N. Y. It contains several villages. Pop. 2862.

**Le Raysville**, post-b. of Pike tp., Bradford co., Pa. Pop. 281.

**Lercara Trid'di**, town of Sicily, in the province of Palermo, pleasantly situated in a very fertile district about half in sulphur-mines. Pop. in 1871, 9154.

**Lerdo de Tejada** (SEBASTIAN), president of Mexico, b. at Jalapa, in the state of Vera Cruz, Apr. 26, 1826, of pure Spanish ancestry; studied at a college in Puebla with a view to the priesthood, but, abandoning that purpose, entered the College of San Ildefonso in Mexico and studied law; was admitted to the bar in 1851; was chosen rector of San Ildefonso in 1852, and became in Dec., 1855, one of the magistrates of the supreme court of justice. About this time his brother, Miguel Lerdo de Tejada, an eminent statesman and economist, was appointed minister of finance in the cabinet of President Comonfort, and by his energetic policy respecting the privileges and property of the Catholic Church became the leader of the liberal party. To him Sebastian lent such efficient co-operation as to be called to the ministry of foreign affairs, which he accepted June 4, 1857. On the overthrow of Comonfort in Jan., 1858, he devoted himself anew to the direction of the college and to practice at the bar, where he soon gained an eminent position. On the restoration of the liberal government Lerdo was elected to Congress (Apr., 1861), re-elected in the following year, and was three times chosen to the presidency of that body, the term of that office in Mexico being only one month. He was president of Congress in May, 1863, when the capture of Puebla forced President Juarez to abandon the capital of the republic, and was one of the few prominent statesmen who accompanied the government in its retreat to San Luis Potosi. In that city he accepted the post of minister of justice, Sept. 10, and that of minister of foreign affairs, Sept. 24, 1863, thereby becoming, next to Juarez, the leading representative of the cause of national independence during the protracted struggle against the French intervention and the so-called empire of the Austrian archduke Ferdinand Maximilian. In the successive retreats of the republican government to Monterey, Saltillo, Durango, Chihuahua, and Paso del Norte, as well as at Saltillo three years later to Chihuahua, Zacatecas, and San Luis Potosi, Lerdo preserved an imperturbable confidence in the ultimate success of the cause to which his entire energies were devoted, and when the turning of the tide placed the archduke a prisoner in the hands of the republicans, neither Juarez nor Lerdo wavered before the most urgent appeals in his resolution to execute upon that prince the sentence to which he had been condemned after a protracted trial. Upon the restoration of the national government to the city of Mexico in 1867, Lerdo was elected president of the supreme court of justice, to which post was annexed the vice-presidency of the republic, but continued to discharge the duties of minister of foreign affairs, and was generally credited with being the originator of the most important measures taken for the rebuilding of the shattered political edifice. He retired from the cabinet Jan. 17, 1871; was an unsuccessful candidate for the presidency in the election of July of that year, and upon the sudden death of Juarez (July 18, 1872) succeeded him by virtue of his office as vice-president. In the election of Oct., 1872, Lerdo was chosen president for four years, ending Dec. 1, 1876. His administration has been characterized by a strict adherence to the policy established by Juarez, by the enforcement of the "laws of reform" against the alleged machinations of the reactionary or "Church party," and by a rigid suppression of all attempts at revolution. His distinguished for consummate urbanity and great diplomatic sagacity, combined with inflexible determination. PORTER C. BLISS.

**Lerici**, town of Italy, in the province of Genoa. It lies on the Gulf of Spezia in the midst of charming scenery, and has acquired some notoriety from the confinement of Garibaldi within its fortress in 1862. Its maritime activity is great for its population, which in 1871 was 3940.

**Lerida**, province of Spain, bounded N. by the Pyrenees and E. by Barcelona, comprises an area of 1919-square miles, with 330,348 inhabitants. The northern portion is covered with sparse of the Pyrenees, and rich in iron, copper, lead, zinc, marble, Jasper, and Gypsum. The southern portion is an extensive plain, which produces wheat, fruits, and vegetables.

**Lerida** [Lat. *Herda*], town of Spain, the capital of the province of Lerida, on the Segre, is surrounded by walls and strongly fortified, as it is the key of Aragon and Cata-

lonia, and consequently a point of great military importance. It has two remarkable cathedrals, one of the thirteenth, the other of the eighteenth century; a lyceum, and several other educational institutions; its university, founded in 1300, was suppressed by Philip V. Pop. 19,627.

**Lérins, The**, several small islands off Antibes, and in the department of Var, France. The largest, Ste. Marguerite, was the place of imprisonment of the "Man in the Iron Mask" from 1686 to 1698. Its fortress, Monterey, is now a prison for military convicts and Algerines, and Bazaine was here confined (1874). It was the *Leron* of the ancients. The next smaller island, St. Honorat (*Plunaria Lerina*), is named from St. Honoratus, archbishop of Arles, who founded here in the fourth century the convent of Lérins, which became a famous school of theology, and passed into the Benedictine order. After 1650 the monastery lost its importance, and is now in ruins, and the island supports some agricultural inhabitants. There are some smaller uninhabited islands in the vicinity.

**Lerma**, FRANCISCO DE ROXAS DE SANDOVAL, DUKE OF, b. in Spain during the sixteenth century; was made a duke and prime minister of Spain immediately on the accession of Philip III. in 1598, and governed the empire till 1618, during which period the exhausted and distracted state of the country became more and more apparent. His foreign policy was marked by defeats, his internal by cruelty and weakness. In spite of enormous exertions, he was compelled to conclude peace with England in 1604 and with the United Provinces in 1608 on humiliating conditions. In 1609 he issued the decree of proscription by which several thousand Moorish families, forming one of the richest and most industrious elements of the Spanish population, were driven out of Spain, and their property, at least in many cases, confiscated. Under Philip IV. the animosity against the fallen minister became so strong that an examination was made of his administration, and he was compelled to return a large sum of money to the treasury. D. shortly after, in 1621.

**Lermontoff** (MICHAEL), b. Oct. 15, 1814; received a military education, and entered the imperial guard, but was removed in 1837 to the army of Caucasus on account of a poem he wrote on the death of Pushkin. In 1840 he published a volume of poems at St. Petersburg, which made a great sensation, and gained for him the title of "the poet of Caucasus." But a novel he wrote shortly after, *The Hero of Our Time*, caused a duel between him and one of his fellow officers in the army of Caucasus, and he was shot July 27, 1841. Most of his works have been translated into German by Bodenstedt (1857), and some of them—*as, for instance, The Song of Our Time*—into French by Saint René Taillandier.

**Lernæ'ada** [from *Lernæa*, one of the genera], a proposed order of crustaceans, not recognized by all systematists. They are assigned to the Entomostraca, and to a section called Pœcilopoda. The mouth is for suction, the thorax not jointed, the organs very small. The males are totally unlike the females. All are parasites of very degraded type. They are often much more completely organized when young than when mature. In the latter stage they lose the power and organs of locomotion and of sight. There are many diverse and strange forms referred to this order, most of which would never be recognized as crustaceans but for their larval forms. They are found attached to fishes and other aquatic animals.

**Le'ros** (APOS), a Turkish island of the Egean, 30 miles S. of Samos, 1-6 miles long from N. to S., and 4 miles wide, is very fertile, and has good harbors. Pop. 3000. Its people were anciently proverbial for ill-nature, and its present inhabitants are despised as niggardly.

**Lerot.** See DORMOUSE.

**Leroux** (PIERRE), b. at Paris in 1798; studied at the Lycée Charlemagne; founded the *Globe* newspaper in 1821, as organ of the philosophers; adhered to the Saint Simonians in 1834, converting his paper into the organ of their socialistic policy; withdrew after the promulgation of the new doctrines of Entailism. He became in 1842 editor of the *Révue Encyclopédique*, and in connection with Jean Reynaud, etc. he b. in 1858 the *Année Encyclopédique*, which was a continuation of the *Encyclopédie* of the eighteenth century. His capital work, *De l'Homme, de son Principe et de son Destin*, appeared in 1829, containing his philosophical and theological ideas, consisting in a continued progress of man and nature toward perfection through changing laws. He founded in 1841 the *Révue Indépendante*, with A. C. and G. de Saint, and in 1848 was elected a representative of the National Assembly as an ultra radical. After the coup d'état of 1851 he emigrated to the island of Jersey, and afterwards to Lausanne, Switzerland. Pierre Leroux was a kind of modern and



secular Zwingli, the representative of pure and honest radicalism in philosophy. He wrote also *Christianity and its Democratic Origin*, *Mathias and the Economists*, or *Shall there be always Poor?* Job, a drama, *The Samaritan Beach*, a philosophic poem, *The Phylaxia*, or *The Government of the Rich*, etc. He returned to France after the amnesty of Aug. 15, 1869, and d. at Paris Apr. 12, 1871.

FÉLIX AUCAIGNE.

**Le Roy**, tp. of Boone co., Ill. Pop. 1002.

**Le Roy**, post-v. of Empire tp., McLean co., Ill., on the Indianapolis-Bloomington and Western R. R., has 1 weekly newspaper. Pop. 862.

**Leroy**, tp. of Benton co., Ia. Pop. 1807.

**Leroy**, tp. of Bremer co., Ia. Pop. 363.

**Leroy**, post-v. and tp. of Coffey co., Kan., on Neosho River, which affords good water-power. The town has some manufactures. The station, 2 miles distant, is on the Missouri Kansas and Texas R. R. Pop. of v. 410; of tp. 1094.

**Leroy**, tp. of Calhoun co., Mich. Pop. 1203.

**Leroy**, tp. of Ingham co., Mich. Pop. 859.

**Leroy**, post-v. of Osceola co., Mich. Pop. 148.

**Leroy**, post-v. and tp. of Mower co., Minn., on the Milwaukee and St. Paul R. R. Pop. 1037.

**Le Roy**, post-v. and tp. of Genesee co., N. Y., on the Erie, Central, and State Line R. Rs., 25 miles S. W. of Rochester, 50 miles E. of Buffalo, and 10 miles E. of Batavia, has 7 churches, 2 banks, 2 weekly newspapers, 4 lime-kilns, 4 stone-quarries, several flour, planing, gypsum, plaster, and saw mills, with fine water-power supplied by Oatka Creek. It is the seat of Ingham University for ladies, and has an academic institute, an art conservatory, and a public library. Pop. of v. 2634; of tp. 4627.

C. B. THOMSON, Ed. "Gazette."

**Leroy**, post-v. of Westfield tp., Medina co., O.

**Leroy**, tp. of Lake co., O. Pop. 811.

**Le Roy**, post-tp. of Bradford co., Pa. Pop. 1144.

**Le Roy**, post-tp. of Dodge co., Wis. Pop. 1576.

**Leroy** (WILLIAM E.), U. S. N., b. Mar. 24, 1818, in New York; entered the navy as a midshipman Jan. 11, 1832; became passed midshipman in 1838, lieutenant in 1843, commander in 1861, captain in 1866, commodore in 1870, and rear-admiral in 1874; commanded the Keystone State in a severe engagement with Confederate iron-clads off Charleston, S. C., Jan. 31, 1863, and the Ononda at the battle of Mobile Bay, Aug. 5, 1864, and conspicuous on both occasions for "gallantry and determination."

FONHALL A. PARKER.

**Leroy d'Étiolles** (JEAN JACQUES JOSEPH), b. at Paris Apr. 5, 1798; studied medicine, and took his degree in 1824. In 1822 he presented to the Academy of Surgery a set of instruments which he had invented for the operation of lithotomy. The invention was disputed by Civiale and Amussat, who also claimed it, but after close examination of the case the prize was awarded to Leroy d'Étiolles. The most prominent of his writings is his *Histoire de la Lithotritie* (1839). D. at Paris Aug. 25, 1860.

**Leroy de St.-Arnaud** (JACQUES ACHILLE), b. at Paris Aug. 20, 1801; enlisted in 1816 in the body-guard of Louis XVIII., but left in 1820 the military service, and led for several years a rather adventurous life in France and England. In 1831 he again entered the army; served at Blaye, where the duchess of Berry was detained; became in 1837 captain in the foreign legion in Algeria, and distinguished himself very much during the following years at the taking of Constantine, by the capture of Bou Maza, as commander of the province of Constantine, and by his campaign against the Kabyles. In 1851 he was made a general and commander of one of the military divisions of Paris. In the same year he became minister of war, and in this position he rendered great services to Napoleon Dec. 2, 1852, for which he was rewarded with the title of marshal. In 1854 he commanded the French army in the Crimean war, and won the battle of Alma, but in September he had to give up his command on account of sickness, and d. on board the Berthollet, Sept. 29, 1854.

**Lery, de** (JEAN), b. at Lery, France, in 1534; was in 1555 a Calvinistic minister at Geneva, when he was engaged by Villegagnon to accompany his expedition to Brazil and introduce the Reformed religion in that country (1565). He preached for some time to the colonists on the small island in the bay of Rio de Janeiro now called Villegagnon, and was thus the first Protestant preacher in the New World. After the unfortunate result of that colony, Lery returned to France; was in 1560 a citizen of Geneva; was afterward preacher at Belleville, Nevers, and Sancerre; lost twenty-two of his congregation by the massacre of St. Bartholomew; retired to Berne, Switzerland, where he seems to

have passed the remainder of his life, and d. there in 1611. He wrote an account of his Brazilian adventures, *Histoire d'un Voyage fait en la terre du Brésil* (La Rochelle, 1578; often reprinted), and a *Histoire mémorable de la ville de Sancerre* (1574).

**Le Sage** (ALAIN RENÉ), b. May 8, 1668, at Sarzeau, in the present department of Morbihan; received his first education by the Jesuits at Vannes; studied philosophy and law in Paris since 1692, and began to practise as an advocate in 1695, but gave up this career in 1698, in order to devote himself exclusively to literary pursuits, in which undertaking he was aided by the Abbé de Lyonne, who gave him a pension of 600 livres a year. His literary career he began by translating dramas and novels from the Spanish, but from mere translations he rose by degrees to the production of independent works of the greatest merit. Of his numerous plays, which mostly consist of farces and comic operas, the most prominent are *Crispin* (1707) and *Turcaret* (1709), which latter comedy is a satire on the financiers of that time, who are said to have offered the author 100,000 francs if he would suppress his work. A still greater success he achieved as a romancer. *Le Diable à quatre* (1707), *Histoire de Guzman d'Alfarache* (1732), and especially *Histoire de Gil Blas de Santillane* (1715), were received with great applause, and the last mentioned is still a favorite in all civilized countries and with all educated people, on account of its striking psychological observations and refined satire. D. at Boulogne Nov. 17, 1747. His *Œuvres complètes* (12 vols.) were published at Paris in 1828.

**Le Sauk**, tp. of Stearns co., Minn. Pop. 268.

**Lesbo'nax** (Λεσβῶνας), of Mitylene in Lesbos, lived in the time of Augustus; wrote a number of orations in imitation of the Attic orators, of which two have come down to us. They are given in the collections of Reiske and of Dobson, separately by Orelli (Leipzig, 1820).—Another Lesbonax, a grammarian, whose date is unknown, has left a treatise on grammatical figures, published in Valckenauer's edition of Ammonius (Leyden, 1749; reprinted, Leipzig, 1822). H. DRISLER.

**Les'bos**, or **Mitylene**, an island of the Grecian Archipelago, 10 miles distant from the coast of Asia Minor, and belonging to Turkey. Area, 600 square miles. Pop. 40,000, of whom 15,000 are Turks. The island is mountainous, but very fertile, producing excellent olive oil, figs, grapes, and pine timber; its wine, famous in olden time, is now inferior. Theophrastus, Alcæus, and Sappho were born here. Chief town, Castron.

**Lescarbot** (Marc), seigneur de St. Audebert, b. at Vervins, France, about 1570; became a lawyer; was associated with De Mont in the colonization of Acadia (Nova Scotia) in 1605, and was engaged with Poutreincourt in the settlement of Port Royal (now Annapolis) until its abandonment in 1607, when he returned to France. He published in 1609 a *Histoire de la Nouvelle France*, giving an account of Cartier's voyages to Canada, of Laudonnière's failures in Florida, and of the enterprise with which he was personally connected, the first attempt at settlement having been made on what is now Boon Island on the coast of Maine. He added a collection of poems, written by himself and others in the new colony, under the title *Les Muses de la Nouvelle France*, one of which relates the defeat of the Micmac by the Armouchiquois Indians in Maine in 1607. The description of the country and the accounts of the Indians are spirited, and probably faithful. The volume attracted the attention of Hakluyt, and under his auspices an English translation of the greater part was published the same year, under the title *Nova Francia*, or the *Description of that part of New France which is one Continent with Virginia* (1609). A second edition, enlarged, of the original work appeared in 1611, and a third in 1618, with the addition of two smaller treatises, *La Conversion des Sauvages* and *Rélation dernière de ce qui s'est passé au voyage du Sieur de Poutreincourt*, the former having been first printed in 1610 and the latter about 1612. An account is given therein of the disputes between Poutreincourt and the Jesuits, in which Lescarbot sided with the former. He also published in 1613 a poetical description of Switzerland, *Le Tableau de la Suisse*, and in 1629 an account of the repulse of the English from the Isle of Rhé. As early as 1599 he had written a *Discours* in favor of the union of the Greek Church with the Catholic. D. about 1630.

**Lés'ches** (Λέσχος), b. near Mitylene, one of the class known as the Cyclic poets, flourished about 700 B. C. His poem, entitled the *Little Iliad* (μικρά Ἰλιάς), treated of the events subsequent to Homer's great poem, including the destruction of Troy, from which that part is called also the *Destruction of Troy* (Ἰλίου πειραή). Pausanias has quotations from Lesches, and an extract is preserved in Proclus. H. DRISLER.

**Les'ghians**, a people of the Caucasus, Asiatic Russia, numbering about 300,000, and speaking many languages. Under the influence of Shamyl they united into a single political body, and for many years carried on a brave resistance to Russia. Since 1859 they have been peaceable. Their religion, called Muradism, is a form of Mohammedanism taught by a native prophet, who began his religious career about 1820. They inhabit the mountains of Western Daghestan, where each village is a fortress.

**Les'ley** (JOHN), b. in Scotland Sept. 29, 1527; graduated at King's College, Aberdeen; studied at several continental universities, and in 1554 was appointed professor of canon law at Aberdeen. He attached himself to the fortunes of Mary queen of Scots, by whom he was made bishop of Ross; became her diplomatic agent; was implicated in the project for her marriage to the duke of Norfolk, and the consequent rebellion in the N. of England (1567); went to France in 1573 in her service and for the promotion of Catholic interests; received ecclesiastical appointments in that country, becoming in 1593 bishop of Coutances in Normandy, and was soon after obliged to take refuge in Brussels, where he d. May 31, 1596. He wrote much in defence of his royal mistress, and published at Rome a history of Scotland, *De Origine, Moribus et Rebus Gestis Scottorum* (Rome, 1578), in 10 books, seven in Latin and the last three in the Scottish dialect. This portion was reprinted in 1830 by the Bannatyne Club.

**Lesley** (J. PETER), b. Sept. 17, 1819, at Philadelphia; graduated at the University of Pennsylvania in 1838, and at Princeton Theological Seminary in 1841; was assistant geologist on the first survey of Pennsylvania in 1839-41, and prepared the maps and illustrations for the final report in 1842; after travelling on foot around France, heard lectures in the University of Halle through the winter of 1844; returned home in 1845, and was authorized by the American Tract Society to establish its colportage system in the northern and middle counties of Pennsylvania; became pastor of the Milton church near Boston in 1847, and left the ministry in 1850 to settle at Philadelphia as a professional geologist; was appointed secretary of the American Iron Association in 1855, secretary and librarian of the American Philosophical Society in 1858, professor of geology and mining engineering in the scientific department of the University of Pennsylvania in 1873, and State geologist of Pennsylvania in 1874; examined the Bessemer iron-works of Europe in 1863; was U. S. Senate commissioner to the Exposition of 1867, and spent the following winter in Egypt; was chosen one of the corporate members of the National Academy in 1864; published a *Manual of Coal and its Topography* (1856), a *Guide to the Iron-works of the U. S.* (1858), and the first series of reports of progress of the geological survey of Pennsylvania in 1875.

**Les'lie**, post v. and tp. of Ingham co., Mich., on the Jackson Lansing and Saginaw R. R., 24 miles S. of Lansing. It has 5 churches, a large union high school, a newspaper, 6 magnetic artesian wells of great flow, 3 hotels, 1 private bank, 6 steam-mills, 1 iron-foundry, extensive stove-works, and a number of stores. It is in a rich agricultural district. Pop. 1936. J. W. ALLEN, Ed. "LESIE HERALD."

**Leslie** (CHARLES), b. at Raphoe, Donegal co., Ireland, about 1645. His father, Dr. John Leslie, was successively bishop of the Orkneys, of Raphoe, and of Clogher for more than fifty years, and d. in 1671, at the age of 101 years. Charles was educated at Trinity College, Dublin; studied law at the Temple, London, for several years subsequent to 1671; took orders in the Church of England in 1680, and was chancellor of the cathedral of Connor in 1687, but by refusing to take the oath of allegiance to William and Mary cut off all prospect of ecclesiastical preferment. He then devoted himself to religious and political controversy, for both of which he was well fitted by extensive studies in English history and law and in theological literature. For thirty-three years he was the leading literary champion of the Jacobites. His works against Jews, Socinians, Presbyterians, Quakers, and Catholics once enjoyed great fame, but the only work of Leslie which has exercised any influence in the present century is the *Short Method with the Deists* (1694), the argument of which rests principally upon the Christian miracles. Though still esteemed by evangelized theologians, it is regarded as inadequate to the wants of the present day, and is now little read. Leslie was for some years at the court of the Pretender on the Continent, then resided in Italy, returned to England in 1721, and d. Apr. 13, 1722.

**Leslie** (CHARLES ROBERT), b. at Clerkenwell, London, of American parents, in 1794. His father was a watchmaker of Philadelphia. The boy returned with his parents to Philadelphia in 1800, and after leaving school was apprenticed to a bookseller; in 1811 went to England, studied with West and Allston; was elected associate of the Academy

in 1821, and member in 1826. His first attempts at painting were on a large scale of historical subjects, but he soon abandoned this style for another, in which he became famous. In 1833 he was appointed professor of drawing at West Point, but held the position for five months only. In 1847 he was chosen professor of painting at the Royal Academy, held the office four years, and delivered lectures which were published by the title of *A Handbook for Young Painters*. In 1849 appeared his *Life of Constable*, the artist. Leslie's productiveness has been very great. His works cover a period of about half a century; they exhibit much variety in subject, but with much sameness of manner. Several of the best of them have been engraved. His *Anna Page and Slender*, *Sir Roger de Coverley going to Church*, *May Day in the Reign of Queen Elizabeth*, are familiar. His works found great favor in England, partly from the character of his subjects, which were taken chiefly from English literature, and partly from the artist's sympathy with English scenery and manners. They are full of a sweet humor, elegant in conception, graceful in execution, and finished in style. The best are in the Sheepshanks Collection. Leslie painted a few portraits and some ceremonial pieces, among which are the *Coronation of the Queen* and the *Christening of the Princess Royal*. He d. in London May 5, 1859. O. B. PROTHINGHAM.

**Leslie** (ELIZABETH), b. at Philadelphia, Pa., Nov. 15, 1787, sister of C. R. Leslie; accompanied her parents to England in 1793, returning in 1800; made her first appearance as an authoress in 1827 with her *Seventy-five Receipts for Pastries, Cakes, and Sweetmeats*, the popularity of which led to other successful works of the same class. In 1831 she published the *American Girls' Book*, and having won a prize offered by Mr. Godey of the *Lady's Book* by her story *Mrs. Washington Potts*, she thereafter devoted herself chiefly to writing works for the young, by which she acquired great popularity. Her *Domestic Cooking Book*, published in 1837, went through fifty or sixty editions, while the *House Book* (1840), and *Lady's Receipt Book* (1846) were also widely circulated. Her only novel was entitled *Amelia, or a Young Lady's Vicissitudes* (1818). She contributed to Hart's *Female Prose Writers of America* an interesting autobiographical sketch. D. at Gloucester, N. J., Jan. 2, 1858.

**Leslie** (GEORGE DEXTER), b. in London, England, July 2, 1820, son of C. R. Leslie; was educated at the Meiers' School, received artistic training from his father and at a school of art at Bloomsbury, and was in 1854 admitted as a student of the Royal Academy. He began to exhibit pictures at the Academy in 1857, was elected an associate of that institution in 1868, and has attained considerable popularity as an artist.

**Leslie** (HENRY DAVID), b. in London, England, June 18, 1822; studied music under the direction of Prof. C. Lucas; founded in 1856 a choral society known by his name, and in 1864 was made principal of the College of Music, an institution founded in that year on the system of the continental conservatories. He has published several symphonies, overtures, oratorios, and cantatas, besides various compositions for stringed instruments, and sixty or seventy songs, duets, anthems, and pieces for the piano. In 1864 he composed a romantic opera in three acts.

**Leslie** (SIR JOHN), b. at Largo, Fifeshire, Scotland, Apr. 16, 1766; was educated at the universities of St. Andrew's and Edinburgh; spent two years (1788-89) in Virginia as tutor in one of the Randolph families; settled in London in 1790, and applied himself to science. He translated Buffon's *Natural History of Birds* (9 vols., 1793), travelled on the Continent as tutor, and was an unsuccessful candidate for professorships at St. Andrew's and Glasgow. In 1805 he was elected by the town council of Edinburgh professor of mathematics in the university of that city, after a vigorous opposition by the clergy on the score of dangerously liberal opinions both in politics and religion. In 1812 he succeeded Prof. Playfair in the chair of natural philosophy, which he held through life. He was knighted a few months before his death, which occurred Nov. 3, 1832. He early took high rank as a scientific investigator and discoverer. His *Experimental Inquiry into the Nature and Propagation of Heat* (1801) gained the Rumford medal of the Royal Society. From 1809 to 1822 he published a series of textbooks in geometry and the higher mathematics, and from 1822 to his death a similar series on natural philosophy. In 1810 he discovered the process of artificial congelation. He was the author of a large number of scientific articles in the *Encyclopædia Britannica*.

**Les'seps, de** FERDINAND VESSELY, b. at Versailles Nov. 19, 1800; entered public life in 1828 as an attaché at Lisbon; held various consular offices; proposed in 1841 to Mehmet Said, viceroy of Egypt, the cutting of a canal across the Isthmus of Suez, and published in that year a report, *Projet de l'isthme de Suez creuse*. A franc



sanctioning the enterprise was granted in 1854, and the work was executed 1859-69. (For a sketch of the history of the Suez Canal and the many difficulties, financial, diplomatic, and natural, which were overcome largely by the energies of M. de Lesseps, see *SUEZ CANAL*.) M. de Lesseps since the completion of his great work has been the recipient of many honors and rewards, and has directed his attention to other vast projects, such as a central Asian railway, the conversion of the Desert of Sahara into an inland sea, the Panama Canal, etc.

**Less'ing** (GOTTFRIED EHRHARD), b. at Camenz, Saxony, 1729; studied at Leipzig, or rather tried to study, first theology and then medicine, but his innate passion for the theatre, drama, and literature in general was too powerful; moved to Berlin, where, in intimate connection with Moses Mendelssohn and Nicolai, he led for several years an exclusively literary life, the most remarkable fruit of which were his *Letter on Literature*. In 1760 went to Breslau as government secretary to Gen. von Tauenzien, and while residing there, in the midst of the Seven Years' war, wrote *Mimæon Baruchim*, the first national drama of Germany and the inauguration of a great and brilliant literature. It made a great sensation, and the impression was both watered and deepened by his tragedy, *Emilie Galotti*, which soon followed. In 1769 he went to Hamburg as director of the theatre, and there wrote his *Hamburgische Dramaturgie*, a series of theatrical reviews, which, together with his *Laokoon*, a series of general critical analyses, not only exercised a great influence on German literature, but raised a new issue in modern civilization: from Hamburg went to Wolfenbüttel as librarian at the ducal library, and while in this position published the famous *Wolfenbüttelsche Fragmente*, the first and perhaps the strongest attack on the historical basis of Christianity. The *Fragments* were written by Reimarus; Lessing was only their editor and champion, but he defended them against the orthodox Church with such superiority of intelligence and brilliancy of argument that the ducal government became alarmed and bade him stop. Although a very independent character, he submitted, and later on set forth his religious views in another form, in his great philosophical drama, *Nathan der Weise*, one of his last and most perfect works. His philosophical essay on the development of civilization, *Die Erziehung des Menschengeistes*, followed next year. He d. at Wolfenbüttel in 1781. Lessing's mind is very strikingly characterized by the well-known saying of his, that if God held truth in the right hand and doubt in the left, and offered him the choice, he would choose the left hand. Truth in the form of dogma, maxim, or rule he did not acknowledge. He understood truth only in the form of something to be searched after, to be striven for. To him, religion was not obedience, but insight; morality, not duty, but wisdom; poesy, not inspiration, but taste. Although Voltaire's antagonist, he is Voltaire's disciple. But in his searchings after truth and in his exertions towards perfection few have ever surpassed him in acuteness and penetrating power, and none in resoluteness and veracity. What was a needle between Voltaire's fingers became a sword in Lessing's hand. What Voltaire had used only as a brilliant means of repartee, Lessing laid down and carried through as a powerful principle. He was a greater critic than Voltaire, and he is the founder of modern art-criticism, of that kind of authorship which at present attracts the attention of the greatest and most accomplished minds in all nations by its analyses and demonstrations of the relation between art on the one side and nature, history, morality, and religion on the other. All that had been written about art before Lessing—by Aristotle and Horace, by Boileau and Voltaire—became insignificant when *Laokoon* and the *Hamburgische Dramaturgie* were published. It consisted merely of rules, and was founded on the idea that art could be defined by rules. Lessing understood that art is as free in its creations as nature, and, like her, bound by laws, not by rules; and to find out and establish these laws, every one of which opens up new perspectives into the philosophy of matter and mind, is the task of criticism. This idea is truly the discovery of a new world, and every point on which Lessing lighted is explored and described with wonderful completeness and accuracy. A positive system of philosophy and religion Lessing probably did not possess. Yet his criticism on these two fields was not merely destructive. He never took from people their prejudices without giving them a hint or suggestion of how the empty place was to be filled; and his ideas in philosophy of the infinite perfection of mankind, and in religion of the true relation between the Bible and the tradition, have been without influence.

(CLEMENS PETERSEN.)

**Lessing** (KARL FRIEDRICH), b. at Wartenberg, Silesia, Feb. 15, 1808; received his first artistic instruction at the school of architecture at Berlin; studied then for several

years at Düsseldorf under Schadow, and was appointed director of the gallery of paintings at Carlsruhe in 1858. His paintings are partly landscapes, partly historical, and among the latter his *Hussites* (1839), *Huss before the Council* (1842), *The Martyrdom of Huss* (1850), and others, excited great admiration by the strength and richness of their characterization. A pupil himself of the school of Düsseldorf, and laboring in many points under its influence, he has contributed much to elevate and ennoble it.

**Les'ter**, post-tp. of Black Hawk co., Ia. Pop. 844:

**Lester** (CHARLES EDWARDS), b. at Griswold, Conn., July 15, 1815, a descendant of Jonathan Edwards; resided for a time in the South and West; came to the bar in Mississippi, and was afterwards ordained to the Presbyterian ministry; was U. S. consul at Genoa, Italy, 1842-47, and has attained distinction as a journalist and political lecturer. Among other works he has published *The Glory and Shame of England* (1841), *Condition and Fate of England* (1842), *Life of Vesputius* (1846), *The Napoleon Dynasty* (1852), *Life of Charles Sumner* (1871), *Our First Hundred Years* (1874-75), and several translations of standard Italian authors.

**Lestocq'** (JEAN HERMAN), b. at Celle, Hanover, Apr. 29, 1692. His father, a French emigrant, was a surgeon, and the son chose the same profession; in 1713 went to St. Petersburg, and was appointed surgeon in the service of Peter the Great, but was banished to Kazan in 1718 on account of his dissolute habits. In 1725, Catharine I. recalled and appointed him surgeon in the service of the princess Elizabeth. He soon acquired complete control over the mind of the princess, and it was by his instigation and by his aid that she undertook the revolution of Nov. 25, 1741, which made her empress of Russia. The king of Poland now made Lestocq a count, the empress gave him a pension of 7000 rubles annually, and for several years his influence in Russian politics was very great. But in 1748 the vice-chancellor, Bestozhef, succeeded in rousing the empress's suspicion against him. He was arrested, put to the torture, and banished to Ooglitche. In 1761, Peter III. recalled him to the court, and Catharine II. gave him an estate in Livonia, where he d. June 12, 1767.

**Lestosau'rus** (Gr. *ἄσπις*, "pirate," and *σαῦρος*, "lizard"), a genus of extinct reptiles from the Cretaceous of Kansas. (See *MOSAURUS*, by PROF. O. C. MARSH.)

**L'Estrange'** (SIR ROGER), b. at Hunstanton Hall, Norfolk, England, in 1616; was probably educated at Cambridge; accompanied King Charles I. in 1639 in his expedition against the Scots, and being a zealous royalist during the civil war was captured in an attack on Lynn (1644), and condemned to death by the Roundheads. He was, however, reprieved, and kept captive several years, until in 1648 he escaped and unsuccessfully tried to stir up a rebellion in Kent; after which he fled to the Continent. He returned to England on the dissolution of the Long Parliament in 1653, and made terms with Cromwell. At the Restoration he was appointed censor or "licenser" of the press; established the *Public Intelligencer* newspaper in 1665 and the *Observer* in 1679, in both of which sheets and in a multitude of pamphlets he showed himself a most energetic supporter of the Crown. He made translations of Josephus, Cicero's *Offices*, *Æsop's Fables*, Erasmus's *Colloquia*, Quevedo's *Visions*, and other works, ancient and modern, some of which possessed considerable merit, though unfaithful and disfigured by flippant phrases. He was knighted on the accession of James II., elected to the Parliament of 1685, and dismissed from his office of censor at the revolution of 1688, soon after which he became insane. D. in London Dec. 11, 1704.

**Lestr'id'inæ** [from *Lestris*, the generic name, literally "robber," and the sub-family affix *-inæ*], a sub-family of the family Laridæ, distinguished by a well-developed beak, the upper mandible of which is strongly hooked, overhanging the lower, and which has at its base a well-developed cere. In this group are embraced the jagers or gull-hunters, and these names, as well as their scientific designations, are derived from an alleged peculiarity in their habits, it being affirmed that they chiefly obtain their food by pursuing the smaller gulls after they have secured food, and compelling them to disgorge; the food thus dejected they pounce upon, and, as the bald-headed eagle does to the fish-bird, appropriate it to themselves. The species are mostly inhabitants of the polar regions, G. R. Gray recognizing four species from the northern seas and one from the Antarctic; but, according to the same authority, two species (not even represented in the British Museum) are found in intermediate regions, one (*Stercorarius Hordyi*) being attributed to "Malay, Philippines, Sandwich Islands," and another (*S. spinicauda*) to "Atlantic Ocean, St. Helena." Dr. Coues admits four North American species, which he

places in two sub-genera, *Baphagus*, with one species, and *Stercorarius*, with three. THOMPSON GILL.

**Le Sueur**, county of S. Central Minnesota, bounded W. by the Minnesota River. Area, 440 square miles. It is fertile, level, and well wooded. Grain and lumber are leading products. The county contains a great number of small lakes, and is traversed by the St. Paul and Sioux City R. R. Cap. Le Sueur. Pop. 11,607.

**Le Sueur**, post-v. and tp., cap. of Le Sueur co., Minn., on the Minnesota River and on the St. Paul and Sioux City R. R., 65 miles from St. Paul. It has 6 churches, an elegant public school, several wagon and furniture manufacturing, and a number of stores. Pop. 1009.

M. R. PRENDERGAST, LITH. ED. "LE SUEUR COURIER."

**Lesueur**' (EUSTACHE), b. at Paris in 1617; received his first artistic instruction from his father, who was a sculptor; studied under Simon Vouet, together with Lebrun, his future rival, and soon became one of the most esteemed painters of that time in France, but d. at Paris in 1655. His pictures represent subjects of the Bible, *St. Paul at Ephesus*; of the Christian legends, *Scenes in the Life of St. Bruno*; and of the Greek mythology, *Scenes in the Life of Cupid*; and the circumstance that he had never been in Italy, nor made a thorough study of the history of the art of painting, gave his genius a freshness, naiveté, and originality which still charm in his pictures, while it is just these qualities which are missing in Lebrun, who followed Poussin to Italy, and succeeded in throwing Lesueur into the shade.

**Lesueur** (JEAN FRANÇOIS), b. Jan. 15, 1763, at Drucat-Plessiel, near Abbeville, France; was appointed director of music at the cathedral of Sez in 1779, and in 1786 at the church of Notre Dame in Paris. The innovations which his compositions introduced into the style of sacred music attracted the public, but were not approved of by connoisseurs and the clergy, and in 1788 he gave up his position, and lived for some years in retirement in the country. In 1793 his opera *La Carmagnole* made a great success, and in 1795 he was appointed professor at the newly formed conservatory of music in Paris. This position he lost in 1802 on account of dissensions with his colleagues, but in 1804, Napoleon made him director of the imperial orchestra. The mass and *Te Deum* which he composed for the coronation of the emperor were received with great applause, and his opera, *Les Bardes*, even excited enthusiasm. *La Mort d'Adam*, on the contrary, was more coolly received in 1809, and his later masses and oratorios failed to make much impression. In 1817 he was appointed professor in composition at the reorganized conservatory of music, and among his pupils were Berlioz, Ambroise Thomas, Gounod, and Dietsch. D. in Paris Oct. 6, 1837.

**Letart**', tp. of Meigs co., O., on Ohio River. Pop. 1319.

**Letch'er**, county of Kentucky, bounded S. E. by Virginia. It is a mountain region, having beds of bituminous coal. Corn is the principal crop. Area, 300 square miles. Cap. Whitesburg. Pop. 4698.

**Letcher** (JOHN), b. at Lexington, Va., Mar. 29, 1813; educated partly at Washington College, but graduated at Randolph-Macon College, Va.; studied law and was admitted to the bar in 1839, and while practising edited a newspaper in his native town; in 1850 was a member of the State constitutional convention, and a member of Congress from 1853 to 1859, when he was elected governor of Virginia. This position he was holding when the State passed her ordinance of secession in 1861. Though he had not favored the policy of secession, yet as an individual and as chief magistrate he sustained the action of the State with zeal, energy, and ability. After the war he took no prominent part in politics, but resumed the practice of law at Lexington. A. H. STEPHENS.

**Letcher** (ROBERT P.), b. in Gerard co., Ky.; was a lawyer by profession; a member of the State legislature for a number of years, and once Speaker of the house; was a member of Congress from 1823 to 1825; was an intimate personal and political friend of Mr. Clay and Mr. Crittenden; was elected governor of the State in 1840, and was minister to Mexico in 1849. D. at Frankfort, Ky., Jan. 24, 1861. A. H. STEPHENS.

**Le'the**, in Grecian mythology, was a river in the lower world of which the departed souls drank before entering the Elysian Fields, thereby entirely forgetting all about their life on earth. It was also used as a personification of oblivion.

**Leto**. See LATONA.

**Letohatch'ee**, post tp., Lowndes co., Ala. Pop. 2538.

**Letronne**' (JEAN ANTOINE), b. at Paris Jan. 25, 1787; studied the art of painting under David, but felt himself more strongly drawn towards science; worked for several

years under Montelle, professor in geography; travelled from 1810 to 1812 through France, Italy, and Switzerland; wrote in 1814 his *Cours Élémentaire de Géographie, ancienne et moderne*, which was often republished; became in 1831 professor in history and archaeology at the Collège de France, and in 1840 keeper of the archives of the kingdom. D. at Paris Dec. 13, 1848. His principal works are *Recherches pour servir à l'Histoire de l'Égypte* (1823), *Revue des Inscriptions grecques et latines de l'Égypte* (1842-48), and *Diplômes et Chartres de l'Époque Mérovingienne sur papyrus et sur velin* (1844). Noteworthy among his minor works is his *La Statue vocale de Memnon* (1833).

**Letter of Attorney**. See POWER OF ATTORNEY.

**Letter of Credit**, a letter written by one merchant or correspondent to another requesting him to credit the bearer or the person therein named with a sum of money. Letters of credit are either general or special. They are general when addressed to any and every person to whom they may be presented, and therefore give any person to whom they may be shown authority to make advances upon the credit of the drawer. They are special when addressed to a particular individual by name, who alone is authorized to act upon the request. If advances be made upon a letter of credit by the person to whom it is presented, he has a right of action against the drawer for reimbursement. A privity of contract springs up between them upon acceptance of the request by the drawee. (See GUARANTY. Burge on *Swedishship*; Bell's *Commentaries*; *Laws of Scotland*; Story on *LIENS*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Lette're**, town of S. Italy, in the province of Naples, not far from Castellammare. Pop. in 1874, 5640.

**Letterken'y**, tp. of Franklin co., Pa. Pop. 2178.

**Letters**. See PALÉOGRAPHY.

**Letters, Law Concerning**. See LITERARY PROPERTY. by PROF. T. W. DWIGHT, LL.D.

**Letters of Administration**. See LETTERS TESTAMENTARY, ADMINISTRATION.

**Letters of Marque**. See PRIVATEER, WAR, MARQUE (LETTERS OF).

**Letters Patent**. See PATENT.

**Let'ters Ro'gatory**, a writ or instrument sent in the name and by the authority of a judge or court to another in a different country or State, requesting that the deposition of a witness be taken who is within the jurisdiction of the foreign tribunal, to be used as testimony in a cause pending before the judge or court from which the letters are sent. This instrument informs the court abroad of the pendency of the action, the names of the foreign witnesses, and is frequently accompanied by written interrogatories, prepared by the litigating parties, upon which the witness is to be examined. It also contains an offer on the part of the court issuing the letters to perform a similar service for the foreign tribunal whenever required. The witness is examined either before the judge receiving the letters, or before a commissioner appointed for the purpose, and the answers, signed and sworn to by the deponent, and duly authenticated, are then returned to the court from which the letters issued. (See DEPOSITION, WITNESS.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Let'ters Testament'ary**, an instrument in writing granted by a surrogate or other judicial officer having jurisdiction of the probate of wills to an executor as evidence of his authority, and empowering him to administer the estate of the deceased. When a person dies intestate, letters of a similar character are granted to the person who is appointed administrator, but they are then termed "letters of administration." By the English common law executors could perform most of the acts pertaining to their office, except engaging in suits in relation to the estate, before obtaining letters testamentary, since an executor's authority and title is deemed in law to be derived from the will, and only to be evidenced by the letters granted. This rule has generally been changed in American practice by statute, and it is usually required that letters testamentary must be obtained before an executor will be authorized to perform any of his usual duties in the settlement of the estate except those of minor importance. An administrator has no authority to act until letters of administration are granted to him, though after the grant is made his title and authority will, by fiction of law, relate back to the death of the intestate. (See FICTIO.) Letters granted by the surrogate are only valid within the limits of the State in which they are issued. If there are assets of the deceased within a foreign State or country, letters must be issued there to subordinate or ancillary administrators, and the principal executor or administrator, as such, will have no authority to administer such assets, unless they are re-



mitted to him from the foreign jurisdiction. (See WILL, ADMINISTRATOR, EXECUTOR, PROBATE, SUCCESSION.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Let'ter-wood, or Snake-wood**, a rare and costly ornamental wood used for inlaying and veneering, the product of *Brosimum Aubletii*, an artocarpaceous tree of South America. It is so hard that axes of extraordinary temper are required to fell the tree. Its rich brown wood has somewhat letter-shaped marks, which are nearly black. It is one of the most beautiful kinds of wood.

**Let'tic Race, The**, forms a subdivision of the Slavic group, belonging to the Indo-European family, and is itself divided into three branches—the Lithuanians, the Letts, and the Old Prussians. The Old Prussians inhabited the region between the Niemen and the Vistula, but were completely Germanized in the seventeenth century. The few remains of their language were collected by Nesselmann, and published at Berlin (1846). The Letts, numbering about 1,000,000, inhabit Courland, Western Livonia, and the adjacent districts of the governments of Vitebsk, Kovno, and Pskov. Their language was not reduced to writing until the sixteenth century, on the introduction of the Reformation; the first book printed in Lettish was the minor catechism by Luther, which appeared in 1586. Since that time the language has been cultivated with steadily increasing care. Religious books, and even books of fiction, were translated; lyrical poetry, and even plays, were produced by native authors; and at present Lettish newspapers and periodicals are issued. The Lithuanians comprise the Lithuanians proper, numbering about 750,000, and inhabiting the eastern part of Courland and the governments of Vilna and Grodno; the Samogitians or Shamaites, numbering about 500,000, and occupying the government of Kovno; and the Lithuanians in Prussia, numbering about 150,000. The Lithuanian language is spoken in several dialects. Like the Lettish, it was not reduced to writing until the time of the introduction of the Reformation, but it is much older than the Lettish, and exists in a much more primitive state, for which reason it is of peculiar interest to the student of the Indo-Germanic languages. It is rich in songs, of which a small collection was published by Rhessa at Königsberg in 1825; and in tales, proverbs, and riddles, of which a collection was published at Weimar in 1857 by Schleicher. A Lithuanian dictionary was published in 1854 by Nesselmann, and a grammar by Schleicher (Prague, 1856); Bielestein gave a Lettish grammar in 2 vols. (Berlin, 1863-66).

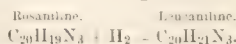
**Lettres de Cachet**. See CACHET, LETTRES DE.

**Lett's**, post-v. of Grandview tp., Louisa co., Ia., on the South-western division of the Chicago Rock Island and Pacific R. R. (Ononwa Station). Pop. 88.

**Let'tuce** [Lat. *lactuca*], an important salad-plant, the *Lactuca sativa*, a composite herb, the native country of which is not known. There are many varieties, some of which form heads of leaves and others do not. It is easy of digestion, rather laxative, and gently soporific. From its juice the narcotic LACTUCARIUM (which see) is prepared. There are several Asiatic, European, and American species of wild lettuce (*Lactuca*), most of which have an acrid-narcotic quality.

**Leucadia**. See SANTA MATRA.

**Leucan'iline** [Gr. λευκός, "white," and Sans. *nīl*, "indigo"],  $C_{20}H_{21}N_3$ , a base produced by the action of reducing agents on rosaniline, and related to it in the same manner as indigo-white to indigo blue:



(See Watts's *Dict.*, iii. 574.)

**Leuch'tenberg**, in the Middle Ages an independent principality of Germany, received its name from the castle of Leuchtenberg, and was ruled by a landgrave. In 1646 the male line of the dynasty became extinct, and the landgrave fell to Bavaria. In 1817 the Bavarian king, Maximilian Joseph, ceded it for 5,000,000 francs to his son-in-law, Eugène Beauharnais, who assumed the title of duke of Leuchtenberg. Area, about 80 square miles. Pop. about 6500. Cap. Pfreimt.

**Leu'cine** [Gr. λευκός, "white"], a curious crystalline substance which is among the products of incipient putrefaction of the albuminoid or proteid bodies. Proust was the discoverer of it in cheese, and Braconnot obtained it by treating animal substances with sulphuric acid. It occurs diffused widely throughout living animal tissues. Its composition is  $C_6H_{13}NO_2$ . Another name now given to it, conveying a theory of its constitution, is *amidocaproic acid*, represented thus:  $C_6H_{11}(NH_2)O_2$ ; as derived from caproic acid,  $C_6H_{11}O_2$ , by replacement of  $H_2$  by  $NH_2$ , amidegen. It was called by its earlier investigators *oxide of caseine* or

*caseous oxide*. Another crystalline substance, called *tyrosine*, which is  $C_9H_{11}NO_3$ , always accompanies leucine, both in nature and as formed artificially. Leucine is prepared by dissolving washed lean meat in oil of vitriol, removing the latter by chalk, evaporating, dissolving in alcohol, decolorizing with animal charcoal, and crystallizing. There are several other methods, however. Leucine may be sublimed like camphor. It dissolves in warm, not in cold, water.

The study of these immediate products of metamorphoses of the nitrogenous substances that form animal tissues is of the utmost importance in connection with physiology and the learning of the chemical laws of life and death, of health and disease. In this view, leucine and tyrosine, and their associates and congeners, are bodies of high importance, which call for the serious attention and investigation of the chemical student. H. WERTZ.

**Leucip'pus**, the teacher of Democritus and the founder of the atomic school in the Greek philosophy, lived probably about 500 B. C., but of his personal life nothing is known. His writings have all perished, and from the notices which Aristotle, Plutarch, and Cicero give it is impossible to see now how far he had developed the atomic theory.

**Leu'cite** [Gr. λευκός, "white"], a natural silicate of alumina and potash, crystallizing in the monometric system, and of a gray or white color (hence it is sometimes called "white garnet"). It occurs abundantly in the volcanic rocks of the Rhine and of Italy.

**Leuck'art** (KARL GEORG FRIEDRICH RUDOLF), b. at Helmstedt, in Brunswick, Oct. 7, 1823; studied medicine and natural science at Göttingen under Wagner, and was appointed professor of zoology and comparative anatomy at the University of Giessen in 1850. His *Beiträge zur Kenntniss weichtierischer Thiere* (1848) and *Ueber den Polymorphismus der Individuen* (1851) attracted much attention, but it was more especially his helminthological researches, *Die Blasenbandwürmer* (1856), and *Trichina spiralis* (1861), which made his name celebrated. He also wrote *Die Parasiten des Menschen* (2 vols., 1861-66).

**Leucocythæ'mia** [Gr. λευκός, "white," κύτος, "cell," and αἷμα, "blood"], or **Leucæ'mia**, a disease of the human subject, characterized by a very great excess of the white cells in the blood, and by a corresponding diminution of the proportion of red corpuscles. It is accompanied by enlargement of the spleen or of some of the lymphatic glands, or of both, and cases are reported accompanied by disease of the medullary mass in the bones, which mass takes on, or perhaps normally possesses, the lymphatic function. In some cases the white blood-cells are not to be distinguished from the normal ones; in others they are smaller and accompanied by free nuclei and granules. The liver is frequently enlarged. A hæmorrhagic diathesis is often developed. The patient wastes away and becomes anæmic. Of the causation and cure of this disease nothing is known. It is always fatal, but often chronic.

**Leu'coline** [Gr. λευκός, "white"],  $C_9H_7N$ , a volatile oily base, isomeric with chinoline, obtained from the oil of coal-tar. (See *Chem. Soc. Jour.*, xvi. 377.)

**Leucorrhæ'a** [Gr. λευκός, "white," and ρέειν, to "flow"], the "whites," a catarrhal flow from the vaginal or uterine mucous membranes. This disease is an exaggeration of the normal mucous secretion, and is often consequent upon a somewhat inflammatory condition of the mucous membranes. Rest, the use of iron and other tonics, and astringent washes are often highly beneficial. Sometimes the catamenia assume a leucorrhæal character, especially towards the close. The cervix uteri is often involved in a sub-acute or chronic inflammation, which not unfrequently is best treated by local caustic or other applications.

**Leucothæa**. See Ixo.

**Leuc'tra**, village of Boeotia, Greece, became famous as the place where the Thebans under Epaminondas defeated the Spartans under Cleombrotus in 371 B. C., thereby checking for ever the influence which Sparta had exercised over Greece for several centuries.

**Leuk**, village of Switzerland, in the canton of Valais, on the Rhone. It is situated at an elevation of 5000 feet above the level of the sea, and is famous for its hot springs, saline, sulphurous, and chalybeate, which are used for both bathing and drinking, chiefly in diseases of the skin.

**Leuret'** (FRANÇOIS), b. at Nancy Dec. 3, 1797; studied medicine, and took his degree in 1826. Having applied himself with special interest to the study of mental diseases, and developed original ideas of the treatment of the insane, he was appointed physician of the insane section of the Bicêtre, then director of a lunatic asylum in Paris, and at last director of the Bicêtre. His most prominent writings are *Fragments psychologiques sur la Folie*

(1834), *Traitément moral de la Folie* (1840), and *Des Indications à suivre dans le Traitément moral de la Folie* (1846). D. at Nancy Jan. 6, 1851.

**Leu'then**, village of Prussia, in the province of Silesia, 2 miles W. of Breslau. Here Frederick the Great completely defeated the Austrians under Prince Charles of Lorraine on Dec. 8, 1757.

**Leut'schau**, town of Hungary, in the county of Zips, has 5729 inhabitants, mostly engaged in the cultivation of wine, fruit, saffron, and hops.

**Leut'ze** (EMMANUEL, b. at Emingen, Württemberg, May 24, 1816, son of a mechanic, who on account of his political opinions left Germany for the U. S., and made his home in Philadelphia. His early passion for art showed itself in rude portraits. A picture representing an *Indian Gazing on the Setting Sun* indicated so much talent that his commissions soon enabled him to travel abroad. In 1841 he arrived in Amsterdam, and from there went to Düsseldorf, and became a pupil of Lessing. His first picture, *Columbus before the Council of Salamanca*, was purchased by the Art Union of Düsseldorf. At Munich, Leutze became an admirer of Kaulbach. Thence he went to Italy, visiting the chief cities and studying the great masters, but he was a German by birth and temperament, and he came back to Germany as to his home, married there, and there lived till 1859; then returned to America, and between Philadelphia and Washington passed the rest of his life. D. in Washington, D. C., July, 1868. Leutze painted numerous portraits, and of eminent persons, of Gen. Grant among the rest. But his chosen field of art was the romance of history, which he illustrated with such vigor and truth as were in him. In Washington and Philadelphia his work meets the eye of the visitor in public and private places. In the Capitol his *Western Emigration* is conspicuous. His *Washington Crossing the Delaware* is familiar through engravings. Other pieces, well known and more or less celebrated, are *The Landing of the Norsemen*, *Cromwell and his Daughters*, *The Tempest*, *John Knox admonishing Mary Stuart*, *Columbus before Ferdinand and Isabella*, *Van Rensselaer's Masques*, *Goliath*. Leutze was a rapid painter, with immense fire and dash. His works are popular with the lovers of action, but distasteful to the lover of delicacy in drawing and color. He was the American exemplar of the modern German school of Kaulbach and Cornelius, with a tumult of passion all his own.

O. B. FROTHINGHAM.

**Leuze**, town of Belgium, in the province of Hainaut, on the Dender, has breweries, distilleries, salt-refineries, oil-mills, dyeing establishments, bleaching grounds, and manufactures of hosiery and lace. Pop. 6069.

**Levaillant'** FRANCIS, b. in 1753 at Paramaribo, in Dutch Guiana, of French parents; removed to Europe in 1763, was educated at different places in Germany, and in 1777 studied natural science at Paris; in 1780 proceeded to the Cape of Good Hope, whence he made two journeys to the interior of Africa, which he described on his return to Paris in 1785 in his *Voyage dans l'Intérieur de l'Afrique* (1790, and *Second Voyage* (1793). These books were read with great interest and ran through several editions, though they were much criticised by scientific authorities. Of unquestionable value were his collections, sold partly in France, partly in Holland, and his ornithological works, *Histoire naturelle des Oiseaux d'Afrique* (6 vols., 1798-1812; *Histoire naturelle des Perroquets* (2 vols., 1801-05). D. at Sezanne in Champagne Nov. 22, 1824.

**Le'van**, tp. of Jackson co., Ill. Pop. 1321.

**Levan**, tp. of Pope co., Miss. Pop. 100.

**Levan'na**, post v. of Union tp., Brown co., O., on the Ohio River, opposite Dover, Ky. Pop. 104.

**Levant'**, post-tp. of Penobscot co., Me., 8 miles W. by N. of Bangor. It has manufactures of lumber. Pop. 1159.

**Levant**, *The*, a name of Italian origin, *Il Levante*. It denotes the countries bordering on the eastern part of the Mediterranean—Asia Minor, Syria, and Egypt. Like Orient, it signifies "rising, east," and was brought into use in the early Middle Ages, when the Italian republics controlled the commerce of Europe.

**Levee**. The word *levee* is French, and signifies, among other meanings, "raising," "embankment," "embanking," "bank," "causeway," "mole." Levees, embankments, dikes, dams, were used by the ancients during the earliest historical periods. Probably the first to use them were the Egyptians in the Nile valley. The Assyrians and Babylonians also leveed and reclaimed portions of the valley of the Euphrates and Tigris. The Chinese leveed their great rivers, the Yang-tze-Kiang, or Blue River, and the Hoang-Ho, or Yellow River. Egypt being a rainless country, or nearly so, except near the sea-coast, the alluvial valley-

lands of the Nile could not be cultivated without irrigation. During the flood season of the Nile—the greatest height being reached about the time of the autumnal equinox—water is drawn off through sluices in the levees, and conveyed through canals to where it is needed; it is there retained within leveled areas or basins as long as required. Variations of a few feet in the annual rise of the Nile are therefore of the utmost importance to the Egyptians, for low inundations cause dearths or famines, and excessive inundations destruction of property, disease, and loss of life. The Nile system is one of leveeing and irrigation, but the irrigation includes the inundation of the valley-lands throughout, leaving dry only the mounds on which the cities, towns, and villages are built, or the leveed areas from which the water is excluded. Near Cairo the river levees are from 12 to 15 feet in height, and but very little higher than the river flood-line. The annual overflow of the Nile lands through sluices or graduated outlets—for many centuries has caused the gradual elevation of these lands—about four to four and a half inches in a century—and also the elevation of the river flood-line. Below Cairo, at the head of the Delta proper, there has been constructed since 1846 a masonry dam, or "barrage," provided with numerous sluice-gates, across the branches of the Nile, for the purpose of facilitating irrigation during low water in the river. Navigation is provided for by means of a lock at the end of the "barrage." It is said that 200,000 laborers were employed to strengthen and maintain the Nile levees during the excessive flood of 1874.

Queen Semiramis, says Wheeler, "prevented the overflow of the Euphrates valley by the erection of stupendous mounds or dams along the banks of the Euphrates; and henceforth the land was irrigated by hand and by engines." In China, says M. Hue, "the maintenance of the dikes on Yellow River is entrusted to a special board, which forms in the provinces of Chee, Shan-Toong, and Honan a body independent of the provincial government." In Hindostan levees or embankments, or "bunds," are used to construct reservoirs for the purpose of irrigating the sterile hills and plains, which were only barren for want of irrigation during the protracted seasons of drought. In the Madras provinces alone, Capt. Smith informs us, there exist no less than 43,000 reservoir-tanks in repair, and 10,000 out of repair—all of native origin. He estimates the length of the levees or embankments which form these reservoirs at 30,000 miles, sufficient "to put a girdle round the globe."

In Italy the levee system has been in use for many centuries—for reclamation as well as to facilitate irrigation—and the old Italian engineers announced some truths which, though manifest and plain, are not even yet fully recognized among modern engineers, or those of to-day. They learned that the lower or alluvial portions of turbid or sedimentary rivers can be leveed safely, without elevation of their beds or surface as the result of the increased quantity of water confined within the channel by levees; that "derivations," or outlets, will not permanently lower the flood-line in such portions of a sedimentary river; and that a division of the waters of such a river into more than one channel results in the elevation of the beds and high-water lines of the divided channels. Frisi says: "It is a hydrostatical paradox, commonly taught by Italian engineers in the past century, and uniformly confirmed by experience, that you do not diminish the height of the waters in great floods by lessening the quantity of the water." Guglielmini taught that "the greater the quantity of water that a river carries the less will be its fall" or surface slope, and also that "the greater the force of the stream the less will be the slope of its bed." It has been the prevalent belief that levees have caused the rising of the bed and surface of the river Po until the flood-line of that river is above the roofs of the houses in Ferrara. But it is now well known that neither the flood-line nor the bed of the Po has been elevated at all during the past 100 years and more, and that for "the roofs" the "first floor" of the houses should be substituted in speaking of the comparative height of the river at high water. The exaggerations are due to M. Cuvier, and were alleged to be based upon statements made by De Prony, but the engineer Lombardini has proven their falsity.

The levees of Holland, whereby immense areas of land, submerged from five to fifteen feet below mean tide in the North Sea, have been reclaimed, drained, and cultivated, are the most wonderful of any in the world. The levees and hydraulic works of Holland are said to have cost fully \$1,000,000,000. The whole country is an intricate network of rivers, water-channels, and canals bordered by levees, and the unconquerable perseverance and industry of the Dutch people have converted a desolate marsh and lakes into the richest farms and gardens in Europe. By means of steam machinery and windmills these lands are kept dry. To prevent their being overwhelmed again, the levees are placed under a careful system of surveillance.



Levees for the protection of river lowlands, as well as to facilitate the reclamation of marshes, morasses, fens, and overflowed land, have been extensively constructed in other portions of the German states, and in France, England, Ireland, and elsewhere. Since 1871 the levee system has been applied on a large scale in California to the reclamation of the tule-lands in the valley of the Sacramento and San Joaquin rivers. The aggregate length of these levees at this time probably exceeds 1000 miles.

*Levees as Applied to the Mississippi River.*—The leveeing of the Mississippi River was commenced at New Orleans in about the year 1720, the engineer Dumont de la Tour having, after locating the future city in 1717, ordered a front levee of 5400 feet in length by 4 feet in height and 18 feet wide at top, as necessary to protect the city. In 1717, De la Tour's observations showed that the river flood-line was three feet higher than the river-bank in the bend where he located the proposed city, and he allowed for a levee one foot above the then high-water line. We are informed by the historian F. Xavier Martin that in 1718 there was an "extraordinary rise of the Mississippi" which greatly discouraged the new settlers. "Bienville," he says, "had selected a site for a city, but the colony not having means to build dikes or levees, the idea was abandoned." Nevertheless, the New Orleans levee was undertaken afterwards, and completed in 1726. Soon after the founding of New Orleans plantations were established along the river-banks above and below the city, but each proprietor had to construct and maintain his own levee. At that time the river during its floods rose above its banks everywhere—from three to four feet in the bends, and one foot or more around the points—thus affording vent to the water through continuous lateral outlets on both banks, and submerging the valley annually; but the reduction of current velocity in the channel, and of channel section, prevented the banks from caving rapidly, therefore the levees required were insignificant compared with what they are now. The levees were low, because the river deposits had kept the banks always nearly up to the flood-line. They were more permanent, because the banks caved in but little; therefore levee maintenance then cost but a fraction of what is now required. In 1723 small settlements had already been established at several points between the mouth of Red River and New Orleans—at Pointe Coupée, Baton Rouge, Manchac, below the Lafourche, at Cannes Brûlées, and at Tchaptoulas. In 1728 the settlements extended almost continuously "for thirty miles above New Orleans," and in 1735 twelve miles below and thirty miles above on both sides of the river. In 1735 a great flood occurred, which inundated New Orleans and broke through or overtopped the levees in many places, and probably the New Orleans levee. The range from high to low water observed and recorded in that year at New Orleans was 15 feet; which slightly exceeds the range of recent years (14.8 feet, which is to the flood-line of 1862, the highest due to a river-rise only recorded for fifty years past) at New Orleans. This proves, on the assumption that the Gulf level is unaltered, that the river flood-line is no higher at New Orleans now than it was in 1735, if so high. In 1743, says Gayarré, "an ordinance was promulgated requiring the inhabitants to complete their levees by Jan. 1, 1744, under penalty of forfeiture of their lands to the Crown." In 1752, according to Monette, the settlements were nearly continuous for "20 miles below and 30 miles above New Orleans," while "nearly the whole coast was in a high state of cultivation and securely protected from floods." In 1770 a great flood occurred with inundations, and in 1782 another. Great floods occurred also in 1785, 1791, and 1799, and during each of these years New Orleans was inundated. But little progress was made in levee construction from 1763, when France ceded Louisiana to Spain, until 1803, when it passed to the U. S., after having been ceded back to France by Spain in the year 1800. In 1805 the settlements and levees began about 40 miles below and extended nearly 120 miles above New Orleans; and the Pointe Coupée settlement above had a front of 24 miles on the river. Opposite Natchez, near the mouth of the Arkansas River, and at New Madrid, small settlements had been made. Both banks of the Bayou Lafourche in Lower Louisiana were leveed for about 45 miles from the river Mississippi. In 1812, Louisiana was admitted into the Federal Union, and, according to Stoddard, the levees were continuous on "both sides of the river from the lowest settlements" to Baton Rouge, and on the right bank to Pointe Coupée. In 1823 the river-banks were leveed nearly to the mouth of Red River, and above, here and there on the W. bank, levees were in existence as far up as the mouth of the Arkansas. In 1844 they were nearly continuous to Napoleon on the W. bank, with many isolated levees between Vicksburg and Memphis. In 1861 levees extended almost continuously from Cape Girardeau in Missouri, with about 40 miles of openings

in the aggregate above the Arkansas River, right bank, according to Prof. Forshey, down to near the forts below New Orleans.

The process of levee construction, as applied to the Mississippi River, began at New Orleans. The lower Mississippi—that portion below the last affluent, Red River—was first leveed; therefore the enlargement of the lower river by the closure of its outlets and the confinement of all the water to the channel, took place before the leveeing of the upper river. It was well that it so happened, for had the upper river been first leveed, before the enlargement of the lower river, the flood-height below would have been much increased and the inundations made more frequent and disastrous. To prevent injury and danger to Lower Louisiana, the sugar region, its levee system should be perfected first and every outlet closed. During 150 years, since about 1720, the levee system was gradually extended, from New Orleans, about 70 miles below and about 1000 miles above. Every bend, before levees were built around it, was a continuous outlet, for the river flood-line was several feet higher than the banks in the bends. Even the banks around the points were overflowed before they were leveed, for they were formed by alluvial deposits while inundated, and were leveed because subject to overflow. The lower river was first accommodated to the leveeing up of outlets. The building of levees is nothing else but the closing up of outlets, and the retention between the river-banks and the levees of the waters which previously passed out laterally over the banks. No evidence exists that the flood-line of the lower Mississippi River is the fraction of an inch higher now than it was before the building of the first levee in front of New Orleans, but the area of the river's channel has been increased undoubtedly. Every outlet except the Bayou Lafourche—the high-water capacity of which is only about 12,000 cubic feet per second, or less than the one-hundredth part of the Mississippi—has been closed below Red River without adding to the height of the river flood-line in the lower river. Had the levee system been commenced above and extended downward, the first effect would have been different.

The last outlet closed below Red River was the Bayou Plaquemine in 1865, the capacity of which was about 35,000 cubic feet per second; but the highest flood-line of recent years below it was that of 1862, which was 0.7 foot above the 1858 mark opposite New Orleans. In 1871 a storm-tide backed up the river at New Orleans to a height about the same as in 1862, but at Donaldsonville, 30 miles below the Plaquemine, the river in 1871 was 1.45 feet lower than in 1862. Again, in 1874 an extraordinary storm-tide raised the river (Apr. 15 and 16) at New Orleans about 8 inches above the 1862 mark, but at a point 45 miles above New Orleans, and about 30 miles below Donaldsonville, and 60 miles below the Plaquemine, the flood-line of 1874 was about 6 inches below that of 1862. Hence the statement (by the U. S. levee engineer commission in their recent report) that the effect of closing the Plaquemine outlet was to add "about six inches to the normal flood height at New Orleans," seems to want the support of facts.

The front-lands at the Belleville foundry, opposite New Orleans, formed by overflow deposits before the river was leveed, were found (see *Ph. and High. of the Miss.*) to be but three-tenths of a foot below the flood-line of the great flood-year 1858, and they were but 1 foot below that of 1862, the highest known for fifty years. Observation shows that in a current deposits do not generally reach within 1 foot of the flood-line. Recent levellings show that the flood-line of 1862 was but 2.1 feet higher than the crown of Old Levee street, opposite Jackson Square (the old Place d'Armes), New Orleans, about 100 yards from the river, and but 4.2 feet above the crown of Chartres street, opposite the square, and about 200 yards distant from the river. The river-bank here is the same as it was in 1717, having neither caved in nor receded by accretion. When De la Tour laid out the city in 1717 the flood-line was 3 feet, at least, above the river-bank here, or certainly as high as now; again showing no rise of the flood-height since then.

It has been claimed (by U. S. engineers Humphreys and Abbot) that the blue clay bed of the Mississippi River "resists the action of the strong current like marble," and that therefore "the bed of the Mississippi cannot yield" and accommodate itself to the increased quantity of water confined to the channel by levees. It is therefore assumed by them that no enlargement of water-way occurs, and no allowance for it is made in calculating the effect of adding to the quantity of water by extending levees. It is well known that the action of running water slowly wears away even the hardest primitive and volcanic rocks—as, for instance, through the immense cañons of the Colorado River, and elsewhere all over the world; and that it dissolves and wears away clay, no matter how firm, cannot be gainsaid

with truth. Whenever a "cut-off" occurs in the Mississippi River, the clay bed of the river is rapidly excavated, and the cut-off soon becomes as large in section as the river elsewhere. Every bend of the river below a cut-off is excavated rapidly and lengthened, and the deepest water is always found nearest to the bank in the bend where the blue clay bed has just been washed out. In 1874, for instance, the maximum horizontal range or extent of caving at Morganzia, below Red River, during that year was 550 feet; at Point Manoir, opposite Port Hudson, it was 1100 feet; at Lobdell's, above Baton Rouge, it was 160 feet; near Bayou Goula it was 350 feet; at Landry's, in Ascension parish, it was 120 feet; in two places in St. Charles parish it was 300 feet; opposite New Orleans it was 200 feet in one place and 220 feet in another, while cavings of 220 feet, 160 feet, and 80 feet occurred between New Orleans and the forts below,\* all of which show that the clay bed of the Mississippi does yield and wear away from year to year, and far more rapidly than is necessary for the very slow, and in fact inappreciable, yearly increase due to levee extension. A recent comparison of river cross-sections opposite Jackson and St. Anne streets, New Orleans, by Prof. Forshey, furnishes another proof that the area of the channel-way is enlarging by yielding of the clay bed. Sections were taken opposite the above-named streets in 1850 and in 1872, and the areas of section in 1872 were 54,000 and 56,000 square feet, respectively, greater than in 1850. Opposite Jackson street the depth had increased 13 feet, and opposite St. Anne street it had increased from 150 to 165 feet. Opposite the lower portion of New Orleans a like increase of section and depth was manifest.

There is evidence that in many places the lower Mississippi is slightly widening as well as deepening. Below Baton Rouge, at a point where, on the left bank, levees have existed since 1805, new levees have been built farther back because of the caving in of the river-bank; and directly opposite, on the W. side of the river, the same thing has occurred. In other places opposite banks are caving in, and the river's width is increasing in straight reaches of the river. Opposite Baton Rouge—the bank on the E. or bluff side remaining as it was—the W. bank is caving in yearly, thereby compelling the construction of new levees farther back. The artesian well borings at New Orleans showed that the river had cut through clay strata before reaching its present depth. Everything indicates that the Mississippi River is not and cannot be an exception to the laws which govern the flow of water in all sedimentary rivers, small or great. As the normal maximum quantity of water is increased, the mean velocity of current is accelerated, the area of channel-way is enlarged, and the slopes of the bed and surface are diminished. The levee system, therefore, as applied to such a river as the Mississippi, is based upon correct principles, and the effect of levees, if persevered in and maintained properly, will be to lessen the liability to inundations, and, if anything, to reduce the flood-line; if cut-offs and outlets, which alone interrupt the establishment of a permanent river regimen, are prevented.

"Cut-offs" precipitate a whole river, by shortening the plane of descent, upon a lower level below the bend cut-off. The effects are, a considerable lowering of the flood-line in the vicinity above; a less corresponding elevation of the flood-line in the region below, and for a time a partial gorge of water below; a greatly increased velocity of current above and below and through the cut-off, due to the increased slopes of bed and surface; and for years afterward, in a great river like the Mississippi, a rapid excavation and prolongation of the river-bends below, and to some extent above, thereby compelling the frequent reconstruction of levees around the bends, and each time on lower ground, and therefore higher and much more expensive embankments than ever before, because the river alluvial lands are highest next the river, and they slope downward away from the river. A fall of 15 feet below the river flood-line, within a distance of one mile back from the river, is not uncommon above New Orleans, and even a fall of 20 feet within one mile may be found in places.

When the river was first leveed below Red River, embankments of from 4 to 5 feet high, with a crown of 4 feet and slopes of 2 to 1, were found sufficient around the bends, where now levees from 15 to 20 feet high, with a crown of 10 feet or more and slopes of 3 to 1, are needed, and are now built and maintained. A levee 14 feet high, of the crown and slopes last named, contains nearly twelve times as much earth, for a given length, as was required for the

old levees; hence the largely increased cost of levee construction and maintenance now, with the river flood-line no higher than at first notwithstanding the effects of cut-offs. Every cut-off increases the cost of levee maintenance and the danger of inundations; therefore, so far as possible, they should be prevented. Above Red River many cut-offs have occurred; below, including one opposite the mouth of Red River, but three in all have ever occurred. Fausse River Cut-off dates back to 1722, at the beginning of the levee era. Red River Cut-off was made by Capt. Shreve, an employé of the U. S. government, in 1831. The Racocouri, between the two former, was made by the State of Louisiana in 1848-49, by digging a deep canal three-fourths of a mile long across the neck of the bend. The total distance around these three lower Mississippi cut-offs was about 65 miles, and the total fall across their necks about 12 feet, where the usual high-water slope was less than three inches per mile. Their effect in adding to the caving and lengthening of the river-bends below, and thereby increasing the cost of levee maintenance, was, and is still, very great; for the river has not yet regained its original length and slopes.

Outlets temporarily lower the flood-line of a sedimentary river, but their final effect always must be an increased elevation of the bed and surface of such a river, and the contraction of its channel-way; for the law is that the less the quantity of water flowing, as the normal maximum, the greater must be the slopes of bed and surface. Outlets, therefore, cannot be depended upon for lowering the flood-line of the lower Mississippi permanently, and they are not needed, because the extension and perfection of the levee system never has caused, and will not cause, any elevation of the river flood-line. Levees, and levees alone, if properly constructed and maintained, can be relied upon for the reclamation of all the alluvial lands subject to overflow in the valley of the Mississippi, and the improvement of navigation will also result from a perfection of the system.

It has been said (*Ph. and Hpl. of the Miss.*) that the waters of the Mississippi at flood are "underecharged with sediment;" that is, that more could be sustained than is held up and transported down stream with the current; therefore, that it contains less sediment than is due to its velocity. This conclusion is based upon observations showing that sometimes, in some places, when the river is falling, and is at a stage between high and low water, the river-water is more highly charged with sediment than at a flood stage. It is assumed or erroneously inferred because of this that no deposits can occur at any stage of the river below an outlet or a crevasse, no matter of what dimensions. It is very well known that in all turbid streams flowing between banks of alluvium the caving in of the banks occurs principally when the floods are subsiding, when the banks have lost the support of the water which they had at a high stage. Then the river-water as it passes around a caving bend becomes overcharged with sediment, and as it cannot all be sustained and transported to the river-mouth, the surplus is dropped on the next bars below, or wherever the velocity or sustaining power of the current is reduced. To assert that the Mississippi is at all times "underecharged with sediment," and therefore different from other sedimentary rivers, because it is in places and at times less muddy at its high stage than when the banks are caving in at a mid stage, is certainly unwarranted. The waters of all sedimentary rivers with caving banks are more turbid when and where the banks are caving in, and the same laws govern the flow of water in the Mississippi as in other turbid rivers. The "clay bed of the Mississippi" obviously *does* yield, because the river excavates its bends by undermining its banks, deepens its channel, and scours out its cut-off channels; deposits are made from its water, after they become overcharged with sediment by caving banks wherever and whenever there is a loss of current in the eddies under or below the points and below outlets.

As an example of the effect of an outlet or crevasse to cause a deposit in, and contraction of, the channel of the Mississippi below it, the following is given: In 1874, Apr. 11, a crevasse occurred in a large levee at Bonnet Carré, left bank of the Mississippi, 40 miles above New Orleans. It became 1370 feet wide, with an area of discharge of about 32,000 square feet, or nearly one-sixth that of the river opposite. The range of the river here from high to low water is about 24 feet, and the level of the land one-fourth of a mile back of the line of levee which had given way was 14 feet below the river flood-line. On the 14th of July, when the river had fallen 15 feet, the water ceased to run through the crevasse outlet opening. In the latter part of September, when the river had fallen 24 feet, sections of the river were carefully taken above and below the outlet. The results, briefly summarized, were as follows: Maximum depths above crevasse, 110 and 120 feet on two sections at the then stage of water; maximum depths of sections below

\* In Tensas parish, above Red River, at Kemp's, the effect of the Davis Cut-off of 1867 has been to cause an average caving in of the river-bank during the years 1868 to 1872, both inclusive, of 1200 feet per year. In 1874 the caving at Wilcox's same parish, was 400 feet. In Concordia parish, at Mingo, the maximum caving in 1868 was 3000 feet, and 1400 feet in 1873.



crevasse, 62 and 64 feet. Firm clay bottom above; soft, silty ooze bottom, indicating recent deposit, below crevasse. Low-water widths above, 2886 and 3014 feet; below, 2406 and 2452 feet, showing a reduction in mean width below of 521 feet. Low-water areas of upper sections, 184,653 and 161,167 square feet; of lower sections, 96,640 and 106,150 square feet, a reduction of channel section, means of upper and lower, of 73,015 square feet. The widths on the high-water lines averaged 3165 feet for the upper sections, and 3365 feet below; the width below being 200 feet the greatest at high water. The mean high-water areas of sections were, however, 75,000 square feet less below than above. It was estimated, approximately, that this outlet or crevasse of the full dimensions measured would discharge at high water about one-tenth of the river at flood. Below this crevasse there were, in the next bend as well as opposite, extensive deposits of sand and earth, reaching several feet above the low-water line, which means known to be new. All of which measurements and observations demonstrate unmistakably that the Bonnet Carré crevasse outlet of 1874 did cause a partial filling up and contraction of the river-channel below it.

Numerous examples of the effects of outlets to contract the river-channel below them on Red River and elsewhere could be given if space permitted. We shall mention one only. Tone's Bayou, 20 miles below Shreveport, which had its origin as an overflow coulee of insignificant dimensions twenty-five years ago, now discharges nearly two-thirds of the turbid waters of Red River which reach it, and yet the flood-line below is as high as, if not higher than, before, while the channel below has been reduced to correspond with the quantity of water abstracted. All of the water of Red River now passes Shreveport, and the high-water section there is about 23,000 square feet. Below Shreveport and above Tone's Bayou three outlets exist on the right bank, and others on the left bank, whereby the river-section just above Tone's is reduced to 9000 square feet. Tone's Bayou itself has a section of 5600 square feet—or had in 1872—while that of Red River below it has been contracted to but 3500 square feet, and to a width of less than 200 feet. Fully five-sixths of the water of Red River escapes through outlets within about 20 miles below Shreveport, and yet, while the area of the river's section is reduced correspondingly, the river flood-line is as high as, if not higher than, ever. Outlets therefore cannot permanently lower the flood-line in sedimentary rivers, although, as we see in the Mississippi, when they occur suddenly, as crevasses, and enlarge rapidly, their effect is to reduce it temporarily, or until the river has had time to accommodate itself to its new regimen by deposits in and contraction of its channel below. The result is certain; how soon is a mere question of time.

In calculating the effects of adding to the quantity of water in the Mississippi River by closing outlets, or in perfecting the levee system, or of reducing the quantity by outlets, it will not do to assume that the sectional area of channel-way will be neither enlarged nor contracted—that it is fixed and unchangeable. That certain determinate and determinable relations exist between the quantity of water flowing, the mean velocity of current, the sectional area of channel-way, and the slopes of bed and surface, cannot be ignored or disregarded. They must be admitted to ensure a reliable result. It is evident, therefore, that levees alone can be relied upon for the permanent reclamation of the Mississippi Valley lands. The only way to safety and exemption from inundations is to build and maintain adequate levees. Cut-offs should be prevented as long as possible. Outlets are worse than useless, even if it were possible, which it is not, to provide a separate and leveed channel to the sea for the water so drawn off; they overflow land when reclamation is the end in view. Artificial reservoirs are impracticable, and what natural swamp-reservoirs there are above Red River only add to the river-floods, and thereby increase the danger of inundation, by feeding the rise below them. As to the diversion of tributaries, it would be useless even if practicable. By means of levees, and afterwards of interior drainage, every acre of land in the Mississippi Valley, exclusive of drainage channels, may be reclaimed, cultivated, and made the home of millions of prosperous inhabitants. According to U. S. engineer Gen. Abbot, with levee protection and drainage 2,500,000 acres of sugar-land, 7,000,000 acres of cotton-land, and 1,000,000 acres of corn-land of inexhaustible fertility may be opened for cultivation and settlement.

The total lengths of levees required to protect the Mississippi front may be stated as follows: In Louisiana below Red River, 500 miles; above Red River, 280 miles. In Mississippi, 380 miles. In Arkansas, 545 miles. In Missouri, 80 miles. Total, 1785 miles. In Louisiana, the interior rivers, bayous, and old river lakes would require about 925 miles more. The U. S. is engaged in a struggle

for the maintenance of her supremacy as the greatest cotton-producer in the world, and the only way to maintain this supremacy is to perfect the Mississippi River levee system, and so bring all of the valley-lands into cultivation. The U. S. alone can do this. It has been demonstrated that the States of Louisiana, Mississippi, and Arkansas have not the means and resources necessary for its accomplishment. Surely, the permanent reclamation of the great Mississippi Valley, with its ten or twelve millions of acres of the richest alluvial lands in the world, is or should be of sufficient national importance to justify its being undertaken by the general government. G. W. R. BAYLEY.

**Level** [Ang.-Sax. *lefel*, from Lat. *libella*, "level"]. A level surface is one that is concentric with the surface of the ocean; that is, with the surface the ocean would have if the globe were entirely covered with water. Any line drawn in a level surface is a level line. For small areas, that is, for areas of a few miles in extent, we may regard a level surface as the surface of a sphere osculatory to the ellipsoidal surface of the earth at the middle point of the area in question. The surface just described is a surface of true level. A surface of apparent level at any point is a plane drawn tangent to the surface of true level at that point. Any line drawn in a surface of apparent level is a line of apparent level. The lines indicated by our levelling instruments are lines of apparent level, but we may deduce from them lines of true level by making suitable corrections for curvature. W. G. PECK.

#### Levelling. See HYPSOMETRY.

**Levelling Instruments.** The instruments used in levelling are of two classes. Those of the first class are used to point out or indicate a line or surface of apparent level, and are technically called *levels*; those of the second class are used to measure the distances of this line or surface of apparent level above the points whose difference of level is to be determined, and these are called *levelling-rods*. W. G. PECK.

**Levelling-rods.** These are rods of wood graduated to feet and decimals of a foot, the lines of division being numbered from below upward; the 0 of the scale is at the bottom of the rod. One of the best consists of a staff of hard wood, capped with metal, usually about 12 feet in length. A sliding vane can be moved up and down by a cord running on pulleys let into the rod. This rod is graduated to hundredths of a foot, and on one edge of the rectangular opening that is made in the vane is a vernier, by means of which the rod may be read to thousandths of a foot. The vane is divided into four sections by lines through its centre, one parallel to the rod and the other perpendicular to it, and these sections are painted in contrasted colors for greater facility in determining the middle of the vane. A second form of levelling-rod is similar to that just described, except that the rod is constructed in two sections, one of which slides in a groove of the other. The arrangement of the graduation is modified to conform to the peculiar character of the sliding joint. A third form of rod is now much used. It consists of a simple rod without a vane, the divisions and numbers being so distinct that the readings may be made by the observer. This form of rod is mostly employed in connection with the Gravatt level, a level which differs from the Y level already described in having an inverting telescope. This form of level admits of greater optical power, with the same length of telescope, and is therefore better adapted to making close readings at great distances. When this species of level is used the figures on the levelling-rod are both reversed and inverted.

The difference of level between two neighboring points may be determined by means of the levelling instruments just described as follows: Let the level be set up at some convenient place and so arranged as to indicate a surface of apparent level; place a levelling-rod at the first point and note the height at which it is intersected by the level surface; in like manner, place a rod at the second point and note the height at which it is cut by the level surface; subtract the first of these heights from the second, and the remainder will be the difference of level of the two points. If the remainder is +, the second point is higher than the first; if the remainder is -, the second point is lower than the first. In the same manner we may determine the difference of level between the second point and a third point, between the third point and a fourth, and so on, as far as may be desirable. The total difference of level between the first point and the last is then equal to the algebraic sum of all the partial differences of level. W. G. PECK.

**Levels.** Levels are constructed on one of three principles: 1st, a line of apparent level is perpendicular to a plumb-line freely suspended; 2d, a line of apparent level is tangent to the free surface of a liquid in equilibrium;

and 3d, a ray of light which is perpendicular to a vertical mirror is a line of apparent level.

The level used by bricklayers, carpenters, etc., affords an example of the method of applying the first principle. In its simplest form, this kind of level consists of a T shaped frame, the line corresponding to the top of the T being perfectly straight and at right angles to a second line drawn through the middle of the stem of the T. A plumb-line is attached at some point of the second line; and when the instrument is held so that the plumb-line corresponds to this second line, the first line is a line of apparent level. The cross line of the T may be turned downwards, as is usually the case when used by mechanics, or it may be turned upwards, in which case, if supported on a suitable stand, it can be used for the rougher kinds of field leveling.

The ordinary Y level is an example of the instruments constructed on the second principle. It consists essentially of a telescope mounted on two vertical supports, which from their shape are called Y's. The Y's themselves are attached to a solid bar, called the *limb*, which turns about an axis at right angles to it. The limb and its axis are connected with a supporting tripod by means of a ball-and-socket joint, so arranged that the axis may be made vertical by the aid of levelling-screws. Suspended from the telescope is a delicate spirit-level, which, when in adjustment, is parallel to the line of collimation of the telescope. The line of collimation of the telescope is indicated by two cross hairs mounted on an adjustable diaphragm placed in the common focus of the field lens and eyepiece. The parts of the instrument are so constructed that they may be brought into accurate adjustment; that is, into proper relative positions. When the instrument is adjusted the attached level is parallel to the line of collimation of the telescope, and both are perpendicular to the axis of the limb, that is, the line that remains fixed when the limb is turned in azimuth.

To use the instrument thus adjusted we plant the tripod firmly in the ground, and by means of the levelling-screws bring the level in such a position that the bubble will remain in the middle of the tube during an entire revolution in azimuth. The axis of the limb is then vertical, and consequently the line of collimation of the telescope in all its positions is a line of apparent level.

Levels constructed on the third principle are called *reflecting levels*. One form of this class of levels consists of a plate of glass suspended from a ring and weighted so that the plane of the glass shall always be vertical. One half of the glass is silvered and the other half unsilvered, the line of division between the two portions being vertical. A line is ruled across the middle of the plate perpendicular to the one last mentioned, and is consequently horizontal. To use the instrument, it is held by the ring and raised or lowered until the observer sees the image of his eye reflected from the ruled horizontal line on the silvered portion; the plane through the eye in that position and the line on the unsilvered portion is a plane of apparent level. Instruments of this kind are convenient for making reconnaissances, and also for contouring in topographical surveys, but they are not very accurate. W. G. PECK.

**Lévêque** (JEAN CHARLES), b. at Bordeaux, France, Aug. 7, 1818; made extensive studies of the Greek and Alexandrian philosophers; resided in 1847-48 at Athens, and became professor in philosophy at the Collège de France in 1856; in 1865 member, and in 1873 vice-president, of the Academy of Moral and Political Sciences. Besides a number of articles in the *Revue des Deux Mondes* remarkable for erudition, he published in 1860 *La Science du Beau* (2 vols.), a work which received prizes from several French academies, but which, as a philosophy of the beautiful, stands far behind what the modern German philosophy contains on the subject.

**Leven, Loch**, a lake of Scotland, in the county of Kinross, about 11 miles in extent. On an island opposite the town of Kinross are remains of Loch Leven Castle, in which Mary queen of Scots was imprisoned from June, 1567, to May, 1568.

**Lever.** See MECHANICAL POWERS, by PROF. W. P. TROWBRIDGE, A. M.

**Le'ver** (CHARLES JAMES), M. D., LL.D., b. at Dublin Aug. 31, 1806; took the degree of M. B. at Dublin University 1831, and of M. D. at Göttingen; was medical superintendent in Londonderry during the cholera season of 1832; physician to the legation at Brussels; editor of the *Dublin University Magazine* 1842-4; vice-consul at Spezia 1848-57, and afterwards consul at Trieste; attained great success as a writer of humorous novels, chiefly descriptive of Irish life and character, among which are *Harry Lorrequer* (1840), *Charles O'Malley* (1841), *Arthur O'Leary* (1844), *The O'Donoghue* (1845), *Horace Templeton* (1849),

*Con Cregan* (1857), *The Brambles of Bishop's Valley* 1858, *Lord Kilgobbin* (1872), and many others. D. at Trieste June 1, 1872.

**Lev'erett**, post-tp. of Franklin co., Mass., on the New London Northern R. R., 106 miles W. of Boston, has manufactures of pails, satinets, and lumber, and tobacco is raised. Pop. 877.

**Leverett** (FREDERICK PERCIVAL), b. at Portsmouth, N. H., Sept. 11, 1807; graduated at Harvard in 1821, and was afterwards principal of the Boston Latin School; published a Latin lexicon (1836) and a number of Latin classics, with notes. D. at Boston, Mass., Oct. 6, 1836.

**Leverett** (Sir JOHN), BART., b. in England in 1616, and came with his father to America in 1633. He held many important positions, both in Massachusetts and in England, where he was an officer in the army of Cromwell, his intimate friend. In Massachusetts he was Speaker of the house 1666-71, major-general 1667-71, deputy-governor 1671-73, and governor 1673-79. In 1676 he was knighted and made a baronet by Charles II. D. Mar. 16, 1679.

**Leverett** (JOHN), F. R. S., b. at Boston, Mass., Aug. 25, 1662, a grandson of Sir John Leverett; graduated at Harvard in 1680; was a judge, lawyer, and Spenser in the general court, and was president of Harvard College 1707-24. He had a wide reputation for learning. D. May 3, 1724.

**Leverrier** (URBAIN JEAN JOSEPH), b. at St. Lô Mar. 11, 1811; studied at the École Polytechnique, Paris; made some important discoveries in chemistry, and in 1846 astonished the world by the correct announcement of the place in the heavens where would be discovered the planet now called Neptune. He was director of the observatory of Paris 1854-70, to which he was reappointed in 1872; became a senator, an academician, and a grand officer of the Legion of Honor, and did much to promote popular education. D. Sept. 23, 1877.

**Le Vert** (HENRY STRACHEY), M. D., b. in King William co., Va., Dec. 26, 1801, a descendant of a rapid surgeon from Count Rochambeau's fleet, who after the siege of Yorktown settled in Virginia; graduated M. D. in the University of Pennsylvania 1829, and his thesis on metallic ligatures was afterwards published; went to Mobile, and from his genial disposition, erudition, skill, and noble impulses soon rose to great distinction. He married Octavia Walton (see O. W. LE VERT). D. in Mobile Mar. 15, 1864.

PAUL F. EVE.

**Le Vert** (OCTAVIA WALTON), b. at Bellevue, near Augusta, Ga., about 1810. Her father, Col. George Walton (son of the signer of the Declaration of Independence of the same name), removed to Pensacola, Fla., in her childhood, as territorial secretary, and for a time acted as governor. Here she imbibed such a knowledge of French and Spanish that they were almost equally with English her mother-tongues. She was invited while still a girl to select a name for the future capital of Florida, and chose the musical Seminole word Tallahassee. Upon the expiration of his term of office, Col. Walton removed to Mobile, where his daughter was married in 1836 to Dr. H. S. Le Vert. She had previously spent one or two winters in Washington, where she enjoyed the friendship of Clay, Webster, Calhoun, and Washington Irving, and acquired distinction for the precision of the reports she wrote of the famous congressional debates on the removal of the deposits from the U. S. Bank. In 1853-54, and again in 1855, Mrs. Le Vert travelled in Europe, was received into the best circles of society in England and on the Continent, and recorded her observations in the interesting volumes called *Souvenirs of Travel* (2 vols., 1857). She rendered good service in behalf of the Mount Vernon Association, and was noted for offices of charity during the civil war. She is understood to have prepared two books, *Sketches of Distinguished People* and *Sketches of the War*, which have not yet been published. She enjoyed a great reputation as an accomplished linguist, conversationalist, and leader of society. D. near Augusta, Ga., Mar. 13, 1877.

**Le'vi** (Heb., "wreathed"), in biblical history the third son of Jacob and Leah, b. in Padan aram about 1817, and the ancestor of one of the twelve tribes of Israel named by his name. (See LEVITES.) Of his person and life the only trait which has been recorded is the manner in which, with his brother Simeon, he perpetrated upon the daughters of Shechem to avenge the wrong done his sister Dinah (Gen. xxxiv.). Levi went into Egypt with his father and brothers after the elevation of Joseph, and there, Moses and Aaron were his descendants; apparently in the fourth generation.

**Levi** (LEONE), PH. D., b. at Ancona, Italy, of Jewish parents, June 6, 1821; removed in 1844 to Liverpool; was naturalized in 1847; was one of the founders of the Liverpool Chamber of Commerce 1849; became in 1852 professor



of commercial law, etc. in University College, London; became a barrister in 1859; received the doctorate from Tübingen 1861; has done much for the reform of commercial law and practice, the utilization of statistics, etc. Author of *Commercial Law* (4 vols., 1850-52), *Mercantile Law* (1854), *On Taxation* (1860), *International Commercial Law* (1861), and other works, besides many valuable papers on statistical and commercial science.

**Leviathan** [Heb., "wreathed monster"], in the Old Testament usually designates the crocodile, but in the Talmudical writers the whale, the fabulous dragon, or any other creature of monstrous size, may be called leviathan. The name is also used figuratively for gigantic animals as well as other objects.

**Levico**, town of Austria, in the province of Tyrol, at the issue of the Brenta into the Lake of Levico, has 5674 inhabitants, mostly employed in the cultivation and manufacture of silk.

**Levigation** [Lat. *lavigare*, "to plane," "to rub smooth"], a special manipulation of the laboratory, devised for the purpose of converting substances to a smooth, uniform powder. A flat surface, called the "slab," is used to place the substance upon, composed of stone, glass, or metal; and a "muller," having a flat surface below, is propelled round and round with an eccentric motion over the mass. A liquid is always added, usually oil or water, to assist the operation. The process of levigation has passed, probably hundreds of years ago, from the laboratory into the arts, and paints, printing-inks, and often drugs, are comminuted by a process of levigation, on the manufacturing scale, in so-called "eccentric mills." *Porphyrisation* is another name formerly applied, from slabs of porphyry being employed. A *spatula* is an essential adjunct in the small laboratory operation to collect together readily and heap up the mass when spread by the muller.

H. WERTZ.

**Levings** (NOAH, D. D., b. in Cheshire co., N. H., in 1796; early joined the Methodist Episcopal Church, and in 1818 entered its itinerant ministry as a candidate of the New York conference; travelled and preached with much popularity and success in New York, Connecticut, Massachusetts, and Vermont; was presiding elder over large districts of his Church, and a member of its General Conference; in 1844 was appointed one of the secretaries of the American Bible Society. In this office he often travelled over the U. S., preaching with great effect, and successfully promoting the interests of the society. After a laborious tour through the South-western States he was attacked by epidemic cholera, and d. at Cincinnati on his way home, Jan. 9, 1849.

ABEL STEVENS.

**Levirate Marriage** [Lat. *levir*, a "husband's brother"], the marriage of a widow by the brother of the deceased husband. This custom (common among the ancient Hebrews, and not unknown at the present day among rude and simple races) was perpetuated by the Mosaic law. It is, however, practically obsolete among the Jews. The canon law expressly forbids such marriage, and in Great Britain it is still unlawful. In the U. S. it is generally permitted to marry the brother of a deceased husband. But the true levirate marriage was compulsory, or at least obligatory (except on certain conditions), but only in case the deceased husband left no male issue. In Abyssinia and parts of Asia the levirate law is still in force. It seems to have prevailed in ancient Italy also.

**Levis**, county of Quebec, Canada, on the S. shore of the St. Lawrence, opposite Quebec. It is traversed by the Grand Trunk Railway. Cap. Levis. Pop., including Levis-town, 24,831.

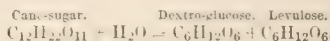
**Levis** (formerly POINT LEVI), an important suburb of Quebec, Canada, in Levis co., is opposite that city, on the S. bank of the St. Lawrence (here 1 mile wide), and is on the Grand Trunk Railway. It has a larger trade than any town in Canada except Quebec and Montreal. It is the seat of a convent, and has a board of trade. The river is crossed by a ferry. Pop. in 1871, 13,921.

**Levite**, one of the tribe of Levi, a descendant of Levi, one of the sons of Jacob, but in a more limited sense one of those members of that tribe who did not belong to the priestly families of the ancient Hebrews. The Levites constituted a kind of inferior priesthood. They had no inheritance except certain cities on either side of the river Jordan; in which, however, they were not compelled to reside. There are at the present day some Jewish families who claim a lineage, more or less pure, from the Levitical stock.

**Leviticus** [so named in the Vulgate because it is largely occupied with directions for the Levitical service], the third book of the Pentateuch and of the Old Testament. It contains the Mosaic law of sacrifices, the laws regarding cere-

monial uncleanness, the laws with regard to intercourse between Israelites and foreigners, together with brief historical accounts, admonitions, and the like. Its direct Mosaic origin has usually been taken for granted, but several recent German, Dutch, and English commentators refer it to the period of Ezra. (See **PENTATEUCH**.)

**Levulose** [Lat. *levum*, "left"],  $C_6H_{12}O_6$ , a variety of glucose. It occurs associated with dextro-glucose in honey, in many fruits, and other saccharine substances. Fruit-sugar or invert-sugar is a mixture of equal proportions of these two sugars. Cane-sugar is *inverted*—that is, transformed—into a mixture of dextro-glucose and levulose by warming with dilute acids, or by contact with yeast, peccase, etc.:



Levulose may be extracted from inverted cane-sugar by adding to the inverted sugar obtained from 10 grammes of cane-sugar 6 gms. of slaked lime and 100 of water. A solid compound of levulose and calcium is formed, while the calcium compound of dextro-glucose remains in solution, and may be separated by pressure. On suspending the precipitate in water, and decomposing with carbonic acid, the levulose is set free, and can be obtained as a syrup on evaporating the filtered solution. Levulose is also produced in a pure state by treating inulin with dilute acids. It is a colorless, uncrystallizable syrup, as sweet as cane-sugar, and exhibiting most of the reactions of dextro-glucose. It is more easily altered by heat and acids, less readily by alkalis and ferments. (See **GLUCOSE** and **SUGAR**.)

C. F. CHANDLER.

**Levy**, county of Florida, bounded S. W. by the Gulf of Mexico, N. W. by the Suwanee River, and S. by the Withlacoochee. Area, 800 square miles. A large part of its area is occupied by the "Gulf Hammock," an extremely fertile tract, covered with dense hard-wood forests. Corn, cotton, and lumber are staple products. The county is traversed by Florida R. R. Cap. Cedar Keys. Pop. 2018.

**Levy** (EMILE), b. at Paris Aug. 29, 1826; studied at the École des Beaux Arts, and under Pujol and Picot, and began to exhibit in 1854. His most celebrated pictures are *Le Souper libre* (1849), *Vierge aptaris* (1863), *La Mort d'Orphée* (1866), and *La Musique* (1869).

**Lewes**, town of England, in the county of Sussex, is picturesquely situated on the Ouse, on a declivity of the South Downs, and carries on a considerable trade in grain, cattle, and sheep. Pop. 10,753.

**Lewes**, post-v. of Sussex co., Del., on Delaware Bay, 2 miles S. W. of Cape Henlopen, and directly in front of the Delaware Breakwater, which affords an excellent and ample harbor for vessels of all classes and sizes. It is the terminus of the Junction and Breakwater R. R., which connects here with the Old Dominion Steamship Co., and lies directly opposite and 12 miles distant from Cape May. It has 3 churches, a weekly newspaper, and a number of stores. Wrecking, fishing, and farming form the principal business. Pop. 1090.

J. H. D. KNOWLES, ED. "BREAKWATER LIGHT."

**Lewes** (GEORGE HENRY), b. in London, England, Apr. 18, 1817; was in youth a clerk in a commercial house; commenced the study of medicine, but abandoned it for that of philosophy and psychology, to which he devoted two years in Germany; returned to London in 1840; devoted himself to literature, and speedily became known as a deep thinker and a writer of uncommon attainments, especially by his articles in the magazines and quarterly reviews. His earliest important work was the *Biographical History of Philosophy from Thales to Comte*, published in 1847, which foreshadowed his own opinions as being of the so-called Positivist type—a book of considerable ability, which became popular and has reached a fourth edition. From 1849 to 1854, Lewes was literary editor of the *Leader*, wrote a compendium of *Comte's Philosophy of the Sciences* (1853), *Lives of Robespierre* (1850) and of Goethe (1855), *Sensate Studies* (1858), *Physiology of Common Life* (1860), *Studies in Animal Life* (1861), and *Aristotle, a Chapter from the History of Science* (1864), besides one or two novels and dramas of minor importance. Since 1854 he has been largely engaged in physiological and anatomical researches, some of the results of which were embodied in papers communicated to the British Association for the Advancement of Science—*On the Spinal Cord as a Centre of Sensation and Volition* (1858), and *On the Nervous System* (1859). In 1865 he founded the *Fortnightly Review*, but in Dec., 1866, was compelled by ill-health to retire from its editorship. His most ambitious work, that in which he purposes to embody his whole system of philosophy, bears the title *Problems of Life and Mind*. Vol. i., *The Foundation of a Creed*, was published in 1873; vol. ii. in 1875.

**Lewes** (MARIAN EVANS), wife of George H. Lewes, and known by the *pseudonym* of GEORGE ELIOT, b. in Warwickshire, England, about 1820, was the daughter of a poor curate, but was adopted by a wealthy clergyman, who gave her a careful education. On leaving the academy she became a pupil of Herbert Spencer, since become famous as a philosopher, and under his training acquired great breadth of mental development, learning German, French, and Italian, studying music and art as well as metaphysics and logic. Her earliest literary effort was a translation of Strauss's *Life of Jesus* (1846), followed in 1851 by Feuerbach's *Essence of Christianity*. As associate editor of the *Westminster Review* she soon became acquainted with the leading representatives of the school of Bentham and J. S. Mill, with which she may be classified. As a novelist her first work was *Scenes of Clerical Life* (1858), originally published in *Blackwood*. In 1859 *Adam Bede* proved a brilliant success, and her reputation was maintained by *The Mill on the Floss* (1860), *Silas Marner* (1861), *Romola* (1863), *Felix Holt* (1866), and *Middlemarch* (1871-72), the last of which is considered one of the greatest novels of the century. As a poet she has published *The Spanish Gypsy* (1868), *Agatha* (1869), and *The Legend of Jubal* (1874), which would have sufficed to establish a poetical reputation of an unknown writer, but have scarcely added to the fame of the great novelist. Her skill as a painter of strongly-marked types of character was marvellous. D. Dec. 22, 1880.

**Lewes and Rehoboth**, hundred of Sussex co., Del. Pop. 2128.

**Lew'in** (THOMAS), F. S. A., b. at Ifield, Sussex, England; educated at the Merchant Taylors' School, London, and at Trinity College, Oxford, taking high honors in classics; was admitted to the bar in 1833, and in 1853 became conveyancing counsel to the court of chancery. He has written a treatise on *The Law of Trusts* (1842), *The Life and Epistles of St. Paul* (1851), an *Essay on the Chronology of the New Testament* (1851), *Jerusalem, a Sketch of the City and Temple from the Earliest Times to the Siege by Titus* (1861), *Cæsar's Invasion of Britain* (1862), *Siege of Jerusalem by Titus* (1863), and *Fæsti Sacri, or a Key to the Chronology of the New Testament* (1865). In the work on Cæsar's invasion he questioned the correctness of the received theories as to the landing-place of that conqueror, and was involved in a controversy on the subject with Dr. Airy, the astronomer-royal, which led to a new survey by the admiralty of the tides in the British Channel near Dover. For more than twenty years after the publication of his early work on St. Paul, Mr. Lewin was engaged in the study of the apostle's missionary journeys, visiting in person through a series of years nearly every place named in the New Testament in connection with Paul, collecting the geographical data of antiquity, and illustrating his materials by accurate modern plans of the localities in question. As the result, a revised edition of his work on St. Paul appeared in 1874 in two large volumes, splendidly illustrated. Mr. Lewin's views upon the sacred localities in Jerusalem, especially the site of the temple, have given rise to much controversy in connection with the rival theories of Robinson, Williams, and Fergusson.

**Lewis, or Lew'isson** [said to have been invented by Louis XIV., though known long before his time], a simple and effective clamp by which to raise blocks of stone. Three iron keys, suspended from a cross-bolt, are let into a fish-tail-shaped hole in the stone. The three keys together fill this hole, and the stone can be lifted by means of the cross-bolt, which is attached to a crane. When the stone is in place the bolt is withdrawn, the middle key, which is straight, is slipped out, and the lateral wedge-shaped keys are then readily removed. There is also an apparatus called the *lewis* used for shearing cloth.

**Lewis**, county of N. E. Kentucky, bounded N. by the Ohio River. It is a hilly but fertile limestone region. Area, 400 square miles. Corn is the largest agricultural product. Cap. Vanceburg. Pop. 9115.

**Lewis**, county of N. E. Missouri, bounded E. by the Mississippi River. Area, 500 square miles. It is rolling and fertile, abounding in timber, coal, and limestone. Cattle, grain, and wool are staple products. It is traversed by the Quincy Missouri and Pacific and the Mississippi Valley and Western R. Rs. Cap. Monticello. Pop. 15,114.

**Lewis**, county of N. New York. Area, 1288 square miles. The county is traversed by Black River, the valley of which is very fertile, but the E. portion and a part of the W. are chiefly wilderness, covered by forests. Cattle, grain, wool, hay, butter, and cheese are extensively produced. Lumber, carriages, leather, cooperage, saddlery, paper, paper-pulp, hemlock extract, and wooden wares are leading articles of manufacture; but dairying is the principal industry of the county, which is traversed by the Utica and Black River R. R. Cap. Lowville. Pop. 28,699.

**Lewis**, county of W. Middle Tennessee. Area, 420 square miles. It is uneven and generally fertile, but is not extensively settled. Indian corn is the chief product. Cap. Newburg. Pop. 1986.

**Lewis**, county of Washington Territory, extending W. from the Cascade Range. Area, 1820 square miles. The W. part is level and fertile. The E. abounds in forests and is broken by mountain-ranges. The county is traversed by the Northern Pacific R. R. Grain is the staple product. Cap. Claquato. Pop. 888.

**Lewis**, county of N. Central West Virginia. Area, 530 square miles. It is hilly and rolling. The soil is uniformly fertile. Tobacco, live-stock, wool, and corn are the chief staples. Grazing is extensively followed. Coal and iron abound. The county is traversed by the W. fork of the Monongahela River. Cap. Weston. Pop. 10,175.

**Lewis**, tp. of Coosa co., Ala. Pop. 367.

**Lewis**, tp. of Clay co., Ind. Pop. 1220.

**Lewis**, post-v. of Cass tp., Cass co., Ia. Pop. 400.

**Lewis**, tp. of Holt co., Mo. Pop. 4081.

**Lewis**, post-tp. of Essex co., N. Y., in the Adirondack region, has beds of iron ore and a mineral spring. Pop. 1724.

**Lewis**, tp. (P. O. West Leyden) in Lewis co., N. Y., is largely covered with forests, and has 5 churches. Pop. 1252.

**Lewis**, tp. of Brown co., O. Pop. 2817.

**Lewis**, tp. of Lycoming co., Pa. Pop. 963.

**Lewis**, tp. of Northumberland co., Pa. Pop. 1228.

**Lewis**, tp. of Union co., Pa. Pop. 1007.

**Lewis**, tp. of Mason co., West Va. Pop. 1364.

**Lewis** (Gen. ANDREW), b. in Ulster, Ireland, about 1730; was brought to Virginia in 1732 by his father, who settled at Bellefonte, Augusta co., and was the first white resident of that county. Andrew was a volunteer in the campaign to the Ohio in 1754; was a major in Braddock's expedition, and present at the great defeat on the Monongahela (July, 1755); commanded the Sandy Creek expedition in 1756; was taken prisoner by the French in 1758 near Fort Duquesne, and taken to Montreal; was the Virginian commissioner in the treaty made with the Iroquois at Fort Stanwix in 1768; was made brigadier-general in 1774, and commanded the Virginia troops in the victory over the Shawnee confederacy at Point Pleasant at the mouth of the Great Kanawha River, Oct. 10, 1774, probably the severest engagement with the Indians recorded in American annals up to that time. He was for several years a member of the house of burgesses, took part in the convention of 1775, was appointed a brigadier-general by Congress at Washington's request in 1776, and was engaged in military operations against Lord Dunmore. He resigned his commission on account of ill-health in 1777, and d. in Bedford co., Va., in 1780. Gen. Lewis was distinguished for athletic powers and an imposing presence, and was highly esteemed by Washington. His statue occupies one of the pedestals around the Washington monument at Richmond. He had four brothers who are mentioned in Virginian annals: SAMUEL, who commanded a company at Braddock's defeat; THOMAS (1718-99), who advocated Patrick Henry's resolutions in the house of burgesses in 1765, was a member of the State conventions of 1775 and 1776, and of that for the ratification of the Federal Constitution; WILLIAM (1724-1811), who served under his brother in the French and Indian war, and was colonel in the Revolution; and CHARLES, b. in Virginia, who also became colonel, and was killed at the battle of Point Pleasant, Oct. 10, 1774.

**Lewis** (DIO), M. D., b. at Auburn, N. Y., Mar. 3, 1823; studied at the Harvard Medical School in Boston, and practised for a time at Port Byron, N. Y., and at Buffalo, where he published a monthly medical magazine, in which he inculcated the importance of gymnastics as a necessary part of a good education, and proposed to replace the use of drugs by diet and exercise. He founded at Boston in 1863 an institution for training teachers, and established in the following year at Lexington, Mass., an academy for young ladies. In Sept., 1868, the institute at Lexington was destroyed by fire, and Dr. Lewis then engaged in medical practice in Boston. Has published *The New Gymnastics* (1862), *Weak Lungs, and How to Make them Strong* (1867), *Pathology of People's Stomachs* (1870), *Our Tricks* (1871), and *Chats with Young Women* (1871).

**Lewis** (DIXON HALL), b. in Dinwiddie co., Va., Aug. 10, 1802; removed in youth to Harrodsburg, Ky., was educated at Mount Zion Academy and South Carolina College; removed before 1823 to Autauga co., Ala.; entered public life when twenty-three years old, and at once took a leading position as a State Rights man; was in Congress 1830-44; U. S. Senator 1844-48. D. in New York Oct. 26, 1878. Mr. Lewis was excessively corpulent, weighing 450 pounds,



but possessed no small degree of physical activity. He was an able supporter of extreme State Rights views.

**Lewis (ELIAS), M. D., LL.D.,** b. at Lewisberry, York co., Pa., May 16, 1798; was a printer in his youth, and in 1822 came to the bar; in 1824 was deputy attorney-general of Pennsylvania, attorney-general in 1833, held various judgeships in the district and supreme courts of Pennsylvania, became in 1854 chief-justice of the latter court, and in 1857 was reelected. His skill in medical jurisprudence won for him the honorary degree of M. D. In 1858 he was appointed a commissioner to revise the criminal code of the State. He wrote *Abridgment of the Criminal Law of the U. S.* D. in Philadelphia Mar. 19, 1871.

**Lewis ESTELLA ANNA ROBINSON,** b. near Baltimore, Md., Apr., 1824; was educated at Mrs. Willard's seminary at Troy; married in 1841, Sidney D. Lewis, Esq., of Brooklyn, since deceased, and has resided chiefly in Europe. She published the volume of poems entitled *The Record of the Heart* in 1844, *The Child of the Sea* in 1848, *The Myths of the Minstrel* in 1852, and *Heleneith*, a tragedy, in 1863. A collection of her poems was issued in the U. S. in 1858 and in England in 1866. She has since published the tragedies *Supper of Lesbos* (1868), *The King's Stratagem* (1869), and a series of letters upon European topics addressed to American journals over the signature *Stella*. D. Nov. 23, 1880.

**Lewis (FRANCIS),** one of the signers of the Declaration of Independence, b. at Llandaff, Wales, in Mar., 1713, and educated at Westminster; became a merchant of New York, and in 1757 was on the staff of Gen. Mercer, and was captured at Oswego and sent to France; received a grant of 5000 acres from the British; was 1775-79 a member of Congress, and was afterwards exceedingly useful to the country, especially as an importer of military stores. His wife and himself were long imprisoned by the enemy, and the greater part of his estates was destroyed. D. in New York Dec. 30, 1803.

**Lewis (Sir GEORGE CORNEWALL), BART.,** b. in Radnorshire, England, Oct., 1806; graduated with high honors at Oxford, in 1828; came to the bar in 1831 at the Middle Temple; entered Parliament in 1847; was an under-secretary of state 1848; secretary of the treasury 1850-52; chancellor of the exchequer 1855-58; became secretary of state for the home department 1859, for war 1861, and was one of the translators of Müller's *History and Antiquities of the Doric Race* (1830); author of *Origin of Romance Languages* (1833), *Influence of Authority in Matters of Opinion* (1849), *Methods of Observation and Reasoning in Politics* (1852), *Insipidity into the Creditability of Early Roman History* (1855); editor of the *Edinburgh Review* (1844-55), wrote *Astronomy of the Ancients* (1861), *A Dialogue on the Best Form of Government* (1863). He also translated a part of Müller's *History of the Literature of Ancient Greece*. D. in Herefordshire Apr. 13, 1863.

**Lewis (JOHN FREDERICK), R. A.,** b. in London, England, July 14, 1805; first attracted attention by a series of studies from wild animals which were engraved by himself; was next engaged in making sketches of manners and costumes in Spain, of which lithographic copies were published in 1833-34 in 2 vols.; resided on the Continent, chiefly in Italy, from 1838 to 1851, making long visits to Greece, Turkey, and Egypt; exhibited in 1853 a series of 64 copies in water-colors of the most famous pictures of the Venetian and Spanish schools, which collection was purchased by the Scottish Academy; was president of the Society of Water Colors from 1855 to 1858; elected associate in 1859, and member of the Royal Academy in 1865. D. Aug., 1876.

**Lewis (JOHN TRAVERS), LL.D., D. D.,** b. June 20, 1825, at Cork, Ireland; graduated in 1846 at Trinity College, Dublin; was appointed curate of Newtown Butts in 1848; went as missionary to Hawkesbury in Canada in 1850; became rector of Brockville in 1855; was nominated bishop of Ontario in 1862, and wrote much for periodicals.

**Lewis (MATTHEW GREGORY), "Monk Lewis,"** b. in London, England, July 9, 1775; was educated at Oxford and in Germany. His famous romance, *The Monk* (1795), was in its original form so obscene that he was obliged to suppress the first edition, but in its amended form it had an immense popularity. He fell heir to great West Indian estates, and exerted himself to improve the condition of his slaves; was the literary associate of Sir Walter Scott, author of many tales, plays, and poems, mostly full of supernatural horrors, and, except *The Monk*, mostly forgotten. The *Journal of a West Indian Proprietor* (1834) is one of his best books. Lewis was a man of amiable and benevolent character. D. at sea May 14, 1818.

**Lewis (MERIWETHER),** b. near Charlottesville, Va., Aug. 18, 1774, the son of W. F. Lewis, a wealthy citizen; volunteered in the "Whisky Insurrection" of 1794; became

an ensign in the regular army 1795, and captain in 1800. Soon afterwards he was Jefferson's private secretary, and in 1803-06 he, with Capt. William Clarke, was sent upon a famous expedition to the Pacific Ocean. In 1807, Lewis was made governor of Louisiana Territory. He was habitually subject to depression of spirits, and in one of his hours of melancholy took his own life, near Nashville, Tenn., Oct. 11, 1809. (His memoir was written by Mr. Jefferson, and published with Biddle and Allen's *Narrative of the Lewis and Clarke Expedition*, 1814.)

**Lewis (Gen. MORGAN),** b. in New York City Oct. 16, 1754, son of Francis Lewis; graduated at Princeton in 1773; studied law in the office of John Jay; joined Washington's army at Cambridge in June, 1775; was made captain of a rifle company in Aug., major of 2d New York regiment in Nov., colonel and chief of staff to Gen. Gates in June, 1776; was at the battle of Saratoga, and was distinguished in Gen. Clinton's campaign against Sir John Johnson in the Mohawk Valley, especially at the battle of Stone Arabia. After the war he was admitted to the bar in Dutchess co., became a judge of common pleas, was elected attorney-general in 1791, made judge of the supreme court of the State in 1792, and chief-justice in 1801. He was governor of New York 1805-06; member of the legislature 1808-11; quartermaster-general, with the rank of brigadier-general, in 1812; promoted to major-general in 1813; was engaged in the operations on the Niagara frontier in Apr., 1813, and was in command of the defenses of New York City in 1814. He subsequently devoted himself to literature and agriculture, delivered an address before the authorities of New York City on the centenary anniversary of Washington's birth, Feb. 22, 1832; was president of the New York Historical Society in 1835, and d. in New York Apr. 7, 1844.

**Lewis (TAYLER), LL.D., L. H. D.,** b. at Northumberland, Saratoga co., N. Y., Mar. 27, 1802; graduated at Union College in 1820; studied law at Albany, and began to practise at Fort Miller, but relinquished this pursuit, and devoted himself exclusively to the study of the classical languages and literatures of Hebrew, Syriac, and Arabic, became professor in Greek at the University of New York in 1838, and at Union College in 1849. Besides several translations and numerous articles in periodicals, he wrote *The Six Days of Creation* (1855), *The Bible and Science* (1858), *The Divine Human in the Scriptures* (1860), and, together with E. W. Blyden and Theodore Dwight, *The People of Africa, their Character, Condition, and Future Prospects* (1871). D. at Schenectady, N. Y., May 11, 1877.

**Lewis (WINSLOW),** b. in Boston, Mass., July 8, 1799; graduate of Harvard University in 1819; proceeded to Europe, and pursued his medical studies under Dupuytren in Paris, and in London under Dr. Abernethy; returning to Boston, at once took a leading position in the profession, and succeeded Dr. Warren as consulting physician of the Massachusetts General Hospital; was also city physician of Boston 1861; repeatedly chosen to the State legislature; was president of the N. E. Historical and Genealogical Society 1861-66; and a prominent member of the order of Freemasons, of which he was for many years grand master of Massachusetts. D. at Boston Aug. 3, 1875.

**Lewis and Clarke,** county of W. Central Montana. Area, 2819 square miles. It is bounded E. by the Missouri River and N. by the Medicine River. It has good grazing and farm land, producing butter and grain. Gold quartz-mining is the principal industry. Cap. Helena. Pop. 5040, largely increased since the census.

**Lewisberry,** post-b. of Newberry tp., York co., Pa., 12 miles S. of Harrisburg. Pop. 268.

**Lewisborough,** post-tp. of Westchester co., N. Y., on the Connecticut line. Pop. 1601.

**Lewisburg,** post-v. of Faulkner co., Ark., on the Arkansas River, 50 miles above Little Rock, has 2 churches, 2 schools, 3 hotels, a carriage and wagon factory, etc. Pop. 239. E. B. HENRY, Ed. "WESTERN EMPIRE."

**Lewisburg,** tp. of Montgomery co., Kan. Pop. 827.

**Lewisburg,** a v. of Mason co., Ky., on the Maysville and Lexington R. R. Pop. 151.

**Lewisburg,** a v. of St. Tammany parish, La., on the N. shore of Lake Pontchartrain. Pop. 110.

**Lewisburg,** a v. of Champaign co., O. Pop. 733.

**Lewisburg,** p.-v. of Harrison tp., Preble co., O. P. 391.

**Lewisburg,** post-b., cap. of Union co., Pa., on the W. branch of the Susquehanna River, opposite the Lewisburg junction on the Philadelphia and Erie R. R., 68 miles N. of Harrisburg, has 7 churches, 2 banks, 2 weekly newspapers, 2 extensive manufactories of agricultural im-

plements, a large and well-appointed boat-yard, a woollen factory, and iron-works. It is the seat of a university and an academy. Large quantities of grain are annually shipped from this point. A railroad connects it with Tyrone. Pop. 3,121. J. R. CORNELIUS, Ed. "CHRONICLE."

**Lewisburg**, post-v. and cap. of Marshall co., Tenn., 50 miles S. of Nashville and 21 miles W. of Shelbyville, on the Duck River Valley R. R., has 11 business houses, 1 church, 1 weekly newspaper, 1 hotel, a male and female institute, a plough and a shoe factory, and other industries. Pop. 322. G. WYTHE EWING, Ed. "GAZETTE."

**Lewisburg**, post-v. and tp., cap. of Greenbrier co., West Va., on the line of the James River and Kanawha turnpike, 4 miles from the Chesapeake and Ohio R. R., and 9 miles from the Greenbrier White Sulphur Springs, has a church, 1 bank, 1 weekly newspaper, 3 public and several private schools, and 10 stores. It is in a fine grass country. Pop. 876. B. E. HARLOW, Ed. "INDEPENDENT."

**Lewis Creek**, tp. of Washington co., Ala. Pop. 1250.

**Lewis Fork**, tp. of Wilkes co., N. C. Pop. 1062.

**Lewis Fork**, the southern branch of the Columbia River, in Idaho Territory, called also Shoshone, Snake, and Sapiin or Shapitin River. (See SHOSHONE.)

**Lewis'ia**, a plant of the *Portulaca* family, named from its discoverer, Capt. Meriwether Lewis, who found it in the mountains about the sources of the Columbia River. It is found as far S. as Arizona. The root is called *racina umbra* by the Canadian voyageurs, and is used for food by the Oregon Indians, who call it *spattan*. It yields abundance of starch.

**Lewis'port**, post-v. of Hancock co., Ky., on the Ohio River, 8 miles above Rockport, Ind. Pop. 308.

**Lewiston**, post-v. of Trinity co., Cal., on Trinity River, in a gold-mining region among lofty mountains, 14 miles N. E. of Weaverville. Pop. 338.

**Lewiston**, post-v. and cap. of Nez Percé co., Id., at the junction of the Snake and Clearwater rivers and head of steamboat navigation, 90 miles from Walla-Walla, Wash. Ter. It was formerly the capital of Idaho. It has 1 weekly newspaper.

**Lewiston**, city of Androscoggin co., Me., 30 miles E. of Portland, situated on the Maine Central R. R. and on Androscoggin River at one of the most powerful waterfalls in New England; is largely engaged in the manufacture of cotton and woollen fabrics; has 13 churches, 1 daily and 2 weekly newspapers, 2 national and 3 savings banks, Bates College (Free Baptist) and theological school, fine school system with costly edifices, a public library, and an elegant city building with one of the largest public halls in New England. In the park in the centre of the city is a soldiers' monument surmounted by a bronze statue by Simmons. There are 10 cotton-mills, with 242,548 spindles, and 5 woollen-mills, with \$7,750,000 invested, which manufactured by water-power in 1873, 35,000,000 yards of cotton and woollen goods, valued at \$11,500,000. The river here falls 50 feet over a ledge of rocks, and the surrounding scenery is highly picturesque. Lewiston is now (1875) the second city of the State in population, having largely increased since 1870, when the number was 12,600. E. L. DINGLEY, Ed. "EVENING JOURNAL."

**Lewiston**, post-v. of Winona co., Minn., on the Winona and St. Peter R. R., 19 miles by rail W. of Winona.

**Lewiston**, post-v. and tp. of Niagara co., N. Y., on the Niagara River, opposite Queenston, Canada, is the N. terminus of the Buffalo and Niagara Falls R. R., and is at the head of navigation from Lake Ontario. It has 4 churches, and was formerly connected with Queenston by a suspension bridge. It is partly occupied by the Tuscarora Indians. Lewiston is the seat of the seminary of Our Lady of the Angels. Pop. of v. 770; of tp. 2,637.

**Lewiston**, tp. of Lunenburg co., Va. Pop. 1805.

**Lewiston**, post tp. of Columbia co., Wis. Pop. 1,031.

**Lew'istown**, post-v. and tp., cap. of Fulton co., Ill., on the Lewistown branch of the Chicago Burlington and Quincy R. R., 60 miles N. W. of Springfield, has 1 national bank, 1 weekly newspaper, 2 hotels, carriage wagon, woollen, plough, spoke, and hub factories, flouring and saw mills, and a number of stores and shops. Pop. of tp. 2902. W. T. DAVISON, Ed. "PEPPER DEMOCRAT."

**Lewistown**, post-b., cap. of Mifflin co., Pa., on the Juniata River and Canal, 61 miles W. of Harrisburg, is on the main line of the Pennsylvania R. R., and terminus of two of its branches, has 7 churches, 7 hotels, 2 banks, 3 weekly newspapers, an academy, a fine public school building, 2 flouring-mills, 2 breweries; Mann's saw factories, Logan's steel-works, and Logan's trout-ponds are located in the vicinity. Grain, iron, and coal are largely shipped.

The surrounding mountain-scenery is surpassingly grand, attracting numerous visitors during the summer months. Pop. 2737. FRYSENGER BROS., PUBL. "GAZETTE."

**Lew'isville**, post-v., cap. of La Fayette co., Ark., 19 miles S. E. of Fulton.

**Lewisville**, post-v. of Franklin tp., Henry co., Ind., on the Columbus Chicago and Indiana Central P. R. Pop. 416.

**Lewisville**, post-tp. of Forsyth co., N. C. Pop. 876.

**Lewisville**, post-v. of Summit tp., Monroe co., O. Pop. 124.

**Lewisville**, a b. (ULYSSES P. O.) of Ulysses tp., Potter co., Pa. Pop. 226.

**Lewisville**, tp. of Chester co., S. C. Pop. 2507.

**Lewis-with-Harris**, the largest and northernmost of the Outer Hebrides, separated from the mainland by the Minsh Channel, comprises an area of 770 square miles, with 23,666 inhabitants. The coasts, especially of the southern part, Harris, are wild and rugged; in the interior tracts of swamp and peat-moor occur. Barley and potatoes are cultivated, but fishing is the principal occupation. The inhabitants speak the Gaelic language, though in the northern part there is a colony of purely Scandinavian descent. Stornoway, situated on the eastern coast, is the only town of the island. Remains of Druidical structures are very frequent, and remnants of forests which formerly covered the surface are everywhere met with.

**Lex Domicilii.** See DOMICILE, INTERNATIONAL LAW, PRIVATE.

**Lex Fo'ri** [Lat., the "law of the forum"], the law of the place or state where a remedy is sought or action instituted. It is a well-established legal doctrine that the forms of remedies, the modes of procedure in the conduct of suits, and the execution of judgments are to be regulated exclusively by the laws of the place where the action is brought. This rule is applied in determining what parties are legally entitled to maintain and defend actions, what form of action should be brought, and what kind of process may be employed in securing the enforcement of a claim. For instance, a written instrument having a scrawl instead of a regular seal would be considered in some States as a sealed and in others as an unsealed instrument, and the appropriate form of action might therefore vary in different States, being governed by the *lex fori*. Arrest and imprisonment might not be allowable upon a certain claim by the law of the place where the contract was made (*lex contractus*), but might be adopted as a mode of legal process if permitted by the law of the State in which the action was instituted. The defence of set-off (see SET-OFF) or of discharge under insolvent laws (see INSOLVENCY) is also governed by the *lex fori*. The same is true of defences under the statute of frauds (see FRAUDS, STATUTE OF) or under the statute of limitations (see LIMITATIONS, STATUTE OF). All suits must be brought within the period prescribed by the law of the country where the suit is brought, or they will be barred. (See *LEX LOCI*, *LEX RIETII*.)

GEORGE CHASE, REVISED BY T. W. DWIGHT.

**Lex'icon, Dictionary, Thesaurus, Vocabulary, Glossary.** The first two of these words are the etymological equivalents of each other, the Greek *λέξ*, the source of the one, corresponding in signification to the Latin *dictio*, the parent of the other. *Λέξις* and *dictio*, though sometimes used in the sense of *word*, both mean rather a phrase, a *manière de dire*, or at least a special use of a term, than an ordinary single vocable, and the explanation of such phrases was the original office of lexicons or dictionaries. The titles "lexicon" and "dictionary" are of comparatively modern origin, because, though there were explanatory lists of the *λέξεις* or *dictiones* of particular Greek and Latin authors, true dictionaries or collective vocabularies of the whole verbal stock of particular languages hardly existed in the classic ages. There is no well-established distinction of use or meaning between the two words, though "lexicon" is perhaps more frequently applied than "dictionary" to the larger word-books of the Hebrew, Greek, Arabic, Sanskrit, and other dead or unfamiliar languages. In present usage a lexicon or dictionary, in its complete normal form, is a general list of the authorized words, phrases, and idiomatic expressions occurring in the literature of a given language, with indications of the pronunciation, the etymology, and the history of each word, with copious definitions, or explanations, in the sense of its ascertained use, and with exemplifications of the actual use of the word in combination with others, and illustrations of peculiarities in their grammatical relations. Many dictionaries, both for greater clearance and for saving space, now contain engravings of material objects in cases where verbal description would necessarily be inadequate or imperfect. This is a real improvement, and the objections which have



been urged against it have generally their foundation in pure lexicographical pedantry.

A *thesaurus* is also a general explanatory word-list, but professedly more copious than ordinary dictionaries, and provided with more of citation and discussion in illustration and support of the definitions ascribed by it to the words which compose it. In English this term is not often applied to dictionaries of modern languages, however voluminous and complete.

A *vocabulary* is an expository catalogue of words, but in English use it commonly comprises only technical or professional terms occurring in a particular author or in a given art or science, though it is also applied to partial lists of words collected from little known tongues. We employ "vocabulary," too, as the equivalent of the German *Wortverrath*, or "word-stock," implying not a list of words, but the entire verbal wealth of a given language as displayed in its literature or speech. This use of this word is hardly authorized in the Romance languages, and they often apply the term "vocabulary" to copious general dictionaries.

A *glossary* is a work of a lexical character, but commonly restricted to obsolete, provincial, obscure, or technical words. It may embrace only such as are employed by a particular author or class of authors, or it may aim to comprise all the antiquated or professional words of a language, or those occurring only in a particular stage or period of it. In continental lexicography, "glossary" is generally confined to explanatory lists of obsolete words, or of words employed in senses different from classical or from modern usage, and is not often applied to collections of words of art.

But, after all, the common usage, even of lexicographers, does not always accurately discriminate between any two of these words, and our definitions must accordingly be taken with some latitude.

The order of the words in lexical lists is usually alphabetical, but in certain languages an etymological arrangement is preferred. Even here, however, the radical forms under which derivative words are grouped commonly follow the alphabet. In some alphabetical dictionaries the alphabet itself does not conform to the ordinary modern A B C sequence, but the letters are arranged according to their phonological affinities. There are also word-books in which a classification according to primary signification, without reference to real or supposed radical forms, has been adopted. Dictionaries of these classes require for convenient use, and are often provided with, an alphabetical index. The Spanish and English dictionary of Fernandez is remarkable as having the words of the two languages under a single alphabet. Besides general lexicons, whether of words or of science, literature, or art (see *DICTIONARY*), modern philology has given birth to numerous new classes of word-books. Thus, almost all the principal living languages have dictionaries of their dialects, and even America, remarkable as it is for substantial uniformity of speech, whether in its Hispanic or in its Anglo-Saxon districts, has furnished important contributions to English diabetology in Bartlett's *Dictionary of Americanisms*. 2d ed., Boston, 1859) and in other kindred glossaries. There are also dictionaries of pronunciation, of prosody, and of rhymes; of etymology; of idiomatic and conventional phrases; of grammatical difficulties; of synonyms and of rhetorical analogues or equivalents; and in the essentially homogeneous languages, as German, of foreign words which have been more or less completely naturalized and adopted.

All dictionaries, even those of science and art, are essentially word-books, for the knowledge of words is the knowledge of things, inasmuch as the full comprehension of the nomenclature of a given science implies the mastery of the science itself. No lexicon or other list of the words of a living language, or of the terminology of a progressive knowledge, can ever be complete, for new words are formed and introduced faster than lexicographers can collect them, and the hourly discoveries of science are hourly demanding the coinage of fresh terms to enunciate them. A certain time must elapse before the claims of a new word to the rights of citizenship, whether in literature or in art, can be established and recognized; and besides, no scholar or body of scholars, no student or association of students of nature, can keep pace with the swift advance of human intellectual culture and attainment, or with the rapid multiplication of the words in which new ideas require to clothe themselves. Dictionaries, whatever their range or purpose, are at best but imperfect digests, and, like the digests of legal adjudications, are never to be cited as *authorities*. The exemplified use of the words by rabbis in literature or in science is the authority. Hence, the real test of a lexicon is the multitude of its judiciously selected citations. In this lay the crowning excellence of Dr. Johnson's *English Dictionary*, and the destruction of the 10,000

exemplifications which he sacrificed to save space is one of the greatest losses that English literature has sustained.

All literature, especially poetry and jurisprudence, inclines to archaic forms of expression, and its diction is in other respects less readily intelligible than that of ordinary conversation. Hence, explanatory lists of peculiar vocables and verbal combinations, first, no doubt, in the form of marginal glosses, must have been almost coeval with the birth of written literature itself. These glosses, gradually collected into separate volumes, were the earliest lexicons. Rudimentary dictionaries have been found stamped even on the bricks of Assyria, and more or less complete lexical collections existed at a very remote period in all the cultivated nations of the East, as well as in Greece. The Greek lexicon of Hesychius, of the fourth century, is said to be the oldest European general dictionary extant. Incomplete as were the ancient dictionaries, they have been of extreme value to scholars, for the very reason that, being designed exclusively for the elucidation of rare words or obscure verbal combinations, the space and labor requisite for cataloguing and explaining familiar expressions of every-day life have been spared, and the compilers have consequently been able to be more full and thorough in the exposition of really difficult words and phrases. Hence, we are indebted to such word-lists for our knowledge of the force of many *ἀπαξ λεγόμενα*, or "once-used words," technical terms, and the like, which without them would have remained quite unintelligible. And this is equally true of the more primitive word-books of modern languages. Palsgrave, Florio, Cotgrave, and still older vocabularies answer many questions in English philology of which we have no other solution.

It does not appear that the Greeks and Latins had bilingual lexicons, or dictionaries explaining their word-list in another tongue. Instruction in foreign languages was oral, as, in fact, it continued to be, substantially, in modern Europe until the seventeenth century. The pupil in general had little or no self-help, and his teacher was his dictionary. Modern dictionaries of the learned languages, indeed, existed at an earlier period, but Stephens and the other great lexicographers of the sixteenth century labored for advanced scholars, not for tyros; and this explains why not only Greek and Latin dictionaries had their explanations in the latter language, but why even the old English and German word-books employed the same universal medium for defining obscure words of the vernaculars. Notwithstanding the immense importance which the rapidly increasing study of foreign languages has given to dictionaries of this class, the principles of bilingual lexicography, at least in regard to modern languages, do not appear to have ever been well considered and discussed, and consequently there are few bilingual dictionaries of living languages which have any pretensions to philological merit. Hilpert's German-English dictionary may be said to have been good for its time, and the same remark may be applied to Fleming and Tibbins' French and English dictionary, but the latest editions of both are far behind the demands and the possibilities of the age. Of other bilingual general dictionaries of living languages, the only three known to the writer which can be pronounced even tolerable are the late edition of Kramer's Dutch and French dictionary, the German and French dictionary of Sachs, and the Icelandic and English dictionary of Cleasby and Vigfusson, which, with great compression and economy of space, are all truly excellent.

The material form and construction, scarcely less than the literary execution, of lexicons is a matter of very great importance, especially in an age whose habits of study oblige every scholar to unshelve and reshelve dictionaries twenty times in a day. The principles of convenience in this respect are almost universally sadly neglected by lexicographers and compilers of encyclopædias and other books of reference. We are acquainted with no satisfactory essay on this subject, and for want of a better we refer to a series of criticisms on the form, composition, and statistics of Webster's and other dictionaries by the writer of the present article in the *New York Nation* for 1865. (For a list of important lexical works see our article *DICTIONARY*; and we may notice the following additional general dictionaries: of Sanskrit, that of Böhtlingk and Roth, just finished at St. Petersburg; Sanders' German Dictionary, very full, but arranged on bad principles, very badly carried out; Tommaseo's very voluminous Italian Dictionary, now advanced to letter S; De Vries and Te Winkel's important Dictionary of the Netherlandish Language; Lane's great Arabic Lexicon, rather more than half issued; and two new editions of Facciolati and Forcellini's Latin Dictionary, at Prato and at Padua. GEORGE P. MARSH.

**Lex'ington**, county of Central South Carolina. Area, 700 square miles. It is hilly, with a good soil. It is bounded on the N. E. by the Congaree River. Live-stock, rice, corn,

and cotton are leading products. Flour is the chief article of manufacture. It is traversed by the Columbia and Augusta R. R. Cap. Lexington Court-house. Pop. 12,388.

**Lexington**, tp. of Dallas co., Ala. Pop. 659.

**Lexington**, tp. of Lauderdale co., Ala. Pop. 1236.

**Lexington**, post-v., cap. of Oglethorpe co., Ga., near the Athens branch of the Georgia R. R. (CRAWFORD STATION).

**Lexington**, post-v. and tp. of McLean co., Ill., on the Chicago and Alton R. R., 100 miles S. of Chicago and 15 W. of Bloomington, has 6 churches, 2 banks, 2 weekly newspapers, 1 hotel, a public graded school, lodges of Patrons of Husbandry, and a good trade, dealing largely in stock and farm products. Pop. 2404. Ed. "ENTERPRISE."

**Lexington**, post-village of Scott co., Ind., on the Lexington branch of the Ohio and Mississippi R. R. Pop. of v., 149; of tp. 2529.

**Lexington**, tp. of Johnson co., Kan., on the Kansas River and the St. Louis Lawrence and Western R. R., on which is De Soto Station. Pop. 1256.

**Lexington**, city, cap. of Fayette co., Ky., on a branch of the Edmon River, 65 miles S. E. of Louisville and 29 miles S. E. of Frankfort, on the Louisville Cincinnati and Lexington and the Kentucky Central R. R., has 18 churches, 1 State and 3 national banks, 1 daily, 1 weekly, and 2 semi-weekly newspapers, 7 free schools, 2 private Catholic schools, 5 denominational female seminaries, a library company owning 16,000 volumes, a State insane asylum, an orphan asylum, carriage, bagging, and rope factories, and a large trade sustained by the resources of the fertile and beautiful surrounding country. The city is regularly laid out at right angles, is well built, well paved and lighted, and the streets are bordered with shade trees. Founded by Col. Robert Patterson in May, 1775, the town received its name in commemoration of the battle of Lexington fought the preceding month. It was incorporated in 1782, was for a time the State capital, and soon became the principal seat of wealth and culture W. of the Alleghanies, and celebrated as the home of several eminent men, chief of whom was Henry Clay, to whose memory a monument has been erected in the beautiful cemetery. Transylvania University, the oldest college in the Western States, was founded here in 1798, and had law and medical departments. The Kentucky State University, chartered in 1848, and opened at Harrodsburg in 1859, was removed to Lexington in 1865, and Transylvania University was combined with it. The new institution had in 1872, 21 professors, 9 other officers, 579 students, and 20,000 volumes in its libraries. Pop. 11,891.

**Lexington**, post-tp. of Somerset co., Me., 24 miles N. W. of Norridgewock. Pop. 397.

**Lexington**, post-v. and tp. of Middlesex co., Mass., 11 miles S. W. of Boston, on the Boston Lowell and Nashua R. R. Lexington branch, has 5 churches, 1 savings bank, 1 weekly newspaper, a fine high school, and a public library with 3500 volumes. There are no manufactures, the principal business being farming, dairying, and market-gardening. It was settled in 1642 under the name of "Cambridge Farms," and probably received its name from Lexington (Laxington or Laxton), Nottinghamshire, England, of which place Francis Whitmore, an early settler, was a native. Memorable as the spot where the first blood was shed in the Revolutionary struggle, this historic town possesses many mementoes of that period. A modest granite monument upon the village green tells its story of life sacrificed for principle, while a beautiful memorial hall is eloquent with tablets and statues of John Hancock, Samuel Adams, the minute-man of 177, and the soldier of 1861. The two former were inaugurated at the centennial celebration of the battle of Lexington, Apr. 19, 1775, an occasion which was brilliantly successful in the many thousands of visitors attracted from all parts of the Union, including the national and State executives, and elicited eloquent orations and genuine poetry. Lexington is the native place of The Liberator, whose grandfather, Capt. John Parker, commanded the company of minute-men fired upon by the British troops in 1775. Pop. of tp. 2277. (See the excellent *History of Lexington*, published in 1868 by Hon. Charles H. Smith.)

On the evening of the 18th of April, Gen. Gage despatched a force of 800 men, under Lieut.-Col. Smith, to Concord for the purpose of destroying the military stores there collected, and in anticipation had picketed the roads leading from Boston to prevent the news of the intended expedition from spreading. The capture of Hancock and Adams, who were at Lexington, was also contemplated. But in these excited times everybody was on the alert, and the first movement of the enemy was at once made known by preconcerted signals, and Paul Revere, rowing across to the Charlestown shore, mounted his horse and rode swiftly

away towards Lexington, arousing each household as he went; the bells of the village churches now rang out the alarm; signal-guns were fired and other messengers were arousing the country. By midnight Paul Revere had arrived at Lexington and given the alarm; the militia at once assembled on the village green, but there being no signs of the enemy, they were dismissed to await their coming, after a number of men had been sent out towards Boston to report the approach of the British. It was about 4½ in the morning when Major Pitcairn, with six companies, who had surprised and captured all the outposts, arrived within a mile or two of Lexington. A general alarm was now sounded, and the militia to the number of 60 or 70, under command of Capt. John Parker, were drawn up in line upon the green. Pitcairn, moving rapidly forward with his men, himself rode up and ordered the militia to surrender and disperse. The militia, however, held their ground, and after firing a volley over their heads without effect, a second fire was poured into the American line, which killed eight and wounded ten of the little band. Capt. Parker, seeing that further resistance would result in the certain destruction of all hands, ordered his men to disperse, which they did, some discharging their muskets at the British as they retired, inflicting, however, but little injury upon the enemy (three of the regulars were wounded and Pitcairn's horse struck), who now pressed on to Concord, six miles beyond, whence Revere, continuing his ride with Ebenezer Dow and Dr. Samuel Prescott, had hastened to spread the alarm. Revere and Dow were captured by a British patrol; Prescott, however, barely escaping, succeeded in reaching Concord. The Lexington men rallied after the departure of the regulars, and followed on to Concord, and in the retreat of the British which followed the battle at Concord bridge, joined in the pursuit, which only terminated on the arrival of the regulars at Charlestown Neck, under the guns of their shipping. In this pursuit three more of the Lexington militia were killed. During a visit in 1852 of Kossuth to "the birthplace of American liberty," he said of the fallen heroes of that day: "It is their sacrificed blood with which is written the preface of your nation's history. Their death was, and ever will be, the first bloody revelation of America's destiny, and Lexington the opening scene of a revolution that is destined to change the character of human governments and the condition of the human race." In 1799 a small monument was erected upon the spot where Frank the contest of the Revolution.

FRANK E. WEIR, REEL, ED. "MINUTE MAN."

**Lexington**, post-v. and tp. cap. of Sanilac co., Mich., is a port of entry on Lake Huron, 20 miles N. of Port Huron, has 5 churches, 4 hotels, 1 weekly newspaper, a flouring-mill, 1 woollen and 2 furniture factories, and a number of stores and shops. Pop. of v. about 1000; of tp. 2433. C. S. NIMS, ED. "JEFFERSONIAN."

**Lexington**, post-tp. of Le Sueur co., Minn. Pop. 507.

**Lexington**, post-v., cap. of Holmes co., Miss., situated equidistant between the Yazoo River and the Mississippi Central R. R., has 4 churches, 1 weekly newspaper, 1 hotel, 2 schools, and a number of stores and shops. Pop. 744. HOSKINS & WILLIAMS, PUBL. "ADVERTISER."

**Lexington**, city, tp., and cap. of La Fayette co., Mo., on the S. bank of the Missouri River and the Missouri Pacific R. R. (Sedalia branch), 250 miles W. of St. Louis (370 by the river) and 40 miles E. of the Kansas line; is situated on a high bluff 300 feet above the river. The terminus of the St. Joseph and Lexington R. R. is at North Lexington, on the opposite bank of the river, where also the St. Louis Kansas City and Northern R. R. passes along the river bottom. The city has 10 churches, 4 banks, 1 weekly newspaper, 1 German, 3 female seminaries, and excellent public schools, and is the centre of the home-growing region. Immense strata of coal, reputed the best in the State, underlie the whole county, and furnish the leading article of commerce. Lexington was settled in 1837; it is healthy, and enjoys substantial commercial prosperity. In Sept., 1861, a Union force of about 2800 men, under Col. James Mulligan, occupied the hill on the N. E. of Lexington, which naturally strong position was fortified and held against a Confederate force of some 24,000 men, under Gen. Sterling Price; the siege terminating on the 20th in the surrender of the town and garrison. Major Frank J. White retook the town Oct. 16, capturing 60 or 70 prisoners, and releasing such of Mulligan's force as were found there. Again, in Oct., 1864, the army of Gen. Price here attacked Gen. Blunt, who after a two hours' resistance withdrew. Pop. of city 1400; of tp. 679.

MARK L. DE MOORE, ED. "REGISTER."

**Lexington**, post-tp. of Greene co., N. Y., among the Catskill Mountains, has 3 churches, and contains a natural reservoir. Pop. 1571.

**Lexington**, post-v. and tp., cap. of Davidson co., N. C., on the North Carolina R. R. Pop. of v. 475; of tp. 2289.



**Lexington**, post-v. of Richland co., O., on the Baltimore and Ohio R. R. (Lake Erie div.). Pop. 482.

**Lexington**, tp. of Stark co., O. It contains the city of ALLIANCE (which see). Pop. 3700.

**Lexington**, tp. of Lexington co., S. C. It contains the county-seat, LEXINGTON COURT-HOUSE (which see). Pop. 1363.

**Lexington**, post-v. and cap. of Henderson co., Tenn., an inland town, 30 miles E. of Jackson, has 2 churches, 2 hotels, 1 weekly newspaper, and an academy. It was located in 1821, was seriously damaged during the war, but is now being rapidly rebuilt. Pop. about 500.

L. M. FORD, Ed. "REPORTER."

**Lexington**, post-v. of Burleson co., Tex. Pop. 157.

**Lexington**, post-v. and tp., cap. of Rockbridge co., Va., situated in the "Valley of Virginia," on the N. branch of James River, 35 miles N. N. W. of Lynchburg, has 7 churches, 3 hotels, 1 weekly and 1 semi-monthly newspaper, 1 bank, a public library, a foundry, flouring-mills, and a number of business-houses. It has unlimited water-power, and is the head of canal navigation on the James River and Kanawha Canal, and on the line of the Valley R. R. The celebrated Natural Bridge and the picturesque Peaks of Otter are in the immediate vicinity. Washington College was founded here in 1798 by George Washington, and the Virginia Military Institute (the West Point of the South) established in 1839. The former was reorganized after the civil war as Washington and Lee University, under the presidency of Gen. Robert E. Lee, who resided here until his death. It now has over 20 instructors, nearly 300 students, and a library of 10,000 volumes, while the Military Institute has 12 professors, 300 students, and a library of 5000 volumes. It receives an annual appropriation from the State, which appoints a certain number of cadets. Stonewall Jackson was a professor at this institute, and, like Gen. Lee, is buried here. Pop. of v. 2873; of tp. 3948.

BARRETT & CO., PUBLS. "GAZETTE."

**Lexington Court-house**, post-v. of Lexington tp., cap. of Lexington co., S. C., on the Charlotte Columbia and Augusta R. R., 12 miles W. of Columbia, has 3 churches, 1 weekly newspaper, several schools, 2 hotels, an excellent water-power, supplying 4 flouring-mills, and manufactories of cotton-yarn and furniture. It is a noted place for summer resort; famous also for its fruits. Pop. in 1874 about 450.

G. M. HARMAN, PUB. "DISPATCH."

**Lex Lo'ci** [Lat., the "law of the place"], a phrase used in law as a common abbreviation for the more complete expression *lex loci contractus*, the "law of the place of a contract." It is a general principle of private international law that the validity, interpretation, and obligatory force of personal contracts are to be determined by the law of the place where the contract is made, if that is also the place where, by the stipulations of the parties, the agreement is to be performed. But if a different place of performance is agreed upon, this is deemed the place of the contract, the law of which is to be followed in its construction, the determination of the rights acquired under it, and the duties and obligations which it imposes. The rule may be briefly stated, that a contract valid by the law of the place where it is made or is to be performed is valid everywhere, and if void by such law is void everywhere. This rule, however, is not without important exceptions, for a contract may be valid in one country which would not be enforceable in another, on account of its being considered in the latter as injurious to public morals or welfare, or in contravention of public policy or some positive law. There is no binding obligation resting upon any state to give force and effect to contracts made in other states; and though this is generally done, it depends entirely upon international comity, which will not be extended so far as to operate disadvantageously to the interests or public institutions of the state in which the contract is sought to be enforced. The capacity of the parties to contract, as determined by minority, coverture, guardianship, and other causes of personal disability, is also, as a general rule in English and American law, governed by the *lex loci contractus*. The place where the contract is made is that in which the assent of the parties first concurs and becomes complete. For instance, if a proposition be made by a person in one place to a person in another, and an assent to the offer be deposited in the mail addressed to the first party, the contract is generally deemed to be fully made at the time and place of mailing the answer. The *lex loci* also governs as to the formalities and modes of authentication necessary in the execution of contracts. (See INTERNATIONAL LAW, PRIVATE; LEX FORI; LEX REI SITÆ; STORY on the *Conflict of Laws*; Westlake's *Private International Law*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Lex Re'i Sitæ** [Lat., the "law of the place of the situation of a thing"]. The transfer of real estate, the ten-

ure by which it may be held, and all contracts or acts in regard to its management, enjoyment, or disposition, are governed by the law of the place where such property is situated. It is only in reference to real property that this invariable rule prevails. The ownership, management, and conveyance of personal property are governed in some cases by the law of the place where the owner is domiciled (see DOMICILE), in other cases by the law of the place where contracts in regard to it are made or are to be performed (see LEX LOCI). These laws may be either those of the state or country where the personal estate is situated, or those of some other state. The capacity of persons to take or transfer real estate is also determined by the *lex rei sitæ*. If, for instance, aliens are prohibited by the laws of a country from holding lands, they can obtain no valid title to real property situated therein, whatever may be the law of the place of their domicile. The formalities to be observed and the modes of conveyance to be employed must be those which the local law prescribes. Thus, it is a general rule at common law that a seal is required to an instrument conveying an interest in lands, and therefore a deed executed without a seal in a country where this was not required would be held invalid as a conveyance of land in a state where the common-law rule prevailed. The *lex rei sitæ* further determines the interest in real property which may be transferred. If this law provides that an owner of land shall not alienate more than a certain portion by devise or any other specified method, no larger interest can be transferred, although the instrument of conveyance be executed in a foreign country. The law of the place of situation governs not only real property of a corporeal nature, as land, but also that which is incorporeal, as servitudes, easements, rents, etc. (See INTERNATIONAL LAW, PRIVATE; LEX LOCI; LEX FORI.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Leyden** [anc. *Legdunum Batavorum*; Fr. *Legde*], an important city of the Netherlands, in the province of South Holland, on the Old Rhine, 6 miles from its outlet in the North Sea. It is intersected by canals, kept exceedingly clean, well built, with straight and broad streets; its Breede straat is considered one of the finest streets in Europe. Thus, although the former splendor of the city is almost entirely lost, there is not the least indication of decay. It was once a strong fortress, and the siege which it sustained from the Spaniards in 1573-74 made it famous. For seven weeks there was no bread within the walls, but the burghers still resisted, though the hunger became almost unbearable. At last the prince of Orange came to their rescue. The dikes were opened, and the waters, which drowned a great number of the besiegers, carried a fleet of 200 boats loaded with provisions to the city. Now the bastions are covered with windmills, and the citadel and the towers transformed into storehouses. As a reward for the valor the city evinced during the siege the prince of Orange founded a university here, and it soon became one of the most celebrated institutions of learning in Europe, adorned with such names as those of Scaliger, Gomar, Arminius, Grotius, and Descartes. An immense trade in books developed at the same time, and its Elzevir editions are world-renowned. Now, the university, although an institution of good reputation, has but 500 students, and the city only 5 printing-offices. In the seventeenth and eighteenth centuries Leyden was one of the cloth-manufacturing centres of the world. It had 100,000 inhabitants, and its broadcloths commanded the highest prices at any fair. Now, it has only 39,121 inhabitants, and only half a score of factories, employing about 1000 hands. Yet, although retiring from the bustle of life, Leyden shows no signs of decay; it seems only to rest and prepare itself for any new chance which may come up. The great painters, Metzu, Mieris, Dow, and Rembrandt were born here. The Pilgrim Fathers who left England for Amsterdam in 1608 remained in Leyden from 1609 till their departure for America in 1620.

**Leyden**, post-tp. of Cook co., Ill., 10 miles N. W. of Chicago. Pop. 1437.

**Leyden**, post-tp. of Franklin co., Mass., 9 miles N. of Greenfield. Leyden Glen is a place much visited for its romantic scenery. Pop. 518.

**Leyden**, post-tp. of Lewis co., N. Y., on the Utica and Black River R. R., has stone-quarries and various manufacturing interests, and contains several villages. Pop. 2048.

**Leyden** (JOHN), b. in Denholm, Roxburghshire, Scotland, Sept. 8, 1775; studied at Edinburgh University; was ordained in 1798, but soon abandoned the clerical for the medical profession, and in 1802 obtained an appointment as assistant surgeon in India. He first resided at Madras; studied the Oriental languages, and removing to Calcutta, became professor of Hindostanee in Fort William College. He afterwards became a judge and assay-master at the

mint. He accompanied the English expedition against Java, and d. at Batavia Aug. 21, 1811. Among other works he wrote a *Historical Account of Discoveries and Travels in Africa* and an *Essay on the Languages and Literature of the Indo-Chinese Nations*, in vol. x. of *Asiatic Researches*; also *Poems and Ballads*, published after his death. The centennial of his birth was in 1875 celebrated in Scotland.

**Leyden** (LUCAS VAN; real name LUCAS J. VONCEZ), b. at Leyden, Netherlands, in 1494; was a contemporary and friend of Albert Dürer. His genius was precocious and original. Under the tuition of Engelbrechtson he made such progress that at the age of twelve he was already distinguished. He painted in oil, distemper, and on glass, and excelled in history, portrait, and landscape. His pictures are rare, and fine impressions of his prints are scarce and costly. His most important picture is a *Last Judgment* in the town house at Leyden; the *Good Phylax*, the *Virgin and Child* in the Munich Gallery, the *Portrait of the Emperor Maximilian* in the Belvedere at Vienna, and the *Descent from the Cross* in the church formerly of the Jesuits in Paris are remarkable. As an engraver he held rank with Dürer and Marc Antonio. His *Edenspiegel* is said to be the rarest of all prints. Lucas exerted a powerful influence on the artists who came after him, by deciding them to take fresh subjects and treat them naturally. His industry was great, for in spite of the brevity and dissipation of his life upwards of 100 paintings and 174 prints are ascribed to him. D. in 1533. O. B. FROTHINGHAM.

**Leys** (JOHN AUGUST HENRY), b. at Antwerp Feb. 18, 1815; was destined for the Church, but at the age of fifteen entered the studio of Brakeler, his brother-in-law; exhibited in 1833 a picture that excited remark, *Combat of a Grenadier with a Cossack*; travelled and studied in France and Holland, and on his return till his death, Aug. 26, 1869, lived in his native city. The artist took the subjects for his canvases from the history of his own country and the life of the Middle Ages, and painted with the fidelity and feeling of one who describes what he thoroughly knows and is imbued with the spirit of what he depicts. His work has the solid reality of truth and the earnest glow of natural feeling. Few of his pieces have come to the U. S. His chief works, such of them as were not painted for his rich patron, M. Couteau, were executed, it is said, for public places in Belgium. Three pictures which he sent to the Exposition in Paris of 1855 obtained for him one of the grand medals of honor. To the Exposition of 1867 he sent eleven pieces, and was again honored by a medal. In 1846 he was decorated with the order of Leopold; in 1851 raised to the rank of officer; in 1867 made commander of the order, and promoted to the dignity of officer in the Legion of Honor. He had already been created a baron by Leopold I. and elected a member of the Royal Academy of Belgium. O. B. FROTHINGHAM.

**L'Hôpital, de** (MIEMT), b. at Aigueperse, in the present department of Puy de Dôme, about 1504; studied jurisprudence at Padua; was sent by the French court in 1547 to the Council of Trent, which had just removed to Bologna; became in 1551 president of the court of accounts, and in 1560 chancellor of France. By his ability and integrity he gained the respect of all parties, but the policy of moderation by which he endeavored to pacify the tumultuous state of the popular mind made him many enemies, and several of his measures, by which he prevented the establishment of the Inquisition in France and authorized the free exercise of Protestant worship, as well as the circumstance that his family became Protestant, made him suspected in the eyes of the Catholic party. In 1568 he resigned his office and retired to his estate at Bellebat, in the present department of Seine-et-Oise, where he d. Mar. 13, 1573. His *Œuvres*, containing Latin poems, speeches, and memoirs, were published in 1824 at Paris in 4 vols., and his poems separately in 1827.

**Li'na** [Fr. *liane*], a name usually found in the plural applied to the climbing and twining woody plants which, in some tropical countries (as Brazil), entwine themselves among forest trees, often rendering great areas of land quite impenetrable. They belong to a great number of different natural orders. Some are of very great size, and by their constriction and weight they often kill the trees which support them.

**Li'as**, *The*, a group of strata occurring in Western Europe and belonging to the Jurassic period. The word was originally a local term, a corruption, it is said, of "layers," in allusion to the thin bedded limestones that in its lower portion alternate with marls. It is divisible into two natural groups, the older of which comprises the strata that are known as the Lower and Middle Li'as. The Lower Li'as rests below on the Keuper, and commences by lime-stones, which we find giving place as we ascend the series to bluish marls. Where the entire series is well developed

we find the blue marls succeeded by gray marls (of the Middle Li'as); these become micaceous, and finally arenaceous, passing above into the "Middle Li'as Sands," which in turn are capped by a highly ferruginous and sometimes arenaceous limestone known as the "Marlstone." Succeeding to the Marlstone we find a similar series of strata recurring—namely, the "Upper Li'as Limestone," the "Upper Li'as Clay," and the "Upper Li'as Sands," which are capped by the inferior Oolite limestone of the next formation. To the paleontologist the Li'as is classical ground; in both Germany and England it has yielded hundreds of perfectly preserved skeletons of saurians (*Ichthyosauri*, *Phosiosauri*, *Tetrasauri*, *Scoliodon*) and of *Protodactyls*; from 70 to 100 species of fish, often most beautifully preserved; and a host of Mollusca (970 species are recorded from the English Li'as alone), amongst which Ammonites, Belemnites, and Brachiopods are especially abundant. Pentacrinites abounded in the Liassic waters, Crustaceans and Echinoderms left their remains more sparingly, and corals were not so abundantly represented as in some other secondary formations. We may on the whole, however, safely affirm that the fossils of the Li'as give us the most complete representation that we have yet found of any extinct fauna. The most characteristic forms of the Lower Li'as are *Gryphaea lacuna*, *Li'as gigantea*, and Ammonites of the group *Arctites*; of the Middle Li'as, Ammonites of the group *Amalthei*; and of the Upper Li'as, Ammonites of the group *Falciferi*; the vertebrate remains are met with most commonly in the limestones of the Lower Li'as and the marls immediately over them, and again in the Upper Li'as limestone. The Marlstone of Yorkshire, England, has of late years proved to be one of the most valuable sources of iron ore. This Cleveland Ironstone, as it is termed, is an argillaceous carbonate of iron, yielding on an average about 30 per cent. of iron. According to Ansted, it extends over a district of some hundreds of square miles, in a stratum, generally Oolitic in structure, sixteen feet in thickness, and from which are annually obtained 1,000,000 tons of ore. EDWARD C. H. DAY.

**Liba'nus**, b. at Antioch in 314 or 316, and d. there shortly after 391, in the reign of Arcadius; studied at Athens, and mentions Cleobulus, Didymus, and Zenobius as his teachers, but acquired his education principally by private study of the old Greek writers, whom he often imitated with success, and for whom he always showed great enthusiasm. He first set up a private school of rhetoric at Constantinople, and his teachings conquered the attention of the students so absolutely that the schools of the official teachers were deserted. These now brought an accusation of magic against him, and by the aid of the prefect, Limenius, a personal enemy of Libanius, they succeeded in getting him expelled from the city, about 346. He went to Nicomedia, where he taught with equal success for five years, but when recalled to Constantinople he was rather coolly received, and persecuted by the intrigues of his rivals and harassed by domestic troubles and ill-health, he gave up teaching and lived in retirement in his native city. He was vain and meddlesome in character, and the moderation of his views—his toleration, for instance, towards Christianity, though himself a pagan—was due, at least to some extent, to his being a rhetorician and not a philosopher; he cared more for the form than for the substance. But he was, nevertheless, a man of superior talent and of friendly disposition, and stood in intimate connection not only with Julian the Apostate, but also with St. Chrysostom and St. Basil. A considerable number of his writings are still extant. His orations, declamations, etc. have been published by Reiske (4 vols., Leipsic, 1791-97), and his letters, which are very interesting and of great value for the student of the history of that period, by I. C. Wolf (Amsterdam, 1738). There exist, however, still many letters by him, in manuscript and unpublished, at Madrid, Venice, and other places.

**Liba'tion** [Lat. *libare*, to "pour"], an offering of wine, milk, oil, or other fluid as a ceremony of divine worship. The Mosiac law required libations (drink offerings) of wine, and similar practices were common among the pagans of antiquity. Libations were poured upon the hearth before meals in honor of the Roman Lares, and before sacrifice wine often was poured upon the victim's head, upon the altar, or upon the ground. Libations were often employed in the confirmation of public treaties with foreign states.

**Li'bau**, town of Russia, in the government of Courland, on the Baltic. It has a considerable shipbuilding interest and large trade in timber and corn. Its harbor freezes later than other harbors of the Baltic, and is earlier free of ice. Pop. 3020.

**Li'bel** [Lat. *libellus*, "little book," "pamphlet"]. The term "libel" has in legal usage two diverse significations.



As employed in one sense it denotes a particular mode of defamation of character, constituting an offence punishable at law, while in another application it denotes one of the pleadings employed in proceedings in courts of admiralty.

1. Libel as denoting defamation of character, and considered as the basis of a civil action, may be defined as a malicious publication in printing, writing, signs, or pictures imputing to another something which has a tendency to injure his reputation, to disgrace or to degrade him in society, or to hold him up to hatred, contempt, or ridicule. As distinguished from the offence of slander, which is defamatory matter addressed to the ear, libel is defamatory matter addressed to the eye. (See SLANDER.) Libel is moreover distinguished from slander in this respect—that it constitutes both a criminal offence and a civil injury, and is therefore punishable both by indictment and by a civil action for damages. Slander, on the other hand, is only a civil wrong, a violation of private rights, and is never indictable, the only available mode of redress being a private action. But while it is generally true that a libellous charge is both indictable and actionable, this is not invariably the case. There are certain forms of libel which constitute criminal offences, but which will not support an action for damages, inasmuch as they are not deemed in law to be in violation of individual rights. The definition of libel, therefore, which has just been given, and which describes it merely as an offence against the right of reputation, is not sufficiently comprehensive to include its full extent of meaning and application in its criminal aspect. All actionable libels are also indictable, but the converse of the proposition is not true that all indictable libels are also actionable. While the general definition, as above given, embraces modes of defamation or injury which are open to both forms of redress, those varieties of libel which are distinctively of a criminal character may more conveniently be classified and described separately. These are of three principal classes—libels which blacken the memory of the dead, libels upon the government, and obscene libels tending to corrupt the public morals. Of these, the first class is of the most importance. Publications reflecting upon the memory of one who is dead, vilifying him or tending to detract from his posthumous reputation, are regarded in law as likely to excite the animosity of his family, and provoke them to measures of retaliation or punishment, and thus to occasion violations of public peace and order. But only such criticism of the character or conduct of a deceased person is criminal as is made with malevolent purpose, with a design to degrade his memory. Fair and honest consideration of his actions, motives of conduct, and mode of life is allowable. Libels against the government consist of calumnious publications in denunciation or unwarrantable criticism of the established governmental system or in censure of methods of administration, provided the allegations are of such a nature that their natural tendency or evident purpose is to promote disaffection among the citizens or to excite a spirit of revolution. But indictments for libels of this kind are very rare, and would probably not be sustained at the present day except in very extreme cases, though the rules of the common law in most of the States probably remain unchanged. Obscene or immoral libels are such indecent or immodest publications as tend to destroy the love of purity, morality, and virtue, and corrupt the public morals. This form of libel is generally at the present day made the subject of express statutory provisions, whose object is to repress such pernicious publications, and punish those who issue them with severe penalties. It is, moreover, somewhat unusual now to designate such publications as libels, though they are so considered and classified at common law.

But the most common forms of libel are those which constitute both civil and criminal offences, and which affect the reputation of some living person. The theory of law, however, upon which libel is adjudged to be a criminal offence is essentially diverse from that upon which it is declared to be a civil or private injury and open to redress by an action for damages. It is regarded as a tort or private wrong, because it is a violation of the right of reputation which inheres in every individual. (See TORT.) But a crime is a public and not a private wrong—an offence against the community considered in its social aggregate capacity, instead of a violation of personal rights; and libel is adjudged to be a crime, not because it is an infringement upon the right of reputation, but because it tends to public detriment. Thus, libels against the government and obscene libels are indictable because in the one case the tendency is to weaken or destroy the allegiance of citizens to the state and foment intestine disorders, and in the other to occasion a pernicious laxity of morals. But libels which blacken the memory of the dead and those which injure the reputation of the living are indictable on account of their tendency to occasion breaches

of the peace, by provoking the person defamed, or his relatives and friends if he be deceased, to punish the libeller. In former times it was viewed as a natural and probable consequence that the libeller would be challenged to fight a duel or would be assaulted; and upon this legal presumption the jurisdiction of criminal courts over this offence was based and still depends as a matter of principle, though the probability that acts of violence will be resorted to in a particular case is a wholly immaterial point.

A more definite and specific statement as to the point what charges against a person's reputation will be considered libellous than is comprised in the general definition already given is hardly practicable. Every form of malicious defamatory publication which is calculated to make a person appear ridiculous or contemptible is to be deemed a libel, and modes of casting derision and degrading imputations are of course infinitely various. It has been held, however, that mere terms of general abuse are not libellous, though the discrimination between charges that are libellous and those that are merely abusive is necessarily difficult. It has also been decided in some cases that charges of violation of etiquette, of good taste, or the rules of polite society are not actionable. As illustrations of charges which have been adjudged libellous the following may be referred to: Imputations of fraudulent or dishonest conduct; of committing any crime or of being guilty of any dishonorable practices; against a professional man of unfitness to practise his profession; of incontinency or unchastity; or assertions that a dealer's wares are adulterated, or that he knowingly sells bad articles, etc. It is not necessary that the charge should be expressed in the form of direct and positive assertion. An ironical mode of conveying an imputation will be sufficient. So a defamatory charge may be made by indirect allusion, by covert innuendo, or in the form of an interrogation. It is, moreover, not requisite that the person defamed should be mentioned by name in the libel, or should be referred to with such definiteness of description that all who saw the publication would know to whom it applied. It is enough if the designation be to such a degree specific that the natural and reasonable understanding of the charge would be, at least among some portion of those to whose knowledge it came, that a particular person was alluded to. Thus it has been held that a person whose name was indicated merely by asterisks, but who was otherwise sufficiently described, might maintain an action for libel. All persons who take part in the dissemination of the libel by republication are responsible to the same extent as the original libeller. It is no defence to one who circulates a charge of this kind that he was not himself the author of the imputation. Hence, publishers of newspapers are responsible for whatever statements of a libellous character appear in their columns, though these may be merely copied from some other paper or publication as matters of interest. This is true even though the name of the author be given in connection with the publication. So it is no excuse that a libellous publication is based upon a widely circulated rumor, even though this be generally credited and have a reasonable semblance of truth.

As regards the nature of the defamatory charges which will sustain an action by the party defamed, there is an important distinction between libel and slander. While every form of imputation calculated to bring a man into contempt will be adjudged libellous if written or printed, there are only certain kinds of defamatory charges which if circulated orally will be adjudged slanderous. These will be considered in the article on slander. (See SLANDER.) The reason for this distinction between the two species of defamation is that the wider circulation which charges are likely to receive, and their more permanent character, if written or printed, than if merely spoken, are calculated to render them more productive of injury to a person's reputation, and to make refutation particularly difficult. It follows as a natural result of this distinction that the author of a defamatory charge may be wholly relieved from legal accountability because he only circulated it by word of mouth, while another to whom he communicated it, and who published it and thus extended its circulation, will be liable to an action or prosecution for libel.

It is an essential element in libel that the defamatory charge be made with *malice*. But the word "*malice*" is used in this connection not in its popular but legal meaning. A legal distinction is made between *malice* in law and *malice* in fact. *Malice* in fact denotes actual malevolence, positive ill-will, spite, or animosity against some person to whom an injury is done; and this phrase has therefore much the same signification as the simple word "*malice*" in common acceptance. *Malice* in law, on the other hand, signifies that intent or disposition of mind from which proceed wrongful acts done intentionally, without just cause or excuse. This use of these phrases is not



confined to the law of libel, but appertains to various criminal and tortious acts. The malice which is a necessary ingredient in libel is not, except in special cases, malice in fact, but malice in law, and its existence is inferred from the defamatory nature of the imputation and the absence of legal justification. If, for example, one man traduces another in a published statement, and there are no attendant circumstances connected with the making of the charge to render it legal and justifiable, or, as it is technically termed, a "privileged communication," it will be malicious, and therefore libellous, whether the traducer knew the other or not, or whether he intended to do him an injury or not. As every man is presumed to intend the natural consequences of his acts, an intent is imputed to him in such a case which would reasonably be expected to accompany and occasion libellous accusations. Malice in such cases is a conclusion of law which the plaintiff is not required to prove, nor the defendant permitted to deny. Malice in fact need not be proved to exist in order to sustain an action for libel, but evidence to this effect may be given for the purpose of enhancing the damages. The presumption of malice will be made in all cases of trial for libel, except in regard to communications made under circumstances of privilege. As respects these the existence of actual malice must be established. The same principles prevail in regard to actions for slander. In criminal prosecutions for libel also the same general distinctions are maintained in relation to the subject of malice as in civil proceedings.

It is furthermore necessary that the defamatory charge be published. But the meaning attached to the term "publication" is somewhat diverse in the criminal and the civil law. This distinction depends upon the difference of theory which has been already referred to. As a civil action is maintainable because the plaintiff's reputation has been injured, the libel is said, in reference to this mode of redress, to be published only when it is communicated to some other person than the plaintiff himself. It will be sufficient if it be communicated to the plaintiff's wife, since for this purpose husband and wife are not regarded as one. But in criminal law it is held to be a sufficient publication if the charge be communicated simply to the party defamed, since in such a case it has a tendency to cause a breach of the peace in the same way as if brought to the notice of third persons. It has been held in a civil case sufficient publication to read defamatory charges contained in a letter or any written or printed document to a third person, even though he did not himself see the article.

The principal defences to an action or a prosecution for libel are (1) that the charge is a "privileged communication," and (2) justification. A communication or publication is said to be "privileged" when, though containing statements that would ordinarily be deemed libellous, it is yet held in law to be justifiable because made in the discharge of some public or private duty, legal, moral, or social, or in the protection of important interests, or in the furtherance of public welfare, etc. The peculiar circumstances under which the imputation is made are regarded as rebutting the presumption of malice which the law usually makes in cases of defamation of character, and afford in some cases a full, and in others a qualified, defence to the action or prosecution. When they afford a full defence, the publication is said to be absolutely privileged; when they furnish only a qualified defence, the communication is conditionally privileged. In cases of the latter kind the action or prosecution will be sustainable if actual malice or malice in fact be proved to have actuated the defendant's conduct in making the charge. The existence of actual malice, being a question of fact, is to be determined by the jury upon the testimony adduced before them, and not by the court. If a publication is known to be false by the party making it, and sufficient evidence to this effect is given, actual malice is plainly and unquestionably inferable, and he loses the benefit of the privilege claimed. But if a publication be absolutely privileged, it cannot under any circumstances become the subject of legal proceedings for redress or punishment, whether civil or criminal. Proof of actual malice will not in such a case deprive the defamer of the privilege. There are two classes of communications which are absolutely privileged: (1) Proceedings in legislative assemblies in the regular transaction of public business, as the reports of members upon any subject, written speeches, etc.; (2) proceedings in judicial tribunals which are pertinent to any cause of which the court has jurisdiction. This rule is established in order that legislators, judges, counsel, jurors, witnesses, etc. may be fearless in the performance of their official duties, and active and diligent in forerunning out corruption, incompetence, and violation of law, undeterred by apprehensions of being harassed by legal proceedings. This privilege is usually secured to legislators by constitutional provisions. (See U. S. Constitution, Art.

I. § 6, and State constitutions.) Other classes of privileged communications are conditional or qualified, the privilege being complete only when the charge is made *bona fide*, in full belief of its truth. A few instances of publications of this kind may be mentioned for the sake of illustration: Petitions to the legislature or proper public officer for the purpose of securing reforms in which the petitioners are particularly interested as citizens; communications by public officers acting in the discharge of a public duty; charges made by the officers or members of a religious organization or public or private association against a fellow-member in the course of the regular discipline of the body to which they belong; private confidential communications between relatives or friends to prevent anticipated injury to their special interests; communications between persons engaged in a common business enterprise in strict reference to their business affairs; statements concerning the character of servants made to those who intend to employ them; fair and honest reports of trials without defamatory comments; the publication of speeches and proceedings in legislative bodies. The privilege in these last two cases is sometimes made the subject of express statutory or constitutional provisions. So reviews of books or literary productions of any kind are privileged if the critic do not step aside from a consideration of the work to defame the author's private character. The same rule applies to criticisms upon works of art or of one journalist upon another. The same principles in regard to matters of privilege prevail in the law of slander as in the law of libel.

A "justification" is a plea in defence that the defamatory allegations are true, and therefore justifiable. But here, also, there is a difference between the rules of criminal and those of civil procedure in regard to this offence. It has always been a rule of law that in a civil action for libel a plea that the charge is true is a valid and effectual defence, since a man is entitled to no better reputation than his actual character would warrant. As the theory upon which the civil action is based allows the recovery of damages for the injury which the reputation of the party defamed has sustained, he is entitled to recover nothing if the injury is really attributable to his own misconduct. But in criminal procedure a different rule was adopted, and it even became a maxim at common law that "the greater the truth the greater the libel." This was on account of the principle that the criminality of a libel depended upon its tendency to cause a breach of the peace. The view was taken that a person defamed would be likely to be more incensed, and more inclined to retaliation, if the charge were true than if it were false, by reason of the great difficulty or impossibility of successfully refuting it. This rule has been modified in modern times by statute or constitutional provision, and it is usually the rule that the truth of the alleged libellous matter shall be a defence in a criminal prosecution if the publication be made with good motives and for justifiable ends. It is evident, however, that even with this change there is an important difference between civil and criminal proceedings upon this point. If "good motives and justifiable ends" be not proved in a trial upon indictment, the truth is not, as in a civil action, an effectual defence. It was a rule of common law that a justification must be as broad as the charge, and if the truth of the allegation were not substantially proved the plea was equivalent to a repetition of the libel, and in a civil action would aggravate the damages.

Libel considered as a crime was at common law a misdemeanor only, and not a felony (see CRIME, FELONY), and the statutes which have been generally enacted in this country defining the offence and declaring its punishment have usually left this rule unchanged. As respects civil actions for libel, the question as to the measure of damages which may be awarded becomes of much importance. (See MEASURE OF DAMAGES.) It may be shown by way of mitigation of damages that the plaintiff was a man of blameworthy or ruined character before the publication of the libel, so that he has sustained comparatively little injury; or that a full and unqualified retraction was subsequently made; or that the defendant was insane or intoxicated when the charge was made; or that he was provoked by previous libels of the plaintiff upon himself, etc. It was a rule of common law that facts tending to establish the truth of the charge were not to be used in mitigation of damages, but only by way of "justification." This rule has, however, been changed in a number of the States by statutes providing, in substance, that facts and circumstances which tend to prove the truth of the charge, but fail to amount to complete justification, may be given in evidence to reduce the damages. A defendant in these States is permitted to set up a plea of justification, together with a plea of mitigating circumstances, although the one plea affirms the truth of the charge and the other impliedly admits its falsity. This



rule, however, though not strictly logical, has been thought to be better adapted than the common-law doctrine to work substantial justice between the parties.

There is an important distinction between civil and criminal proceedings for libel as to the province of the jury in the construction of the alleged libellous charges. In a civil action, when the words of an alleged libel are unambiguous, the question whether the publication is actually a libel is to be determined by the court, and not by the jury. But if the words are of doubtful meaning, the question becomes one of fact for the decision of the jury. In respect to criminal prosecutions, there was at common law much uncertainty as to the proper function of the jury in this respect. It was held in England by a number of decisions of the court of king's bench that the court alone had power to determine whether the subject of the publication was or was not a libel, as in civil cases. But this rule was much controverted, and to reduce the matter to certainty a statute was passed giving power to the jury to render a general verdict of guilty or not guilty upon the whole matter in issue, and thus to determine questions both of law and of fact. Similar statutes or constitutional provisions have been adopted in a number of the States of this country. The construction of the alleged libel is thus made to devolve upon the jury, instead of upon the court. This is an anomalous provision in criminal law, and peculiar to prosecutions for this offence. It is a general rule in the interpretation and construction of libels that the language is to be understood in its natural and ordinary sense. If obscure and ambiguous language is used, or that which is figurative or ironical, its sense is to be gathered from the context and the facts and circumstances under which it was used. (See for general rules INTERPRETATION AND CONSTRUCTION. Consult on this general subject the works of Bishop, Wharton, Russell, and Chitty on *Criminal Law*; Townsend on *Libel and Slander*; Addison on *Torts*; Hilliard on *Torts*; Starkie on *Slander*; Hoard on *Libel and Slander*.)

II. **LIBEL** in admiralty practice denotes the first pleading of the complainant in a suit, and contains a statement of his cause of action. In England the word is also applied to a similar pleading in the ecclesiastical courts. A libel in admiralty is not required to be drawn in any specific form. It should, however, be addressed to the proper judge, should state the names of the parties accurately, and should contain a clear and comprehensive statement (usually in propositions or "articles") of the facts upon which the libellant bases his suit. The libel should also include a prayer for relief. A libel answers to the declaration or complaint in a civil action. The plaintiff in an admiralty suit is termed the libellant, and the defendant the respondent. (See works on *Admiralty Practice*.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**Libelt** (KAROL), b. at Posen Apr. 8, 1807; studied philosophy and mathematics at Berlin, where he gained a prize for his essay *De Pantheismo*, and acquired the degree of Ph. D. in 1829; served in 1830 as an officer in the artillery, and distinguished himself in the battle of Ostro-lenska and at the defence of Warsaw; retired after the failure of the revolution to his estates in Posen; founded in 1840 the successful periodicals *Tygodnik literacki* and *Rok*, to which the best Polish writers contributed; was arrested in 1846 for participation in the conspiracy of Mieroslawski, but liberated on the outbreak of the revolution at Berlin in 1848; took part afterwards in politics as member of the Slavic congress at Prague in 1849, and as leader of the Polish fraction in the second Prussian chamber in 1859; commenced the publication of his philosophical writings, the most prominent of which are *Filozofia i Krytyka* ("Philosophy and Criticism"), (5 vols., Posen, 1845-50), and *Estetyka* ("Aesthetics"), (3 vols., Posen, 1851); he also wrote a number of mathematical, economical, and agricultural essays and pamphlets. His philosophical works have been translated into German, and have attracted considerable attention as an individual development of the ideas of the German philosophy.

**Li'ber**, post-v. of Jay co., Ind.

**Libe'ria**, a republic on the western coast of Africa, founded in 1820 by the AMERICAN COLONIZATION SOCIETY (which see), and established as an independent state in 1847, is situated between 4° 20' and 7° 20' N. lat., and stretches along the Atlantic from the Sherboro River on the N. W. to the Pedro River on the S. E., a distance of about 600 miles, extending inland from the coast from 10 to 40 miles. Its area, which is steadily increased by purchases from the native tribes, was estimated in 1873 at 9700 square miles. The shore is elevated and rocky in the S. E., but otherwise low, generally sandy or gravelly, seldom marshy. In the interior the country rises, swelling into forest-covered hills and lofty mountain-ranges traversed by fine valleys.

Many streams flow to the ocean, but none of them is navigable for more than 20 miles from the mouth; the most important are the St. Paul, navigable for 18 miles, and having 7 feet of water at low tide on the bar at its mouth; the St. John, the Junk, and the Cape Mount River. The climate is thoroughly tropical. Of the two seasons, the dry lasts from October to June, and the wet from June to October. In the dry season the average heat is 84° F., the thermometer seldom rising above 90° in the shade; in the wet season the average heat is 76°, the thermometer never falling below 60°. To the white man the climate is deadly—not from its excessive heat, but probably from miasmata; and even the negro, when born and reared in another climate, suffers on his arrival here from the so-called African fever. The natives, on the contrary, are robust, healthy, and long-lived. The soil is generally very fertile. The principal farming districts lie along the banks of the St. Paul. Here the sugar-cane grows luxuriantly; the produce of 1871 was estimated at 300,000 pounds. Cotton is indigenous, and yields two crops annually. Coffee of excellent quality is cultivated with success in the interior. The cereals, maize, rice, wheat, barley, and oats; the vegetables, cabbages, peas, beans, tomatoes, cucumbers, etc.; and the fruits, lemons, oranges, guavas, tamarinds, pomegranates, pineapples, African peaches, etc., are easily raised. The forests contain teak, mahogany, rosewood, hickory, poplar, several kinds of gum trees, dyewoods, medicinal shrubs, and different varieties of useful palms, among which is the nut-bearing palm, from which palm oil is made. Wild animals, the elephant, hippopotamus, crocodile, leopard, etc., are now nearly exterminated. Of minerals, iron abounds, and copper is said to occur in the interior. The inhabitants of the republic numbered, according to the latest estimates, about 720,000, of whom about 19,000 were Americo-Liberians, and the rest natives. The natives belong to different tribes: the Veys, mostly Mohammedans, among whom the Protestant Episcopal Church of the U. S. has established a mission school at Totocoreh; the Pessehs, entirely pagans; the Bassas, among whom the American Baptist missionaries established a mission in 1835; the Kroos, mostly idolaters; the Mandingos, the most gifted of the tribes under the jurisdiction of the republic; and others. The Americo-Liberians have a regular system of schools, and are progressing in all branches of civilization. Industrial processes and manufactures have been started among them, and a lively trade has sprung up between the republic and the U. S., Great Britain, Belgium, and Hamburg. Palm oil, sugar, cotton, coffee, ivory, camwood, arrowroot, etc. are exported; cotton goods, cutlery, powder, and tobacco are imported. The country is divided into four counties—Mesurado, Grand Bassa, Sinou, and Maryland. The capital, Monrovia, is situated on Cape Mesurado, and has about 13,000 inhabitants. Other settlements are New Georgia, Caldwell, Virginia, Edina, Greenville, Lexington, Buchanan, Millsburg, etc. The annual revenue is about \$100,000, almost exclusively derived from custom-house duties. A public debt of \$500,000 was contracted in 1871. The constitution of the republic is modelled after that of the U. S. All men are born free and equal. Elections take place by ballot, and every male citizen who possesses real estate has the right of suffrage. But no white man can be admitted to citizenship, and none but citizens can hold real estate in the republic (a temporary provision). The president is elected for two years; the senators for four; the representatives for two. Each county sends two senators to the legislative assembly, and one representative for every 10,000 inhabitants. The first president was Joseph Jenkins Roberts, who served four terms, from 1848 to 1856, and was once more elected in 1871. The official language is the English. (See Stockwell, *The Republic of Liberia, its Geography, Climate, Soil, and Productions, with a History of its early Settlement*, New York, 1868.)

**Libe'rius**, SAINT, a bishop of Rome, reckoned in the series of popes after Julius I., whom he succeeded May 22, 350. The Semi-Arians, countenanced by the emperor Constantius, were then in the ascendant, and in the councils of Arles (353) and Milan (355) they condemned the doctrine of Athanasius. Liberius, together with some other Western bishops, having refused to sign this condemnation, he was arrested by the emperor's order and taken to Milan, where Constantius endeavored to secure his obedience by personal solicitations. Finding him resolute in maintaining his previous attitude, Constantius declared Liberius deposed from the bishopric of Rome, banished him to Berea in Macedonia, and had Felix, a deacon, consecrated in his place. In 358, Liberius was restored to his post in consequence of a petition from the principal ladies of Rome. The Council of Ariminum (Rimini), convened in 359 for the settlement of doctrinal difficulties, at first followed the suggestions of Liberius by confirming the Nicene Creed and condemning Arius, but gave way to the influence of

Constantius, and finally accepted an Arian confession of faith proposed by him. Libernus has been falsely accused of having signed this confession, as well as of having purchased his recall from Berea by submission to the emperor's will as regarded Arianism. He built the basilica now called Santa Maria Maggiore. D. in 366, and was succeeded by Damasus I. His festival occurs in the Catholic calendar Aug. 27, and in the Greek Sept. 23.

**Liberty** [Lat. *libertas*, "freedom"], in the abstract, denotes the power of acting as you will (*potestas vivendi ut velis*—Cicero); but for a finite being this definition has to be modified into the power of acting as you will within the sphere of existence pertaining to the individual. It is assumed also that the will itself is free, in view of motives, to choose what appears to be the greater good before the less, or the less before the greater. For an infinite being the highest freedom coincides with the highest moral necessity; that is to say, there is one course, and one only, which his perfection of nature requires him to choose, and makes it certain that he will choose. And for a finite being, moral excellence, united with the greatest perfection of intellect pertaining to human nature, will make the best course of action certain within his sphere of existence.

Liberty in the sphere of the citizen cannot be understood without a correct idea of rights. Here we must refer to the articles **Justice** and **Rights**, and will only add that personal and civic liberty may pertain to a man, while in particular cases he renounces the exercise of it; in which case a man waives his right—that is, freely renounces what he was free to own, do, or enjoy. Liberty in this sphere consists in the power of freely exercising those rights which may be deduced from a true idea of the nature and destiny of man. The entire, or nearly entire, absence of such rights makes a man a slave. To be authorized to exercise some of them is imperfect liberty; to enjoy all of them is perfect liberty. Sometimes the liberty exists in a degree, although the individual would be injured if he were free to act as he chose. Such is the case with children, who have rights even against their parents, yet cannot, under wise law, exercise the rights of contract and of testament, because they would be in danger, if they did, of injuring themselves.

Political liberty implies a share in political power, and those restraints on a government and on individuals which are necessary for the protection of one and of all in the civil and political spheres. Such liberty consists in the right of voting, the right of holding office, in a great variety of institutions and of guaranties, and in certain free modes of action in concert with others, such as the rights of association, of discussing, petitioning, and remonstrating against public measures, of freedom of the press, and others. What may be called personal liberty and equality of individual rights may exist without equality of political rights. Thus, a man who cannot read, or who does not hold a certain amount of property or pay a certain house rent, may have no right of suffrage or eligibility to office. So a woman, a male minor, a foreigner, may have no suffrage; a man over seventy may be incapable of holding a judicial office, or a man under thirty-five be ineligible to that of President of the U. S. All these last-mentioned disqualifications exist under our form of government. Have such persons, then, no complete political liberty? In the most exact use of terms we must deny that their status is equal to that of some others, although the disqualifications affect all, in each of the classes affected, alike. We do make a difference between *civis optimo jure* and *civis non optimo jure* (citizens enjoying the best right, and citizens enjoying a right that is not the best). But under free institutions these disqualifications are so few that the persons affected by them are in no danger of having their personal liberties invaded, especially as they are connected by close relations with others who have a somewhat greater share of political power. It, however, a larger part of a community was shut out of suffrage and the power to hold office, in order to keep power in the hands of another distinct part, the guaranties of personal rights would not be felt to be great enough, and the prohibited good would be much coveted, while yet not one of a thousand, perhaps, of such persons would under unlimited suffrage ever hold office. T. D. Woodruff.

**Liberty**, county of Florida, bounded E. by the Ocklawchee and W. by the navigable Apalachicola River. Area, 650 square miles. It is sparsely settled, and is mostly employed as a cattle-range, but contains much good land. Cap. Bristol. Pop. 10,000.

**Liberty**, county of E. Georgia. Area, 770 square miles. Its E. extremity reaches St. Catharine's Sound; its S. W. border is washed by the navigable Altamaha River. The surface is level, well timbered, and in part marshy. Rice, cotton, and corn are staple products. It is traversed by the Atlantic and Gulf R. R. Cap. Walhoroughville. Pop. 7,688.

**Liberty**, county of S. E. Texas. Area, 1600 square miles. It is partly prairie and partly fine timber-land. The county is traversed by the Trinity River and the Texas and New Orleans R. R. Petroleum has been found and mineral springs are abundant. Live-stock and cotton are the chief products. Cap. Liberty. Pop. 4414.

**Liberty**, tp. of Carroll co., Ark. Pop. 253.

**Liberty**, tp. of Independence co., Ark. Pop. 455.

**Liberty**, post-tp. of Ouachita co., Ark. Pop. 908.

**Liberty**, tp. of Pope co., Ark. Pop. 741.

**Liberty**, tp. of St. Francis co., Ark. Pop. 273.

**Liberty**, tp. of Van Buren co., Ark. Pop. 295.

**Liberty**, tp. of White co., Ark. Pop. 368.

**Liberty**, tp. of Klamath co., Cal. Pop. 348.

**Liberty**, post-tp. of San Joaquin co., Cal. Pop. 1231.

**Liberty**, post-tp. of Adams co., Ill. Pop. 1623.

**Liberty**, tp. of Effingham co., Ill. Pop. 504.

**Liberty**, tp. of Crawford co., Ind. Pop. 757.

**Liberty**, tp. of Delaware co., Ind. Pop. 1639.

**Liberty**, tp. of Fulton co., Ind. Pop. 1429.

**Liberty**, tp. of Grant co., Ind. Pop. 1989.

**Liberty**, tp. of Hendricks co., Ind. Pop. 2478.

**Liberty**, tp. of Henry co., Ind. Pop. 1884.

**Liberty**, tp. of Howard co., Ind. Pop. 1697.

**Liberty**, tp. of Parke co., Ind. Pop. 1540.

**Liberty**, tp. of Porter co., Ind. Pop. 798.

**Liberty**, tp. of Shelby co., Ind. Pop. 1465.

**Liberty**, tp. of St. Joseph co., Ind. Pop. 1394.

**Liberty**, tp. of Tipton co., Ind. Pop. 1746.

**Liberty**, post-v. of Centre tp., cap. of Union co., Ind., on the Cincinnati Hamilton and Indianapolis R. R., near the E. fork of the Whitewater River, 50 miles N. W. of Cincinnati, O., and 70 miles S. E. of Indianapolis. It has 2 national banks, 2 large flouring mills, an agricultural implement manufactory, planing-mills and shops, 2 hotels, good schools, 4 churches, 1 weekly newspaper, a number of stores, etc. Principal business, farming and stock-raising. Pop. 700. C. W. STIVERS, Ed. "HERALD."

**Liberty**, tp. of Union co., Ind. Pop. 763.

**Liberty**, tp. of Wabash co., Ind. Pop. 1816.

**Liberty**, tp. of Warren co., Ind. Pop. 1176.

**Liberty**, tp. of Wells co., Ind. Pop. 1097.

**Liberty**, tp. of White co., Ind. Pop. 888.

**Liberty**, tp. of Buchanan co., Ia. Pop. 1272.

**Liberty**, post-tp. of Clarke co., Ia. Pop. 778.

**Liberty**, tp. of Clinton co., Ia. Pop. 931.

**Liberty**, tp. of Dubuque co., Ia. Pop. 1102.

**Liberty**, tp. of Jefferson co., Ia. Pop. 1082.

**Liberty**, tp. of Johnson co., Ia. Pop. 640.

**Liberty**, tp. of Keokuk co., Ia. Pop. 1135.

**Liberty**, tp. of Lucas co., Ia. Pop. 600.

**Liberty**, tp. of Marion co., Ia. Pop. 1532.

**Liberty**, tp. of Marshall co., Ia. Pop. 709.

**Liberty**, tp. of Mitchell co., Ia. Pop. 173.

**Liberty**, tp. of O'Brien co., Ia. Pop. 715.

**Liberty**, tp. of Ringgold co., Ia. Pop. 243.

**Liberty**, tp. of Scott co., Ia. Pop. 1193.

**Liberty**, tp. of Warren co., Ia. Pop. 891.

**Liberty**, tp. of Wright co., Ia. Pop. 269.

**Liberty**, tp. of Howard co., Kan. Pop. 394.

**Liberty**, tp. of Labette co., Kan. Pop. 720.

**Liberty**, tp. of Linn co., Kan. Pop. 480.

**Liberty**, tp. of Woodson co., Kan. Pop. 363.

**Liberty**, post-v., cap. of Casey co., Ky., on the Louisville and Cincinnati R. R.

**Liberty**, post-tp. of Waldo co., Me., 16 miles W. of Belfast, has manufactures of leather, axes, pegs, handles, boots, shoes, wooden ware, furniture, and woollen and other goods. Pop. 907.

**Liberty**, post-v. and tp. of Frederick co., Md., 11 miles N. E. of Frederick, has 4 churches, 3 schools, 1 printing-office, 2 hotels, a lodge, Red Men and Fort Gould Companies, and stores, shops, etc. The principal business of the surrounding neighborhood is farming. Pop. 3281.

J. S. L. ROBERTSON, Ed. "THE BANNER AND LIGHT."

**Liberty**, post-tp. of Jackson co., Mich. Pop. 1070.



**Liberty**, post-v., cap. of Amite co., Miss., has 5 churches, 2 newspapers, 3 hotels, 2 drug and several other stores. Principal business, cotton-planting. Pop. 560.

MISS P. W. FORSYTHE, ED. "ADVOCATE."

**Liberty**, tp. of Adair co., Mo. Pop. 854.

**Liberty**, tp. of Bollinger co., Mo. Pop. 1680.

**Liberty**, tp. of Callaway co., Mo. Pop. 1646.

**Liberty**, tp. of Cape Girardeau co., Mo. Pop. 870.

**Liberty**, post-v. and tp., cap. of Clay co., Mo., on the Hannibal and St. Joseph R. R. (Kansas branch), 16 miles S. of Holt, has 2 weekly newspapers and considerable trade. Pop. of v. 1700; of tp. 4831.

**Liberty**, tp. of Cole co., Mo. Pop. 901.

**Liberty**, tp. of Crawford co., Mo. Pop. 1071.

**Liberty**, tp. of Daviess co., Mo. Pop. 781.

**Liberty**, tp. of Grundy co., Mo. Pop. 1036.

**Liberty**, tp. of Iron co., Mo. Pop. 479.

**Liberty**, tp. of Macon co., Mo. Pop. 1210.

**Liberty**, tp. of Madison co., Mo. Pop. 480.

**Liberty**, tp. of Marion co., Mo., contains PALMYRA (which see). Pop. 3871.

**Liberty**, tp. of Phelps co., Mo. Pop. 470.

**Liberty**, tp. of Pulaski co., Mo. Pop. 893.

**Liberty**, tp. of Putnam co., Mo. Pop. 1174.

**Liberty**, tp. of Schuyler co., Mo. Pop. 1529.

**Liberty**, tp. of St. Francois co., Mo. Pop. 1405.

**Liberty**, tp. of Stoddard co., Mo. Pop. 1307.

**Liberty**, tp. of Sullivan co., Mo. Pop. 772.

**Liberty**, tp. of Washington co., Mo. Pop. 879.

**Liberty**, tp. of Cass co., Neb. Pop. 400.

**Liberty**, tp. of Gage co., Neb. Pop. 770.

**Liberty**, tp. of Richardson co., Neb. Pop. 506.

**Liberty**, post-v. and tp. of Sullivan co., N. Y., on the New York and Oswego Midland R. R. The township has an uneven surface, with two ponds, the chief industry being dairying and stock-raising. The village has 4 churches, 2 weekly newspapers, and a normal institute. There are 5 other post-offices within the township—Liberty Falls, Parksville, Red Brick, Robertsonville, and Stevensville. Pop. of v. about 500; of tp. 3389.

**Liberty**, tp. of Lincoln co., N. C. Pop. 1170.

**Liberty**, tp. of Nash co., N. C. Pop. 2860.

**Liberty**, tp. of Randolph co., N. C. Pop. 1009.

**Liberty**, tp. of Yadkin co., N. C. Pop. 1588.

**Liberty**, tp. of Adams co., O. Pop. 1377.

**Liberty**, tp. of Butler co., O. Pop. 1443.

**Liberty**, tp. of Clinton co., O. Pop. 1184.

**Liberty**, tp. of Crawford co., O. Pop. 1597.

**Liberty**, tp. of Delaware co., O. Pop. 1395.

**Liberty**, tp. of Fairfield co., O. Pop. 3000.

**Liberty**, a v. (Kimbolton P. O.) and tp. of Guernsey co., O., 9 miles N. of Cambridge. Pop. of v. 169; of tp. 1163.

**Liberty**, tp. of Hancock co., O. Pop. 1011.

**Liberty**, tp. of Hardin co., O. Pop. 2308.

**Liberty**, tp. of Henry co., O. Pop. 1766.

**Liberty**, tp. of Highland co., O., contains the village of Hillsborough. Pop. 5183.

**Liberty**, tp. of Jackson co., O. Pop. 1747.

**Liberty**, tp. of Knox co., O. Pop. 959.

**Liberty**, tp. of Licking co., O. Pop. 837.

**Liberty**, tp. of Logan co., O. Pop. 1624.

**Liberty**, tp. of Mercer co., O. Pop. 779.

**Liberty**, tp. of Putnam co., O. Pop. 1120.

**Liberty**, tp. of Ross co., O. Pop. 1460.

**Liberty**, tp. of Seneca co., O. Pop. 1668.

**Liberty**, tp. of Trumbull co., O. Pop. 2420.

**Liberty**, tp. of Union co., O. Pop. 1414.

**Liberty**, tp. of Van Wert co., O. Pop. 1174.

**Liberty**, tp. of Washington co., O. Pop. 1632.

**Liberty**, tp. of Wood co., O. Pop. 965.

**Liberty**, tp. of Adams co., Pa. Pop. 860.

**Liberty**, tp. of Bedford co., Pa. Pop. 806.

**Liberty**, tp. of Centre co., Pa. Pop. 1062.

**Liberty**, tp. of McKean co., Pa. Pop. 1093.

**Liberty**, tp. of Mercer co., Pa. Pop. 634.

**Liberty**, tp. of Montour co., Pa. Pop. 1229.

**Liberty**, tp. of Susquehanna co., Pa. Pop. 1030.

**Liberty**, post-tp. of Tioga co., Pa. Pop. 1379.

**Liberty**, tp. of Orangeburg co., S. C. Pop. 408.

**Liberty**, post-v., cap. of Liberty co., Tex. Pop. 458.

**Liberty**, post-v. and tp., cap. of Bedford co., Va., on the Atlantic Mississippi and Ohio R. R., 25 miles W. of Lynchburg, has 7 tobacco-factories, with 2 large additional ones in course of construction, 2 tobacco-warehouses, 2 banks, a school, 2 weekly newspapers, and 7 churches. The Peaks of Otter, 10 miles distant, rival the White Mountains in grandeur and sublimity. Pop. of v. 1208; of tp. 5840. JAMES R. GUY, ED. "BEDFORD SENTINEL AND NEWS."

**Liberty**, tp. of Marshall co., West Va. Pop. 2062.

**Liberty**, tp. of Ohio co., West Va. Pop. 1362.

**Liberty**, tp. of Grant co., Wis. Pop. 907.

**Liberty**, tp. of Manitowoc co., Wis. Pop. 1430.

**Liberty**, tp. of Outagamie co., Wis. Pop. 461.

**Liberty**, post-v. and tp. of Vernon co., Wis., 9 miles S. E. of Viroqua, and on Kiekapoo River. Pop. 414.

**Liberty Grove**, tp. of Door co., Wis., on Green Bay and Lake Michigan. Pop. 333.

**Liberty Hill**, post-v. of Williamson co., Tex. Pop. 47.

**Liberty, Religious.** The distinction is quite clear and broad between what is civil and what is religious. Civil government is not to support or hinder any form of religion. Privileges are not to be granted nor are injuries to be inflicted because of religious belief. A state is manifestly unable to exercise minute supervision over religious opinions. The state cannot go behind the overt act. Religion looks to the posture of the mind and the heart. Men are bound to submit their judgment on points of faith to no visible body. Religious liberty is absolute freedom of religious opinion and worship, the equality of all churches, religious associations, or persons in the way of protection or restraint by the legally expressed will of the nation. Toleration is the assumption of the right by civil process to control religious affairs. Toleration *ex vi termini* implies that the state prefers one or more forms of belief, but graciously allows others. To permit implies the right to prevent.

The New Testament contains no precept favoring a national or state religion, or interference by government with the right of worship. It recognizes a clear distinction between "the things which are God's" and "the things which are Caesar's." Disciples of Christ were such not by compulsion, but by free choice. The kingdom set up was not of this world, acknowledged no temporal head, asked no help from, nor alliance with, civil power. Until the third century Christianity had the hostility of governments. A state religion, under pagan governments, subjected the early Christians to severe persecutions. Unfortunately, Constantine in 313 established Christianity by law, and since that time Christians, when they have obtained power, have allied their religion with civil authorities. When papacy was established and became strong, the governments of Europe were not so much in alliance with, as in subjection to, the ecclesiastical power. According to the Roman Catholic theory, states have rights only by permission of superior authority expressed through the Church. When, as the result of the Reformation, several states in Europe renounced the authority of the pope, Protestant kings and governments, as a substitute for papal dominion, assumed to themselves authority over religion. In some instances, when the pope's authority ceased in the realm, much of the authority exercised by him was claimed by sovereigns, who became the heads of the Church in their respective dominions. Civil governments in Europe universally claimed and exercised the right of legislating upon ecclesiastical and spiritual matters. The power of legislation or control extended to the very being and constitution of the state Church—to its creed, ministry, offices, and ordinances. The Church became completely at the disposal of the civil power in temporalities and in spiritual condition.

As the result of this claim on the part of the separate governments, a national Church was established in each. The Church thus established or denomination taken into alliance became the recipient of state favors, was supported by state property, endowed with manifold and exclusive privileges, and became a part of the government. These national establishments rested at first on the principle of making citizenship and church-membership coextensive. To secure conformity and crush dissent, lives were sometimes taken, property confiscated, civil and educational disabilities imposed, and other repressive measures enacted and enforced. Under the humanizing influences of Christian civilization this harshness has been greatly modified. In every government of Europe there has been more or less relaxation of rigid rules. Toleration is becoming general, and the tendency is towards unrestrained liberty of

worship. In France several denominations receive government patronage. In Germany, although the government claims the management of ecclesiastical affairs, there is little interference with the right of worship. In Russia progress has not been so marked, but even there the public opinion of Christendom has made itself felt in opening prison doors and obtaining exemptions. The revolutions in Spain and Italy have rid those countries of former exclusiveness, and now different forms of faith are entitled to protection. In Great Britain the change has been marvellous. The colonies enjoy perfect liberty of religion. The Anglican Church has been disestablished in Ireland. It still remains the establishment in England, as the Presbyterian is the establishment in Scotland, with many privileges, but there is now no public position, not ecclesiastical, for the tenure of which a particular religious belief is required, except the throne and the office of governor of a few colleges. These reforms in Europe indicate the irresistible advance of public sentiment. Propagation of religion has almost ceased to be regarded as one of the ends of government. It has been found quite as easy to persecute or bribe into one religion as into another. The connection of Church and State is increasingly regarded as corrupting to the Church, destructive of the purity and spirituality of religion, and antagonistic to the rights of man.

The success and popularity of American ideas of government have contributed largely to these gratifying results. A distinctive American principle of government is, that what is religious is necessarily, from its very character, beyond the control of the civil government. In the U. S. religious liberty is an absolute *personal* right. All denominations, churches, and religious faiths are equal and free in the eye of the law. None receive gratuities, none are subjected to inequalities. There is entire divorce of Church and State. So long as private rights are not violated, no one is restrained from publishing or advocating his opinions on religion or morals. Voluntarism is the universal rule. Worship is sustained, ministers are supported, churches are built, missionary operations are carried on, by purely voluntary contributions. The Constitution of the U. S. contains these two articles: "No religious test shall ever be required as a qualification to any office or public trust under the U. S.;" "Congress shall make no law respecting an establishment of religion, or prohibiting the free exercise thereof." The State constitutions are equally emphatic, and generally more specific in the expression of their jealousy of ecclesiastical ambition and sectarian intolerance. Absolute religious liberty is the contribution of the U. S. to the science of politics. Many external causes conspired to give us the vantage-ground in the establishment of soul liberty. To Rhode Island belongs the pre-eminent honor of being the first state in the world to incorporate in its organic law, and to practise, absolute religious liberty. Other colonies set up some forms of Christian worship and established some articles of faith. In New England a kind of theocratic government was established. In South Carolina, New York, and Virginia the Episcopal Church was established. In some of these States harsh attempts were made to enforce conformity. Very early there was positive and prolonged resistance to the attempt to perpetuate the establishment of the English Church in the colonies, and the evidence is conclusive that such an attempt hastened the beginning and aided in the success of the American Revolution. J. L. M. CHURCH.

**Libertyville**, post-v. and tp. of Lake co., Ill., 32 miles N. W. of Chicago. Pop. 1236.

**Libocedrus** [Gr. *λεβος*, "tears," or "frankincense," and *cedrus*, "the cedar"], a genus of coniferous trees, of which four species are known—two in New Zealand, one in Chili, and one (*L. deccurrens*) in California, where it was discovered by Fremont, and is now known as "white cedar." In France and England it was for some time confounded with the *Juniperus* or arbutus of Oregon, which it somewhat resembles. The California species is found only in the mountains, generally at an elevation of 1000 feet or more. It is a beautiful tree, attaining a height of 120 to 200 feet, with a trunk 6 or 7 feet in diameter, and a peculiar fibrous bark, much like that of *Sequoia*. It has a yellowish wood of great durability, the leaves are glossy and bright, and the elegant form of the young tree has brought it into request as an evergreen.

**Libourne**, town of France, in the government of Gironde, on the Dordogne, at its confluence with the Isle. It is a handsome and thriving town, with large manufactures of leather, ropes, nails, and yarn, and trade in wine, salt, grain, and timber. Pop. 13,565.

**Libra** (Lat., "The Balance"), the sign of the Zodiac which the sun enters at the autumnal equinox about Sept. 23). The constellation Libra has no very remarkable stars.

VOL. II.—111

It corresponds at present to the sign Scorpio, while the sign Libra corresponds to the constellation Virgo.

**Library** [from the Lat. *librarium*, a "repository of books"], a collection of volumes, whether manuscript or printed, containing the product of human thought. Libraries are to be ranked among the foremost agencies of civilization. The great development which they have undergone in modern times, and especially during the last twenty years, both in Europe and America, has very nearly doubled the numerical extent of the principal collections, while many more progressive libraries have advanced in a still greater ratio.

The oldest approximation to libraries of which any records exist were brought to light by recent Assyrian discoveries, and consist of the Babylonish books inscribed on clay tablets, supposed to have been prepared for public instruction about 650 B. C. It is said that Pisistratus founded a library at Athens about 527 B. C., though there is no clear evidence of the fact. Strabo says that Aristotle was the first known collector of a library, which he bequeathed (B. C. 322) to Theophrastus; and this library, through successive hands, at length found its way to Rome on the capture of Athens by Sylla. The story of the great Alexandrian library, founded by Ptolemy Soter, and burned by order of the caliph Omar in the seventh century, rests on insufficient evidence. Its alleged number of volumes, stated by different writers at from 100,000 to 700,000, so vastly exceeding the aggregate of any library of the Middle Ages, or indeed for three centuries after the introduction of printing, throws discredit upon the whole story, except the single fact of the existence of a collection of books at Alexandria. Plutarch says that the library of Lucullus at Rome was open to all, and this antedated the library of Pollio, which Pliny asserts was the first public library established at Rome. Suetonius relates that Augustus collected in the temple of Apollo two libraries of Greek and Latin writers, while Tiberius and Domitian assembled manuscripts to add to these libraries, and employed scribes at Alexandria to copy works there preserved. Many Romans, and notably Cicero, collected extensive libraries, notwithstanding the limitations which the great cost of copying and the scarcity of books and material entailed upon the collectors. St. Jerome records that St. Pamphilus of Cæsarea (A. D. 309) made a collection of 30,000 volumes, chiefly libraries, with a view of lending them out to read. This, if authentic, is the first record of a circulating library, except some obscure notices in the Latin writers.

The libraries of the Middle Ages were very limited in extent, and were of monkish origin. One of the earliest known was the still existing library of the Swiss abbey of St. Gall, which claims an antiquity of 1000 years. As early as the thirteenth century there are records of a library-tax levied on all the members of an individual monastery. Indeed, many mediæval conventual institutions were universities for the copying or reproduction of books, and rendered inestimable service in preserving before the invention of the printing-press precious manuscripts which might otherwise have been lost. The first approach to a library in England is said to have been nine precious MSS. brought by Augustine on a mission from Pope Gregory the Great (A. D. 596), and preserved at Canterbury. In 668 this deposit at the monastery of Christ Church was enlarged by the library of Theodore of Tarsus, brought from Rome in the same year. The abbey of St. Alban's had gathered quite a collection by the year 1100, and other monasteries of the English Benedictines collected a few hundred volumes. The monastery of Croyland had 300 volumes and 400 tracts, all of which perished by fire in 1091. Richard of Bury (A. D. 1333) was an enthusiastic book-collector, and has eloquently written in praise of libraries in his *Philobiblon*. Among the earliest royal libraries, that of Charles VI. of France numbered 1100 volumes in 1411. As late as the reign of Henry VIII. the royal library of the British crown contained only 329 volumes. In striking contrast to this literary poverty in England and France is the splendid library of Matthias Corvinus, king of Hungary, which at his death in 1490 numbered 50,000 volumes, nearly all MSS. Forty years afterward this precious collection was pillaged and burned by the Turks. Leonardo da Vinci gathered a great library, which still forms the basis of the Laurentian library of Florence. In 1566 the royal library of France, then containing 2000 volumes (of which only about 200 were printed books), received by royal ordinance the privilege of a copy of every book printed in France. This was the foundation of the copy tax, which has been the means of enriching so many of the great government libraries of Europe. That of France had grown to 200,000 volumes as early as 1789, and was then, as now, the foremost library in the world. Italy, which has long enjoyed the reputation of being rich in libraries, and which possesses many manuscript treasures and early printed



books, is poor in collections of modern literature. The library of the Vatican, the most precious in Rome, contains about 100,000 volumes of printed books and 25,000 MSS. In Germany, the land of books and universities, are more libraries of great extent and value than in any other European country. Petzholdt, in his *Adressbuch der Bibliotheken Deutschlands* (1875), enumerates 1044 libraries of all grades in Germany, Austria, and Switzerland, twenty of which contained over 200,000 volumes each. The largest collections are the Royal Library of Berlin, 700,000 volumes, including pamphlets; the Imperial Public Library, Vienna, 400,000; the Royal Public of Dresden, 500,000, and 400,000 pamphlets; and the Royal Library at Munich, 400,000 books, to which must be added 400,000 pamphlets. The latter library has long passed in statistical tables as the second in Europe; this claim was based on the fallacious system of enumeration, which counted every thesis and tract as a separate book—a method which would swell many collections in our table to double the figures claimed for them. France has, besides the National Library, half a dozen collections of 100,000 volumes or upward, and the provincial libraries of that country furnish superior opportunities for improvement. Spain has about 30 public libraries, containing altogether some 700,000 volumes, of which the largest, the National Library at Madrid, has 220,000. The Imperial Library of St. Petersburg, now containing over 1,000,000 volumes, is, next to the libraries of Paris and the British Museum, the richest in Europe. Of Northern European libraries, the Royal at Copenhagen contains 500,000 volumes, all others being of small account in comparison.

In England the library of the British Museum dwarfs all other collections. Founded in 1753 by the wise and timely purchase of Sir Hans Sloane's collection for £20,000, it received no other grant of public money for its increase until 1807, or more than half a century. But it has been fortunate in munificent gifts of many valuable private collections, and during the last thirty years there has been a systematic and highly successful effort to collect in London a great monumental library whose fundamental idea should be inclusiveness, not exclusiveness. For many years past the sum expended for books and binding has been £16,000 (or \$80,000) annually, and the British Museum Library now counts 1,150,000 volumes. Next to this stands the Bodleian Library at Oxford, the oldest and most valuable collection, next to the British Museum, in England, now numbering over 330,000 volumes. The library of the Faculty of Advocates of Edinburgh stands next, with 300,000 volumes. The University of Cambridge numbers 250,000, and the library of Trinity College, Dublin, has about 150,000. These five libraries enjoy the benefit of the copy-tax, and can each claim one copy of every work printed in the United Kingdom. In Great Britain there are only nine libraries exceeding 100,000 volumes each. Provincial and town libraries are, however, springing up, having been originated as recently as 1850 with the Manchester Free Library. The fact that for nearly a century and a half after Shakspeare's time there was no public library in London speaks volumes as to the very recent development of this means of public enlightenment.

In the U. S. the annals of the foundation and growth of libraries show that while our collections can never hope to rival those of Europe in manuscripts or early printed books, they will one day equal them in the number and extent of the collections. The first foundation of an American library was in 1638, when the library of Harvard College was started at Cambridge, Mass. In 1700 a public library was founded at New York City, which was known for over half a century as the City Library, but, not flourishing in that form, was converted into a subscription library in 1754, becoming the New York Society Library. Yale College Library was founded in 1700. In 1731, Dr. Franklin and his associates founded in Philadelphia a library company still in existence, which has the honor of having been the first subscription or proprietary library of which we have any record. At the date of its formation no town in England possessed a subscription library. The Library of Congress—or, as it was called in its first general catalogue, the Library of the United States—was founded in 1800, on the establishment of the seat of government at Washington. The Capitol and library having been burned in 1814 by the British army, Congress purchased ex-President Jefferson's collection of 7000 volumes as the basis of a new library, which was gradually increased until 1851, when it had reached 55,000 volumes, and was again nearly consumed by fire, only 20,000 volumes being saved. The collection has since grown with rapidly accelerating volume, until it now numbers over 280,000 books, besides 50,000 pamphlets. The valuable scientific library of the Smithsonian Institution was incorporated with the collection in 1866. The Library of Congress is rich in history, jurisprudence, political science, and

books relating to America, while no other department of letters has been neglected in its formation. It is the only American library receiving the benefit of the copyright law, through which it will in time come to possess an approximately complete representation of the entire product of the American press. The preservation in a national fire-proof repository of all the national literature, with a selection of the best literature of all other countries, is a boon which will be more and more appreciated by scholars with the advancing development of the country. Next to the Library of Congress in numerical extent stands the Public Library of Boston, founded in 1848, and now numbering 225,000 volumes, besides 60,000 more in its eleven branches or subsidiary libraries in the suburbs of that city. This is unquestionably the most widely useful collection of books in America, lending its volumes free of charge to all citizens. Its example has been widely followed in other cities and towns, not only in Massachusetts, but in the West, where Cincinnati and Chicago have each rapidly increasing free-lending libraries, supported, like that of Boston, by funds derived from municipal taxation.

The school-district library system, originated by New York in 1838, has been adopted by ten to twelve States, the books collected being paid for by a proportion of the school taxation fund of the respective States. The State libraries of the country are many of them collections of considerable extent and value. That of New York at Albany is the largest, numbering 95,000 volumes, and furnishing a model of a well-stored and liberally managed public library, free to all. In the other States, and in all of the Territories, libraries have been gathered at the seat of government, primarily for legislative uses, and consisting chiefly of documents, all of which are, however, open to public use and reference.

A class of subscription libraries which have had much success in America are the mercantile libraries, of which those of New York and Boston were founded in 1820, the Philadelphia Mercantile in 1821, the Cincinnati in 1835, and the San Francisco in 1853. Twenty-nine of these libraries were established from 1820 to 1870, inclusive. Of professional libraries, law, medical, theological, and scientific, there are many. The largest medical collection in the country is the library of the surgeon-general's office at Washington, numbering 37,000 volumes; next to which stands the library of the College of Surgeons, Philadelphia, with 18,000. Several of the historical societies, of which more than 160 have been organized in the U. S. since 1789, have valuable libraries, those of New York and Massachusetts being especially rich in early American books and pamphlets, and in manuscripts. Public libraries founded by individual bequest are becoming numerous. Some of the principal are the Astor and the Lenox Library at New York, the Watkinson Reference Library at Hartford, and the Peabody Institute Library at Baltimore.

By the census of 1870 there were reported 107,673 private libraries in the U. S., containing 25,500,000 volumes. The superintendent of the census expresses the opinion that this is far below the truth for the whole country, and adds that it is difficult to see what value attaches to an enumeration of private libraries which includes such ephemeral productions as school-books, public documents, Sunday-school literature, and pamphlets. By the same census the public libraries in the U. S., including in that designation every little collection down to parishes and Sunday schools, as well as the large libraries open to public reference, numbered 55,580 collections, aggregating about 20,000,000 volumes. According to the report of the bureau of education for 1874, the number of libraries in the U. S. which returned their statistics was 790, with an aggregate of 7,760,118 volumes. This enumeration, however, is properly confined to the libraries which can be fairly considered public or associated.

The following table exhibits all the libraries of the world known to contain 100,000 volumes or upwards at the latest dates:

City.	Library.	Volumes.
Athens.....	University.....	125,000
Augsburg.....	City.....	100,400
Bamberg.....	{ Royal.....	129,000
	{ and pamphlets.....	170,000
Bâle.....	Public.....	100,000
Berlin.....	Royal.....	700,000
".....	University.....	115,000
Bologna.....	University.....	200,000
Bonn.....	University.....	180,000
Bordeaux.....	City.....	125,000
Boston.....	{ Public.....	225,000
	{ Branches.....	60,000
".....	Athenaeum.....	108,000
Breslau.....	University.....	340,000
Brussels.....	Royal.....	250,000
Buda-Pesth.....	Public.....	200,000
".....	University.....	105,000
Cambridge, Eng.....	University.....	250,000

City.	Library.	Volumes.
Cambridge, Mass.	Harvard College	210,000
Carlsruhe	Grand ducal	110,000
Cassel	National	120,000
Christiania	University	200,000
Copenhagen	Royal	500,000
"	University	200,000
Cracow	University	110,000
Darmstadt	Grand ducal	380,000
Dresden	Royal Public	500,000
"	and pamphlets	400,000
Dublin	Trinity College	150,000
Edinburgh	Faculty of Advocates	300,000
"	University	130,000
Erlangen	University	110,000
Florence	National	200,000
Frankfort	City	150,000
Freiburg	University	230,000
Gießen	University	150,000
Glasgow	University	105,000
Gotha	Ducal	240,000
Göttingen	University	400,000
Hague	Royal	100,000
Halle	University	100,000
Hamburg	City	300,000
Hanover	Royal Public	170,000
Heidelberg	University	300,000
Helsingfors	University	140,000
Jena	University	180,000
Kiel	University	150,000
Königsberg	Royal and University	220,000
Leipsic	City	100,000
"	University	350,000
Lisbon	National	100,000
Liverpool	Public	100,000
London	British Museum	1,150,000
Lyons	City	120,000
Madrid	National	220,000
Manchester	Public	120,000
Marburg	University	120,000
Mentz	City	110,000
Mexico	National	100,000
Milan	Ambrosian	100,000
"	Brera	185,000
Modena	Esti.	100,000
Moscow	University	160,000
Munich	Royal	400,000
"	and pamphlets	400,000
"	University	280,000
Münster	Royal Paul	100,000
Naples	National	200,000
New Haven	Yale College	105,000
New York	Astor	150,000
"	Mercantile	160,000
Oxford	Bodleian	350,000
Padua	University	100,000
Paris	National	2,000,000
"	Arsenal	225,000
"	St. Geneviève	200,000
"	Sorbonne	110,000
"	Mazarin	160,000
"	Institute	100,000
Parma	Public	140,000
Prague	University	152,000
Rome	Vatican	105,000
"	Casanata	160,000
"	Angelica	100,000
Rouen	City	120,000
Rostock	University	140,000
St. Petersburg	Imperial	1,100,000
"	Academy of Sciences	130,000
Stockholm	Royal	125,000
Strasbourg	City	300,000
Stuttgart	Royal Public	180,000
Treves	City	100,000
Tübingen	University	220,000
Turin	University	150,000
Upsal	University	150,000
Venice	St. Mark's	120,000
Vienna	Imperial Public	400,000
"	University	210,000
Washington	Library of Congress	280,000
Weimar	Grand ducal	170,000
Wolfenbüttel	Brunswick Ducal	250,000
Würzburg	University	200,000
Zurich	City	100,000

The subject of library economy and management can here be touched on only in the briefest manner. Three points are of cardinal importance: library buildings, the classification of books, and the catalogue system. While most libraries are bestowed in dark and ill-ventilated buildings, there are some modern constructions which afford worthy repositories for the learning they contain. Every library building should be isolated and fireproof, with adequate room for expansion. The classification of every library by subject matters is indispensable to economy of time in the supply of books and information, and to the highest utility of the library. Yet many of the collections, including some of the largest in Europe and America, have no principle of arrangement other than the sizes of the volumes or the order of acquisition. The catalogue system most universally employed is the card catalogue in manuscript, by which a strict alphabetical arrangement is secured, and the accessions to the library can be kept constantly catalogued up to date. The printing of catalogues has been abandoned by most of the largest collections, in-

cluding the principal government libraries of Europe, as too expensive and laborious to be kept up without falling hopelessly into arrears. When it is considered how enormous is the production of printed matter, and that the principal libraries both in Europe and in the U. S. have doubled during the last twenty-five years, this deprivation to the public of the boon of printed catalogues of the largest collections is partially explained. Yet there is no library hitherto gathered, however large, which contains anything like a complete collection of the literature of all nations, or even of its own. Every national library should have for its object the collection and preservation, on the exhaustive system, of all that the country within which it is located produces. The use of a great library is not for one generation only, but its value is developed by passing into the hands of successive generations, and furnishing a complete record of the progress of letters from age to age.

The private libraries of a country, after they have served their purpose to the owners, continually tend to feed the public collections. A great capital like London, Paris, or New York constantly receives a flood of private libraries, which are poured into auctions or otherwise sold, and from them the vigilant collectors for our public libraries are always recruiting and enriching them.

The relation of libraries to popular education has come into prominence only within the last few years. If, as Carlyle remarks, "the true university of these days is a collection of books," and all education is to teach us how to read, the importance of cherishing and extending these aids to civilization can hardly be overrated. A good library is like a dictionary—not a mere mass of pages to be read through, but a vast repository of learning for the continual use and reference of all comers. That is the best library, and he is the most useful librarian, by whose aid every reader is enabled to put his finger on the fact he wants at the moment it is wanted. A. R. STODDARD.

**Libri Carrucci della Sommaia** (GUILLAUME BRUTUS ICIUS TIMOLÉON), COUNT, b. at Florence Jan. 2, 1803; studied mathematics, and was appointed professor at the University of Pisa, but being implicated in the political disturbances of 1830, fled to France, where he was naturalized in 1833; first ingratiated himself with Arago, and became professor at the Sorbonne; then with Guizot, and was made inspector-general of public instruction and public libraries; but in 1847 was accused of stealing large numbers of costly books from the libraries, and was condemned to ten years' imprisonment. He had fled to England, however, and returned afterwards to Florence, where he d. Sept. 28, 1860. His *Histoire des Sciences mathématiques Italiennes* (Paris, 1838-41) enjoys a great reputation, as do also his numerous annotated catalogues.

**Liburnia**, in ancient geography, a mountainous district of Illyricum extending along the coast of the Adriatic in the present Croatia and Dalmatia. Its inhabitants were famous as sailors, or rather as pirates, and from them the Romans adopted those small, fast-sailing vessels with the one large lateen sail which were known under the name of *naves Liburnæ*, or simply *Liburnæ*.

**Lib'ya**, the name which often was given by the ancients to the whole continent of Africa, but which was generally applied only to that part which is now called the Libyan Desert, extending from Egypt to Fezzan and from the Mediterranean to Darfoor, and consisting of vast stony terraces, sometimes covered with sand and gravel, and sometimes broken by oases, Scawah being the largest.

**Lib'yans, The**, occupied in ancient times the whole northern coast of Africa with the exception of the delta of the Nile, and according to Lepsius and other Egyptologists they probably at one time occupied this territory too, but were driven out by the Egyptians. They were a seafaring nation, and harassed the Egyptians with continuous invasions, until their power was checked in the sixteenth century B. C. by Thothmes III. In the fourteenth century B. C., when the Pelagians on the northern coasts of the Mediterranean had acquired some importance on the sea, the Lib'yans renewed their attacks on Egypt in connection with the Tyrrhenians and Achæans, and conquered Lower Egypt, but were entirely defeated by Rameses II. At the period when the Phœnicians founded Carthage, and the Greeks Cyrene, the Lib'yans seem to have become enfeebled. They were pressed back from the coast, and submitted completely to the Romans, and fell partly into barbarism. (With respect to their ethnographical and linguistic relations, see the articles BERBERS, MAN and HIS MIGRATIONS, and SEMITIC RACES AND LANGUAGES.)

**Libyan Sea, The**, in ancient geography, was that part of the Mediterranean which is situated between the island of Crete, the delta of the Nile, and the territory of Carthage, or Africa proper. *Syrtis Major* and *Syrtis Minor* were inlets of the Libyan Sea.



**Licata.** See **ALICATA**.

**License** [Lat. *licentia*] signifies primarily permission, and as used in law denotes a privilege, power, or authority granted by an individual or a public or private body to do a specified act or series of acts, to carry on a particular occupation, and the like. Thus, an oral permission given by a landowner to another person to pass over the land or to erect buildings or other structures upon it is a license. Trades of various kinds are frequently so regulated that the right to follow them depends upon statutory license, as, for instance, to sell liquors, to keep a tavern, to engage in hawking and peddling, etc. This variety of licenses will be considered under the topic **LICENSE LAWS** (which see). The subject of license has particular importance in law with reference to real property, and will be examined in this article wholly from this point of view. A license appertaining to land must be distinguished from an easement. An easement is a permanent, irrevocable interest in the land, which, in accordance with the requirements of the statute of frauds, can be strictly created only by a sealed instrument called a grant, or its equivalent, prescription. (See **EASEMENT**; **FRAUDS, STATUTE OF**; **PRESCRIPTION**.) An easement amounts in reality to an estate in the land, and is therefore not subject to defeasance by any act of the grantor, except when depending upon a condition. A license, on the other hand, is a mere privilege or authority to do a particular act or series of acts upon another's land, or upon one's own land in such a manner as to deprive an adjacent owner of certain rights which he possesses, as, *e. g.*, an easement of light. It is simply a permission of a temporary nature not capable of assignment, and valid though oral. It is true that licenses are sometimes given by instruments with or without seal, but they would be of the same validity and effect if granted orally. The question whether a particular transaction is a license or an easement depends upon its nature and the intent of the parties, and not merely upon the point whether there is a writing. Licenses are either express or implied. They are express when permission is given in definite and specific terms to do a particular act; implied, when from the fair interpretation of the dealings of the parties permission to enter upon the licensor's land or to do any act thereon may be presumed. Thus, if a purchase be made of goods which are upon the land of the vendor, the purchaser has an implied authority to enter during a reasonable time in order to remove them. The act of opening and keeping a place of business gives an implied license to any one to enter for the purpose of transacting such business as is usually carried on there. Thus, railway stations are kept for public accommodation, and may be freely entered by any one who desires to become a passenger. So an entry into the house of a friend or neighbor for the purpose of paying him a visit is allowable, because the relations of intimacy between the parties afford ground for a natural inference that no objection would be made. On similar grounds, public officers, by a mere rule of law, sometimes called an implied license, are justified in entering upon any person's land to execute, when necessary, legal process. There is no implied license, however, for an officer to enter a man's dwelling-house in the service or execution of civil process, unless he finds it open. There is a maxim of law that "every man's house is his castle," and accordingly it can be only broken open by the peace-officer when the process is criminal, and when entrance has been demanded and refused. (See **EXECUTION, FIERI FACIAS**.) In this class of cases the officers may enter even against the will of the owner and in disregard of his express prohibition or remonstrance.

Licenses are further distinguished as executory and executed. This distinction is of considerable importance, as affecting the question whether a license is revocable by the grantor. Licenses are said to be executory when the privilege given is yet to be exercised; executed, when it has already been exercised, either in whole or in part. It is a general principle in courts of law, as distinguished from courts of equity, that all licenses, whether executed or executory, are revocable at the pleasure of the grantor, provided they are not coupled with any interest in property. But when the license is coupled with the grant of an interest, or where an interest exists whose value, continuance, and enjoyment depend upon the license, there is, in general, no power of revocation. Hence, the right of a purchaser of personal chattels to enter upon the premises of the vendor within a reasonable time, and remove the articles to which he has acquired a right by the sale, is irrevocable by the vendor. Permission to fell and carry away standing timber upon the land of the licensor will give an irrevocable right to remove the timber after it has been cut, unless there be unreasonable delay in making the removal. But until the trees are felled, the privilege, if it does not amount to an easement, can be withdrawn, for not until that time is any right of ownership in the timber acquired.

In like manner, a license to a person to kill game for his own use upon the licensor's land will give him an irrevocable right to carry away the game which has actually been killed. But where there is no proprietary interest connected with the license, it is, if executory, revocable at any time. For instance, a license to hunt in a man's park, or to fish in his waters, or to pass through his land gives the licensee no permanent interest, but merely a privilege whose continuance depends entirely upon the will of the landowner. It is thus seen that no mere license can create or transfer an indefeasible interest in real property. A license is, in reality, in the nature of a power, and is governed by the same general rule as powers, that they are essentially revocable at the will of the person who creates them. (See **POWERS**.) The same principle, qualified by previous statements, prevails in regard to executed licenses, except in courts of equity. There is, however, a distinction necessary to be taken between such executed licenses as are and such as are not attended with expenditure. Licenses of the latter class are revocable at any time, both at law and in equity. A license to deposit property—*e. g.* coal—upon a man's land is of this nature. But where expense has been incurred in carrying into effect the authority given by the license, courts of equity in some of the States adopt different principles from those prevailing in courts of law. At law, it is held that though the licensee may have sustained expense, and may be subjected to necessary loss and injury, the authority may nevertheless be revoked at pleasure by the licensor. If, for instance, the licensee were to construct a drain across the licensor's land to carry off waste water from the premises of the licensee, the privilege might be withdrawn at any time, even though the drain may have been in use. So if a house be erected upon another's land by license, the right to occupy or use it may be revoked whenever the licensor may desire. The right of revocation is sustained at law in these and similar cases because a contrary rule would be virtually in contravention of the statute of frauds, since an indefeasible interest in land would be created without the use of writing. But in equity there is not such strict adherence to the provisions of the statute of frauds as at law, and they are sometimes disregarded when to observe them would be likely rather to encourage or promote fraud than to prevent it, or would operate as a denial of substantial justice between the parties. Therefore, it is held in some States in courts of equity, or in courts having equitable powers, that where expense has been incurred by the licensee on the faith of the license, so that he would sustain loss if it were revoked, no power of revocation remains, and he acquires an absolute right to the continued enjoyment of the license and a permanent interest in the licensor's land. In some cases the delivery of a deed or writing has been required in order to confirm the licensee's right. This equitable practice proceeds upon the doctrine of equitable estoppel, the view being taken that the licensee should not be deprived of the benefit of the expenditure which he was encouraged to make by the very party who seeks to render it fruitless. (See **ESTOPPEL**.) Equity treats the license thus executed as a contract giving absolute rights. The courts of Pennsylvania have perhaps gone farthest in maintaining this doctrine. But the same general principle is sustained by decisions in England and a number of the States of this country. An executed license, on this view, becomes equivalent to an executed oral contract for an easement, which is treated as though it were a grant under seal in equity when the parties cannot be restored to their original position. An executed license is irrevocable, both at law and in equity, when by force of it some act is done upon the licensee's own land the effect of which is to impair or destroy an easement appurtenant to the licensor's property. If, for instance, a landowner has an easement of light over the premises of another, and gives permission to the latter to erect a wall or a dwelling in such proximity to his land as to darken his buildings or entirely cut off the light, he cannot countermand the license after it has been carried into effect. The licensor when executed operates as an abandonment of the licensee's right to the light, and this is sufficient to extinguish an easement. This reasoning would not apply to a license executory in its nature.

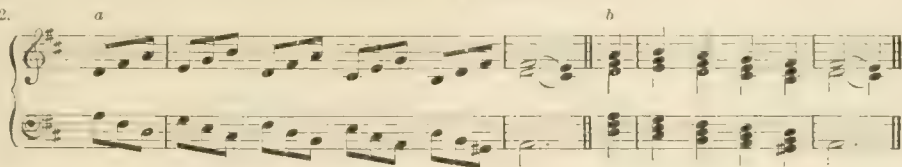
A license is a full justification for acts done carefully and prudently in pursuance of the authority given, and relieves the licensee from all liability for such acts, and for the consequences which may subsequently result from their performance. The rule is sometimes expressed briefly in this way—that a license excuses all trespasses committed under it until it is properly revoked. But for the consequences of negligence or unskillfulness in the performance of the act permitted, the licensee will not be relieved. There is a legal obligation resting upon every man to exercise, in respect to the rights of others, a reasonable degree of care and caution in what he does, and from this duty the license will afford no exemption. A license is in general a privi-

lege of a personal nature. The death of either party operates as a revocation of it. So, if the licensor conveys to another the premises to which the license appertains, it is extinguished without any express act of revocation. These rules, however, apply to mere licenses, and do not extend to licenses coupled with an interest. A license is sometimes granted upon the payment of a consideration. If it be revoked, there will be a failure of consideration, and the licensee can recover back the money paid. For example, the sale of a ticket to witness a theatrical performance or other similar entertainment is in general but a license to the purchaser to enter the building and be one of the spectators. But the license may be revoked before the performance is concluded and the purchaser required to leave the premises. He will in such a case have a claim against the proprietor of the theatre or other place of entertainment for full reimbursement, or for the recovery of a proportional amount of the sum he has paid, as the case may be. (See the leading case of *Wood v. Leadbitter*, 13 Meeson & Welsby's Reports, 838.)

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**License** [Lat. *licere*, to "be permitted"]. The technical sense of this word in music is a liberty knowingly taken in violation of some recognized rule of harmony. Licenses are not unfrequently found even in the compositions of the best masters, and are therefore not to be considered as results of ignorance or heedlessness. They differ also from the mistakes often made by inexperienced composers, by being knowingly written and carefully con-

Ex. 2.



By a judicious distribution of the parts or voices the ill effects more or less inherent in licenses may be softened or concealed, but the use of them is always hazardous, except in the hand of a master.

WILLIAM STANTON.

**License** (in legal pleading). When the defendant to an action relies upon a license given to him by the plaintiff, as justifying or excusing either in whole or in part the act complained of, it is the practice at common law for him to answer the declaration of the plaintiff by a special form of plea or answer, which is technically termed a plea of "license" or of "leave and license." (See DECLARATION, PLEADING.) This form of plea is most commonly employed in actions for trespass upon land, but may be also resorted to in actions for trespass to personal property, or in actions of covenant or of detinue, or in actions upon the case. (See TRESPASS, COVENANT, DETINUE, CASE, ACTION.) Every variety of valid license derived from the plaintiff, whether it be general or particular, express or implied, will support a plea of license on the part of the defendant. Thus, the permission or authority obtained from the plaintiff may have related to the entire act committed, or only to some one or more of a series of acts; it may have been given in definite, specific terms, or it may have been rightfully presumed by reason of particular acts of the plaintiff, his general conduct, or his management and disposition of his property. (Illustrations of these various kinds of licenses have already been given under the topic LICENSE.) The plea should justify only to the extent of the license claimed, and so far as it is capable of being established by proof. It is a general rule that a license must be specially pleaded, and cannot be given in evidence under the general issue. (See GENERAL ISSUE.) This is invariably true of all forms of action except actions upon the case. In these, however, a license need not be pleaded, but it is the practice to admit it in evidence. A plea of license in an action of covenant is not sustainable if the license claimed is by parol, unless it be provided for by the terms of the deed. A parol discharge is in general inoperative against a deed. In those States where common-law pleading has been abolished a license may still be pleaded in justification, but there is no particular form of plea or answer designated by this specific name.

GEORGE CHASE. REVISED BY T. W. DWIGHT.

**License Laws.** These are statutes passed in the various States regulating the pursuit of a particular calling or business. It is common in this way to govern the sale of ardent spirits by innkeepers or retail dealers, or the sale of goods at auction or by peddlers, etc. The laws of the respective States are so varied upon this subject that few general principles can be extracted. Statutes of this kind rest largely upon rules of public policy prevailing in the State which adopts them, and fluctuate with the

changes of feeling continually occurring in society as to the best mode of regulating subjects having in them, when unregulated, an element of danger to social interests. Efforts have frequently been made in the courts to attack these laws on constitutional grounds, as depriving a person who is required to obtain a license of his liberty or property. Such a doctrine is untenable. These laws must be regarded as an exercise of police power inherent in the States, and not withdrawn by the provisions of the U. S. Constitution. They simply direct how a trade shall be conducted in articles intimately connected with the public morals or public safety. The business might be altogether suppressed if the public good required it. It cannot be claimed that such a license is a contract, but it is merely a temporary permission to do what would otherwise be an offence against the general law. Accordingly, if a legislature has granted a license to sell liquors for a particular time, it may before the expiration of that time modify or revoke it if it see fit. This topic is well discussed in the case of the *Metropolitan Board v. Bacon*, 31 New York Reports, 657 (1866). Congress in the course of its legislation concerning the internal revenue has purported to grant a license to carry on a business coming within the police power of the States. Though called a license, such a provision is in substance a tax, and the prohibition under penalties against carrying on the business without license is only a mode of enforcing the payment of such a tax. (See *License Tax Cases*, 5 Wallace Reports, 162, 175.) Such a Congressional "license" does not prevent the State legislature, in the exercise of its "police power," from suppressing the traffic altogether, even though the "license" under the U. S. law was granted on the payment of a fee. All that such a license means is, that while the business is allowed by the State law to be carried on a fee in the nature of a tax must be paid to the U. S. The legislation of the State and of Congress is thus altogether consistent. (See the case of *McGuire v. Commonwealth*, 4 Wallace Reports, 387.) The license laws of the States may, however, come in conflict with the U. S. Constitution, as, for example, where a discrimination is made by a State in favor of the sale of its own products or of one made by its own citizens, adverse to one made by the citizens of another State or of its products. Such a law may conflict with the power of Congress "to regulate commerce among the States," as well as with the constitutional provision that the "citizens of each State shall be entitled to all privileges and immunities of citizens in the several States." A corporation existing in another State cannot be regarded as a "citizen" within this rule, and a State, so long as it does not interfere with the power of Congress to regulate commerce, etc., may discriminate against the act of a non-resident corporation. (See PRIVILEGES AND IMMUNITIES.)

T. W. DWIGHT.



**License to Trade.** In international law this license denotes a permission given by a belligerent government through its agent, such as a commander of a squadron, to trade with the enemy. It may be given to a neutral trader or to a fellow-subject; and it generally specifies the kind of articles to be conveyed to the enemy, the port, the time, perhaps the amount. It may allow of importation, and not of exportation. Being a permission to do something otherwise forbidden, it is of strict interpretation, so that to go beyond its specifications would subject the vessel and cargo to heavy penalties, unless the violation could be shown to be unavoidable. Of course, the enemy is not bound to receive such a licensed vessel into his ports. T. D. WOOLSEY.

**Lichen** (Gr. *λεχην*), a skin disease, characterized by an inflammation producing groups of small elevated persistent spots, containing no serum or pus, and terminating by desquamation. It is common among scrofulous persons, and is rarely caused by external irritation. More often its cause is quite unknown. It may be circumscribed or general, chronic or short-lived. Acute cases are sometimes accompanied by fever and intense itching. If general and long continued, the patient may die of the long and unceasing irritation. Arsenic, alkaline, tarry, and sulphurous washes are often useful. Arsenic has a favorable effect upon some cases. But many of the severer examples of lichen will yield to no treatment. Happily, the disease is not very common. The term *lichen* is vaguely used. Some varieties have been described which appear to be allied to purpura, there being bloody exudations beneath the skin. *Lichen circumscriptus* is caused by a parasitic plant-growth which can be readily destroyed.

**Lichenine** (Gr. *λεχην*, "lichen"), or **Moss-Starch** (Ger. *Mossstärke*), a substance contained in the cryptogams called lichens, constituting in some cases, as in that of the so called Iceland moss, reindeer moss, *tripe de roche*, etc., nearly the whole mass. Many other lichens contain similar mucilaginous bodies. Lichenine may be obtained pure from Iceland moss by long soaking first in cold water, renewed until it remains tasteless, which removes a bitter principle and saline substances. Addition of a little carbonate of soda to the first water is useful. Some chemists treat also with ether and alcohol. The washed mass may then be dissolved in boiling water, strained and evaporated to a hard, brittle, tasteless mass, which swells in cold water without dissolving, but forms a jelly with boiling water familiar in all households. Like other starch-isomeres, it is converted into a gummy or dextrine-like body by long boiling with water. Glucose is formed by dilute acids, as in the case of common starch, and strong nitric acid forms with it oxalic acid. Iodine does not blue lichenine when pure, as it does common starch, but forms merely a yellow stain, as with cellulose. Lichenine does not occur in the plant in the cellular or granular form, like common starch; and some investigators have advanced the idea that it is properly not to be classed with starch, but is *cellulose* in a soluble modification. It is stated of late years that strong alcoholic liquors are prepared on a large scale in extreme Northern regions from these lichens—an art not difficult to comprehend or to carry out. H. WURTZ.

**Lichens** (Gr. *λεχην*) are cellular cryptogamous plants, bearing fruit (*apothecia*) containing free spores in closed sacs (*thekes*), upon a thallus containing green cells (*gonidia*), and often abounding in crystals of oxalate of lime. They rank between *Algae* and *Fungi*, differing from the former in the fruit character, and from the thecasporous groups of the latter (*Ascomycetes*), in the presence of gonidia, and in a great degree in chemical reactions, the hymenium of Lichens being usually colored blue or vinous-red by iodine, but those of *Fungi* yellow, though there are some exceptions in both classes. The thallus is, however, sometimes obscure, and in certain parasitic Lichens wanting. A theory, based partly on the alleged absence of connection between the medullary filaments of the thallus and the gonidia, has recently been maintained by Schwendener and others, that Lichens are compound plants, the thallus being an *Alga* and the apothecia *Fungi*, whose mycelium draws nourishment from the gonidia. But it has not found favor with lichenists.

Lichens are found in all climates and at all elevations, mostly preferring exposure to light. They grow on rocks, by their decay forming a soil for higher vegetation; on trees, and on the earth, the individuals being more numerous in the colder, and the species in the warmer, regions of the earth. Some are so small as hardly to be perceptible to the eye, and others attain dimensions of several feet. They remain inactive while dry, and vegetate when moist, and sometimes reach a great age. In the northern regions they furnish food for reindeer, are stored as fodder for cattle, and are said to increase the quantity of milk. Bread is also made of some species, and species of *Umbilicaria*

(*rock-tripe*) have furnished an unpalatable food for Arctic travellers in time of need. They yield bitter extracts, but are not poisonous. Many species, especially the orchil (*Rocella*), furnish coloring-matters, and have been extensively used in dyeing; and recently alcohol has been manufactured from them on an extensive scale in Sweden. Some species have had considerable repute as remedies, but their medicinal virtues are slight. The thallus is fruticulous, foliaceous, squamaceous, or crustaceous, and diversified in color. The gonidia often burst into mealy or powdery excrescences (*gonidia*), and by their distribution, as well as by the spores, the plants are propagated. The thallus consists, in the best developed forms, (1) of an external cortical layer, subject often to modifications which render it indistinct; (2) of a gonidial layer; (3) of a medullary layer, composed of more or less compact filaments of a cottony or rarely (*Usnea*) of a woolly texture.

In foliaceous species it is often beset beneath by fibrils, by which it is attached to the substratum, and is there sometimes veined (*Peltigera*) or pitted and cyphellate (*Sticta*); and in crustaceous species often rests on a filamentary tissue (*hypothallus*). The cortical layer is especially modified, and the medullary filaments become lax or indistinct in *Collema* and allied genera. The gonidia lie near the upper surface or encircle the medulla, or are sometimes scattered throughout the tissue, and are either (1) true gonidia, of a yellowish-green color, or (2) collogonia (*Tuckerm.*, *granula gonima*, *Avet.*), which are bluish-green, imbedded in a colloid envelope, and often disposed in necklace-like chains. Collogonia occur chiefly in the *Collema* and *Pannaria*, but are also found in other genera (*Sticta*, etc.). The application of hydrate of potash and chloride of lime to the thallus produces changes of color which have been made the basis of specific distinctions; but their value is

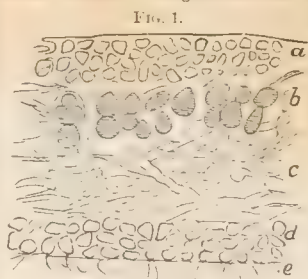


FIG. 1.  
Section of thallus: a, cortical layer; b, gonidia; c, medullary layer; d, inferior layer; e, hypothalline fibres.



FIG. 2.  
Section of angiocarpous apothecium: a, thekes; b, paraphyses; c, hypothecium. Collogonia occur chiefly in the *Collema* and *Pannaria*, but are also found in other genera (*Sticta*, etc.). The application of hydrate of potash and chloride of lime to the thallus produces changes of color which have been made the basis of specific distinctions; but their value is

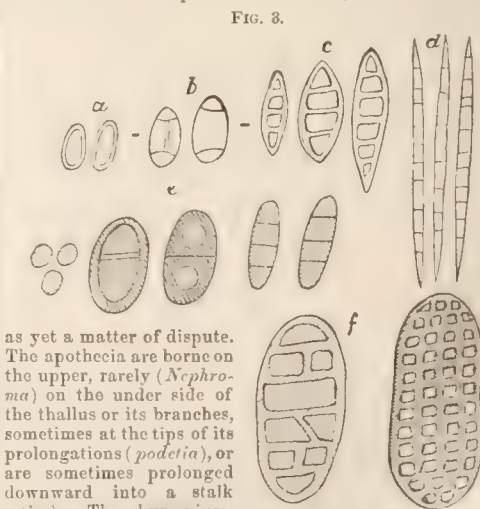
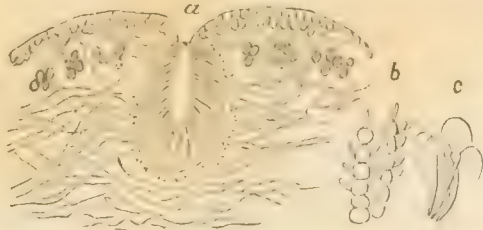


FIG. 3.  
as yet a matter of dispute. The apothecia are borne on the upper, rarely (*Nephroma*) on the under side of the thallus or its branches, sometimes at the tips of its prolongations (*podetia*), or are sometimes prolonged downward into a stalk (*stipe*). The hymenium, which contains the thekes, rests upon a tissue (*hypothecium*) representing the proper exciple, and is composed of filaments (*paraphyses*) imbedded in a colloid substance (*hymenial gelatine*). The spores are expelled from the thekes by the pressure caused by the swelling of the hymenial tissue when wetted. They vary from one to an

indefinite number in the thecae, but the usual number is eight. In form they are globular, ellipsoid, or elongated, and are either simple or divided by dissepiments (2 to plurilocular), or when these are in both the transverse and perpendicular directions, are muriform; and are either colorless or brown, the elongated spore tending to the colorless, and

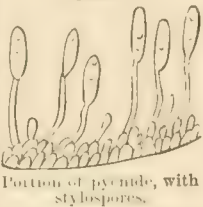
FIG. 4.



a, section of spermatogone; b, jointed, and c, simple sterigmas, with spermatia.

the distended one to the colored type. But the typically colored spore is sometimes decolorate. In size the spores vary from 0.001 to 0.18, or even 0.3 millimetre in length. In germinating they give off extended filaments, forming a confused tissue, but no attempt at producing a perfect lichen from the spores has been successful. Spermatogones are small, usually black bodies, scattered over the thallus, containing minute ellipsoid or elongated organs (spermatia) on simple or branched filaments (sterigmas). They have been supposed to be male reproductive organs, but nothing is certainly known on this point.

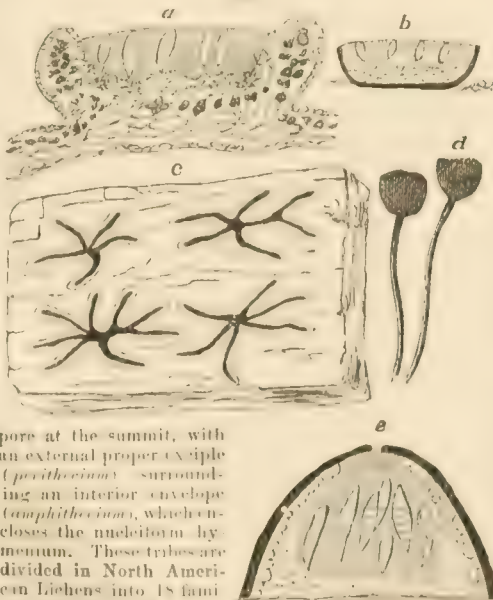
FIG. 5.



Pycnides are similar to spermatogones, but of less frequent occurrence, containing organs (stylisporae) on simple filaments; their function is unknown.

Lichens are divided according to the characters of the apothecia into two series: (1) open (gymnocarpous), and (2) closed (angiocarpous); and five tribes—viz. 1, PARMELIACEI: apoth. open, margined by a thalline exciple (scutelliform); 2, LECIDACEI: apoth. open, margined by a proper exciple (patelliform); 3, GRAPHIDACEI: apoth. with a proper exciple, elongated (lincliform); 4, CALICIACEI: apoth. goblet-shaped (crateriform), with a proper exciple margined by a disk compacted of naked spores; and 5, VERRUCARIACEI: apoth. closed, opening only by a

FIG. 6.



Branches of lichen: a, Parmeliacei; b, Lecidacei; c, Graphidacei; d, Caliciacei; e, Verrucariacei.

pore at the summit, with an external proper exciple (perithecium) surrounding an interior envelope (amphithecium), which encloses the nucleiform hymenium. These tribes are divided in North American lichens into 18 families and about 75 genera, containing, according to the present state of knowledge, about 800 species; the whole number of known lichens being from 1500 to 1800. The systematic arrangement above given is that of Fries (1831), as de-

veloped by Prof. Tuckerman in his *Genera Lichenum* (1878). The system of Koerber (1880) is based upon the characters of the thallus (fruticose, foliaceous, or crustaceous), and that of Nylander (*Synopsis*, 1880) is eclectic, taking all parts into consideration. Lichens were confounded by the ancients with other cryptogams, and the name was originally applied to certain Hepaticae. They were first accurately distinguished by Tournefort (1694), further described and figured by Micheli (1729, 1730, 1741), and Hoffman (1790). At the time of Linnaeus about 185 species were known. Acharius, "the father of lichenography," published his *Methodus*, based on thalline characters, in 1803, and described all then known lichens (about 900 species) in the *Lichenographia Universalis* (1810), and *Synopsis* (1814). Other works down to the modern period are Schærer, *Spicilegium Lich. Helvet.* (1823-46); Eschweiler, *Systema* (1824); E. Fries's excellent *Lichenographia Europaea* (1831); Fée, *Essai et Suppl.*, figuring accurately the spores (1824-37); Tuckerman, *Synopsis of New England Lichens* (1848), continued in the *Am. Jour. Sci.* (1858-59). Catalogues of North American lichens have been published by Muhlenberg (*Catalogus Plantarum*, Lancaster, Pa., 1815), by Halsey (*Synoptical View of the Lichens of New York*, printed in the *Annals of the N. Y. Lyceum of Natural History*, 1823), and by Torrey and others. The spores had been noticed by Micheli, and genera were based upon them by Eschweiler, Fée, and Flotow; but in 1846 a new impulse was given to the study by the publication of the *Frammenti* of De Notaris, who was followed by many able investigators, the exponents and representatives of modern lichenology. The most important works of this period are Massalongo, *Ricerche*; Norman, *Conatus*; and Tulasne, *Mémoire*, all published in 1862; Koerber, *Systema* and *Parergon* (1864-65). But these microscopical studies tended to an extreme—to the making the most of all differences whatever in spore-history—and led to the construction of very many imperfectly distinguished genera. Anzi, *Catal. Lich. Sondr.* (1869), and other works, indicated in a marked way a reaction from this, influenced largely by the earlier writings of Nylander, and the turn became still more marked in Th. Fries, *Genera Heterolecanium Europaea* (1861), and Stitzenberger, *Beitrag* (1862). But the whole question of the value of these spore-differences was first considered by Prof. Tuckerman (*Introduct. to Lichens of Calif.*, etc., 1866); and the reasoning of this paper is perhaps not far from conclusive against the new genera of the Italian and German schools, and tends thus to restore the system to the place as indicated for it by Fries, and maintained to a very great degree in all the writings of Nylander. According to Tuckerman, all the spore-differences are to be regarded as gradual modifications of but two distinct types, complemented in the highest tribe only by what appears an intermediate one (the polar-bilocular); and he disallows any but subordinate value to the distinctions based on the number of spores in the thecae, much insisted on by all other recent writers. Nor should it be omitted that, according to this writer, there is much looking to show that "the ultimate or highest condition of a type of spore being assumed to include potentially all the steps of the preceding process of evolution, such ultimate state may be expected to afford, in its total history, an index to the spore-modification possible within the whole circuit of the natural group or genus to which the species furnishing the ultimate condition belongs." (Gen. p. 15.) Montagne, in his descriptions of the lichens of Cuba, Guiana, etc. (1838-55), was the first who conjoined spore-characters with the Friesian system. Th. Fries, *Lichenes Arctici* (1860), *Lichenographia Scandinavica* (vol. i., 1871); Nylander, *Nomencl. Classification* (1874); *Prod. Lich. Gallia* (1867); *Enum. generum* (1868); 1318 species; *Synopsis Lichenum* (1860, vol. i., all published); *Lichenes Scandinavici* (1861). The same writer has contributed more largely than any other living botanist to the general knowledge of lichens in publications too numerous to cite here. Lindeby, *Spermatogones and Pycnides*, in *Lich. Thorsii* (1879-80); Schwendner, *Untersuchungen über die Lichens* (1880-81); *Algotypen der Lichens* (1882); Bonati, *Ricerche sulle Lichens* (1883); Hepp, *Fauna Fungorum Fenn.*, and *Alphidionum* (1884); Rabenhorst, *Lichenes Europaei*, fasc. 188-191; Tuckerman, *Obs. Lichologicae in Proc. Amer. Acad.* (1869-71), *Lichens of California* (1866), *Genera Lichenum* (1878), which last may be recommended to the student as the most instructive contribution recent times to our philosophical knowledge of systematic lichenology. For a fuller account of American lichenography to 1880, see paper in *Proceedings Inst.* (1869), and for the history and literature of the whole subject, Kriempelhuber, *Geschichte und Literatur der Lichenalogie*, from the earliest times to 1870 (3 vols., Munich, 1867-72).















# For Reference

Not to be taken from this room



UC SOUTHERN REGIONAL LIBRARY FACILITY



D 000 381 470 4



